International Workshop on Sustainability Education:
“Mobilizing Science and Technology towards Sustainability”

Date  ➤  13th February, 2007 [Tue]
Venue ➤ Osaka University Nakanoshima Center 10F

http://www.riss.osaka-u.ac.jp

Organized by
Osaka University Research Institute for Sustainability Science (RISS)
Integrated Research System for Sustainability Science (IR3S)

Supported by
Special Coordination Funds for Promoting Science and Technology of the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan
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Program

Opening Remarks
13:30 – 13:50  Prof. Tatsuyoshi Saijo, Osaka University, Japan

PART1: The role of S&T in the quest for Sustainability
13:50 – 14:30  Sustainability, Science and Education – The Need for New Paradigms
                  Prof. Pim Martens, Director, International Centre for Integrated Assessment and Sustainable Development (ICIS), Maastricht University, Netherlands
14:30 – 15:10  Building Capacity of Science and Technology to Promote Sustainable Development
                  Prof. Peijun Shi, College of Resources Science and Technology, Vice President, Beijing Normal University, China
15:10 – 15:30  Coffee break

PART2: Higher Education for Sustainable Development
15:30 – 16:10  Education’s Contributions to Attaining the Millennium Development Goals
                  Prof. Rosalyn McKeown, Director, Center for Geography and Environmental Education, University of Tennessee, USA
16:10 – 16:50  Teaching Sustainability: Challenges and Opportunities for Japanese Universities
                  Prof. Takashi Mino, University of Tokyo, Japan
16:50 – 17:50  Round table Discussion:
              Capacity Building towards Sustainability in Asia:
              Designing a University Network
                  Moderator: Prof. Tomo Suzuki, University of Oxford, UK

Closing Remarks
17:50 – 18:00  Prof. Takashi Mino, University of Tokyo, Japan
Sustainability, Science and Education: The Need for New Paradigms

Prof. dr. Pim Martens

Abstract:

It is clear that in making the concept of sustainable development concrete, one has to take into account a number of practical elements and obstacles. There is little doubt that integrated approaches are needed to support sustainable development. Therefore, a new research paradigm is needed that is better able to reflect the complexity and the multidimensional character of sustainable development. The new paradigm, referred to as sustainability science, must be able to encompass different magnitudes of scales (of time, space and function), multiple balances (dynamics), multiple actors (interests) and multiple failures (systemic faults).

The basic qualities that future sustainability scientists will need are: analytical insight, problem-solving qualities and good skills in both verbal and written presentation. No less important is knowledge of the diversity of instruments provided by the various disciplines involved, ranging from mathematics to history, from health sciences to economics. The range of skills needed is so wide that it can only be acquired through interdisciplinary study.

Today’s students will be the business leaders, scientific researchers, politicians, artists and citizens of tomorrow. The extent to which they will be prepared to take decisions in favour of a sustainable future depends on the awareness, the knowledge, expertise and values they have acquired during their studies and in the subsequent years. For this reason, the concepts and themes of sustainability should be integrated into all levels of educational programming. Curricula must be revised so that sustainable development forms a guiding principle throughout the entire period of their studies – and afterwards too. New teaching methods must accompany this ‘learning for sustainable development’.
Starting point

It would be naive to assume that the problems facing mankind can be solved using techniques that worked, or appear to have worked, in the past.

Gorbatsjov, 1988
MISSION ICIS

Stimulating integration in sustainable thinking and acting on different social levels by research, education and policy.

Motivated by the belief that science and education are able to greatly contribute to the sustainability of life on Earth, ICIS continues to respond to the particular challenges of sustainable development.

What is sustainable development?

Emerged from the collective aspirations of the world’s people for:

➢ Peace
➢ Freedom
➢ Improved living conditions
➢ Healthy environment
**What is sustainable development?**

**Most frequently quoted:**
(Brundtland Commission (1987))

'Sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs.'

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**Characteristics of Sustainable Development**

- Intergenerational
- Level of scale

![Diagram showing time and place dimensions of sustainable development](image)
Characteristics of Sustainable Development

- Multiple domains
- Resilience
- Efficiency

Characteristics of Sustainable Development

- Multiple interpretation
Symptoms non-sustainable development

- Agriculture:
  mad cow disease, foot-and-mouth disease

- Water sector:
  flooding, droughts
  problems related to water quality

- Traffic and transport systems:
  Air pollution, traffic jams

Symptoms non-sustainable development

- Health:
  SARS
  malaria
  obesity
  AIDS
  tuberculosis
  malnutrition
Sustainable Development in Science, Education and Policy

Breaking down the barriers

- Scientific barriers
- Sectoral barriers
- Geographical barriers
- Communicative barriers

The complexity of sustainable development

- Multiple dimensions
- Complexity
- New paradigm
- Sustainability Science
Sustainability Science

A new research paradigm

Mode-1 science
Academic
 Mono-disciplinary
 Technocratic
  Certain
  Predictive

Mode-2 science
Academic and social
 Trans- and interdisciplinary
 Participative
 Uncertain
 Exploratory

Sustainability Science

New methods and techniques

Mode-1 science
Academic
 Mono-disciplinary
 Technocratic
  Certain
  Predictive

Mode-2 science
Academic and social
 Trans- and interdisciplinary
 Participative
 Uncertain
 Exploratory
Integrated Assessment: Philosophy

Integrated Assessment is an interdisciplinary process of structuring knowledge elements from various scientific disciplines in such a manner that all relevant aspects of a societal problem are considered in their mutual coherence for the benefit of decision-making.

Sustainability Science

Integrated Assessment

- Analytical methods
  (e.g. Integrated Assessment models, scenarios)

- Participatory methods
  (e.g. dialogue, mutual learning)

- Policy methods
  (e.g. transition management)
**Challenges**

- To carry out integrative studies on complex sustainability issues
- To improve existing methods and processes for Integrated Assessment and to develop new techniques and approaches
- To apply scientific knowledge and methods in actual strategic decision making in order to improve the quality of societal decisions
- To support conscious-raising processes on complexity and to share integrated insights

**Sustainable development: Bridging paradigms**
Sustainable education

'Education - in all its forms and all its levels - is not only an end in itself but is also one of the most powerful instruments we have for bringing about the changes required to achieve sustainable development'

Koïchiro Matsuura, Director-General UNESCO
PROBLEM-BASED LEARNING
as an
EDUCATIONAL STRATEGY
for
PROFESSIONAL EDUCATION

What are we looking for?

A scientific/academic approach to
education in which an optimal learning
environment is created, which is based
on rationality, theory and evidence
What do we need to learn?

From static to **dynamic**
Integration of technology

---

Characteristics of PBL

- Student-centered
- Curriculum structured around thematic courses
- Multi- and interdisciplinary
- Learning is problem driven
- Learning oriented work in small tutorial groups
- Emphasis on self-directed learning
**Process of PBL**

- Problem
  - description of phenomena
  - prepared by a team of teachers
  - directs learning activities

- Small group discussion
  - what do we already know about the problem?
  - what do we still need to know about the problem?
  - use a specific problem-solving technique: the 7-Jump

- Exchange of information
  - did we acquire a better understanding of the processes involved in the problem?

- Self study
  - various learning resources
  - integration of knowledge from different disciplines

---

**Why problem-based learning?**

- Intrinsic motivation
- Active construction of knowledge
- Simulation of a professional context
- Development of applicable knowledge and skills
- Cooperative learning
- Independent learning
- Preparation for lifelong learning
- Et cetera
ICIS and education

Bachelor programme
University College Maastricht (UCM)
Courses Introduction to Sustainable Development; Globalisation, Environment and Society; Hands on Sustainability

Master programme
Maastricht Graduate School of Governance
ICIS teaches the master on Sustainable Development.
Cape Coast University, Ghana
Together with MUNDO, IVM (Free University Amsterdam), and the Centre for Development Studies (CDS, Ghana), ICIS develops a MA programme 'Governance and Sustainable Development' at Cape Coast University, Ghana.

Internships
Various internships are offered by ICIS, where students can participate in one of the ongoing projects within ICIS

PhD programme 'Sustainability Science & Practice'
ICIS provides education and training of PhD students (founded through e.g. through the SENSE, NPT and the EU Marie-Curie Programmes.

Principles underlying the Maastricht curriculum

- Active and self-directed learning
- Strong link between theory and practice
- Thematic/multidisciplinary approach
- Assessment is integrated part of the curriculum
- Scientific training is emphasized
- Information and communication technology as educational tool
Sustainable Development
Science, education, business and policy-making

Level of integration

integrated, proactive, long-term, innovation and sustainability

multifunctional, mid- and long-term, cost-effective, optimalisation

functional, reactive, ad hoc, effect oriented, short-term

Our world is Changing

Ergo: we need new scientific and teaching paradigms

Level of scale (temporal and spatial)
Building Capacity of Science and Technology to Promote Sustainable Development

Peijun Shi, Qingxu Huang

1. Brief Introduction to Sustainable Development Science in China

In 2002, Ministry of Science and Technology of China enacted the Program of Sustainable Development Science (2001-2010). Then, in 2006, the State Council of People's Republic of China enacted the Program of National Medium-term and Long-term Science and Technology Development Plan (2006-2020), which stated that the sustainable development in China would face lots of severe challenges in the next 10 years. Not only accumulated issues in those fields like population, resource and environment, but also the new issues accompanied with development need to be handled. The essential role of scientists should be promoting the better use of S&T to support our country's sustainable development. According to the in situ socioeconomic situation and the aim of strategy for sustainable development in China, scientists and researchers should mainly focus on promoting people's living standard and individual quality, exploiting and using resources reasonably, conserving ecological environment and boosting the development of related industries, which will be of tremendous help for harmonious development. Therefore twelve key research domains of China are selected: 1) Population control; 2) Health care and major diseases prevention; 3) Food security; 4) Water resource security; 5) Oil & Gas security; 6) Strategic mineral resources security; 7) Ocean monitoring and resource exploitation; 8) Clean energy and renewable energy; 9) Environmental pollution control and integrated ecology management; 10) Disaster reduction and prevention; 11) City and town development; 12) Global environmental issues. Researches on frontier issues in those domains must be implemented, including earth system process; resource, environment and disaster; scientific issues in agricultural sustainable development; mechanisms of human impact on earth system; global change and regional response; key issues in energy sustainable development and so on.

2. Desertification Combating Technologies in China

Desertification in China may be a prominent manifestation of the impact of global warming. Area of Desertification is 27.46% of China's total land area. Government of China implement a series of major program for combating desertification, for example Sand Source Control Project, and Three-North Shelterbelt Project, and Program of Conversion from Cropland to Forest and Grassland, and Returning Land for Grazing to Pasture Project, and Sand storm sources control around Beijing and Tianjing etc.

In the recent years, about research for combating desertification, we had completed the Programs for combating desertification around Beijing (2000-2004) and Programs for combating desertification about the North China (2001-2005). The main achievements and measures about these programs have Optimized mode for recourses and technology for
effective utilization fit for all kinds of land around Beijing, and Safe technology to control dust storm at bare land, and Forage introduction technology for wind proof and sand control, and Technology for extraction of remote sensing sandy land information and dynamic monitoring of land desertification and its accuracy validation, and Technique system for the vegetation recovery and regeneration at sandy area, and Technique system for biological resource development at sandy area, and Develop the model of sand industry under the different resource conditions.

At present, we take on the Program for combating desertification in China in the period of the eleventh five-year plan (2006-2010).

3. Key Technologies R&D Program: Research and Demonstration of Key Technologies on Integrated Risk Governance

In China, we undergo a rapid development in recent years. Although we have developed some technologies on risk governance, there are some factors limiting our development, such as global environmental change, globalization and localization, shortage of energy and water, food supply, shortage of ecological service capacity, technology invention, market fluctuation, public security, and so on (Figure 2). In the field of integrated risk governance (IRG) research and technical development, the management has not transformed from response after disasters to prevention before disasters, which is stressed by the United Nations (We compare the difference between traditional technologies of public security and technologies of integrated risk governance in figure 1 and figure 2.). Aimed at such shortage, on the basis of existing researches, we implement a project named Research and Demonstration of Key Technologies on Integrated Risk Governance supported by National Key Technologies R&D Program in the period of the eleventh five-year plan (2006-2010). It's an implementation of building national integrated risk governance system under the overall objectives of Program of National Medium-term and Long-term Science and Technology Development Plan (2006-2020).

![Diagram of Public Security System](image)

Fig. 1 Scientific and Technological System of Public Security
Fig. 2 Scientific and Technological System of Integrated Risk Governance

There are four research domains we draw out in this project: 1) Technological system of risk identification and assessment; 2) Key technologies and simulation platforms of IRG; 3) Demonstration and application of IRG; 4) Policy and mechanism of IRG. In the mean time, the key technologies in the research include (Figure 3): risk identification, risk assessment model; Network databases of IRG, search engine, standardized auto-mapping, simulation modeling; Integrated platform of IRG, Main sectors’ (sectors of disaster mitigation and insurance industry) enactments of countermeasures, Integrated prevention technologies on major risk (global environment change, globalization, ecological security, food security, energy security, water security, and so on). According to the research, we try to build national preliminary integrated scientific risk system, and to make the level of national integrated risk governance (assessment, response and adaptation) to meet the demand of national economic and social development.
Building Capacity of Science and Technology to Promote Sustainable Development

Peijun Shi, Qingxu Huang

Academy of Disaster Reduction and Emergency Management, Ministry of Civil Affairs & Ministry of Education, the People’s Republic of China
College of Resources Science & Technology
Beijing Normal University
Corresponding Email: spj@bnu.edu.cn

February 13, 2007

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• Brief Introduction
• Desertification combating technology
• Key Technologies on Integrated Risk Governance
1. Brief Introduction

- Program of Sustainable Development Science (2001-2010), Ministry of Science and Technology of China, 2002


- Scientists and researchers should mainly focus on promoting people's living standard and individual quality, exploiting and using resources reasonably, conserving ecological environment and boosting the development of related industries, which will be of tremendous help for harmonious development.
Twelve key research domains

- Population control
- Health care and major diseases prevention
- Food security
- Water resource security
- Oil & Gas security
- Strategic mineral resources security
- Ocean monitoring and resource exploitation
- Clean energy and renewable energy
- Environmental pollution control and integrated ecology
- Disaster reduction and prevention
- City and town development
- Global environmental issues.

Frontier Issues

- Earth system process
- Resource, environment and disaster
- Scientific issues in agricultural sustainable development
- Mechanisms of human impact on earth system; global change and regional response
- Key issues in energy sustainable development and so on
2. Desertification combating technology

✓ Characteristics of desertification in China

✓ Measures and achievements for combating desertification

Characteristics of densification in China

Climatic Environments of Desertification in China

The Indian Ocean

Climatic Zones
A Humid Tropical
B Humid Subtropical
C Subhumid
D Humid Temperate
E Temperate Semiarid
F Temperate Arid
G Cold High Arid and Semiarid

The Pacific Ocean
# Area of Desertification in China

<table>
<thead>
<tr>
<th>Province</th>
<th>Area (hm²)</th>
<th>Percentage of China’s total land area (%)</th>
<th>Province</th>
<th>Area (hm²)</th>
<th>Percentage of China’s total land area (%)</th>
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**Total** 263616800 27.46
Measures and achievements for combating desertification

- Sand Source Control Project
- Three-North Shelterbelt Project
- Program of Conversion From Cropland to Forest and Grassland
- Returning Land for Grazing to Pasture Project
- Sand storm sources control around Beijing and Tianjing
- Natural Forest Protective Project
- Integrated Management in Rock Desertification Region Project
Programs for combating desertification around Beijing
(2000-2004)

- Optimized mode for recourses and technology for effective utilization fit for all kinds of land around Beijing
- Safe technology to control sand storm at bare land
- Forage introduction technology for wind proof and sand control
- Technology for extraction of remote sensing sandy land information and dynamic monitoring of land desertification and its accuracy validation

Plain area of suburb

The shrub-grass interplanting model
The arbor-grass interplanting model
The arbor-shrub-grass interplanting model
The arbor-shrub interplanting model
Desertification proof technology by reseeding and enclosure

Land cover in summer

Wind erosion control in grapery at hilly area of Yanshan Mts.

Planting pasture in the row

Straw mulch

Protection Net

Protection Net
Farming-pastoral zone

Mixed-sowing wheat and pasture

Beet land with Film mulched

Returning arable land grassland

First year

Second year

Third year

Effect of biological grid on desertification control in Xilinhot region
Fixation of bare land

Programs for combating desertification in the period of the tenth five-year plan (2000-2005)

- Technique system for the vegetation recovery and regeneration at sandy area
- Technique system for biological resource development at sandy area
- Develop the model of sand industry under the different resource conditions
- Achievement for combating desertification
Restoration and regeneration of natural grassland
(Yanchi County, Ningxia Hui Autonomous Region)

Restoration and demonstration of Natural Vegetation in Degenerated natural grassland of Horqin sandy land

Pre-improvement

Post-improvement

Artificial planting astragalus in the degraded natural grassland
Grazing base in Qaidam basin

Sowing Stage

Seedling Stages

Jointing Stage

Mature Stage

Water adding technology for recovering the hungriness vegetation (Zhunger)

Graph showing the effect of water addition on vegetation growth.
Sandy biological resource development

Forage  Livestock  Silage vault

Silage maize

Demonstration area for effective development of bio-resource of the sand in Jingbian county

Apricot garden
Livestock industrialization

[Images of livestock and sheep]

Demonstration area for the high-tech agriculture garden in the Erdos Plateau

[Images of greenhouses and vegetables]
Seedling industrialization

Mongolian scotch pine

Platycladus orientalis

Cypress

Picea crassifolia

Cutting Transplant of tender branches of Poplar

Seeding growth of Haloxylon Ammodendron in the nutrition polybag
Production line of Algae (Irrigation)

Ecological capital and light index (1992)

Ecological capital and light index (2000)
Programs on combating desertification in the eleventh five-year plan

1. Technology research of selection and rapid expansion and breeding of plant for sand protection and control
2. Reasonable water utilization and optimized vegetation distribution at sand area
3. Sandy land resource optimization and its effective utilization under ecological safety condition
4. Technology research of rapid restoration of extensive vegetation in sandy land
5. Technology research of farmland and pasture's wind erosion protection and control and habitat environmental security
6. Sand protection engineering technology in areal and linable sand sources land

7. Monitoring and early warning and project benefit assessment of blow-sand disaster and strategic research sand protection and control
8. Research and demonstration of vegetation reconstruction and control technology in Kerqin sand
9. Demonstration of animal husbandry techniques in xilin gol grasslands
10. Research and demonstration of vegetation rehabilitation and the use of technology in degraded pasture of sand in the east of ningxia river
11. Research and demonstrations of biological controlling technology in Mu us sandy land
12. Sand industrialization technology demonstration in Yongding river in Beijing suburbs
3. Key Technologies on Integrated Risk Governance

- Shortage of Integrated Risk Governance (IRG) in China
- Present Program of IRG

Risk Governance in the Past

Scientific and Technological System of Public Security
Risk Governance in the Future

Scientific and Technological System of Integrated Risk Governance

Risk

Global Environmental Change
Globalization & Localization
Energy & Water
Food Provision
Technology & Market
Public Security

Identification → Assessment → Simulation → Response → Adaptation

Present Program of IRG

Research and Demonstration of Key Technologies on Integrated Risk Governance supported by National Key Technologies R&D Program
Research Content

1. Technological system of risk identification and assessment
2. Key technologies and simulation platforms of IRG
3. Demonstration and application of IRG
4. Policy and mechanism of IRG
<table>
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Thanks for your kind attention!
Education's Contributions to Attaining the Millennium Development Goals

Prof. Rosalyn McKeown,

Abstract

The United Nations has four major educational initiatives related to education: Education For All, Millennium Development Goals (MDGs), Literacy Decade, and the Decade of Education for Sustainable Development. All are based on human rights and all support achievement of the MDGs. MDGs promise to address the deepest poverty and inequality in the world. Of the eight MDGs one is directly related to education—Achieve universal primary education—and another has an education target—Promote gender equality and empower women. The MDGs are interwoven; a solution for one goal can have positive results in other goals. MDG Report for 2006 shows progress on the goal of universal primary education although a gender gap still exists. Educating the girl child improves the quality of life for her and her children. Also, intractable problems like reducing the HIV/AIDS infection rate can improve with education. Some educational issues still need addressing to achieve universal primary education (e.g., school fees, mandatory uniforms, and lack of funding). Challenges to higher education to reorient education to address sustainability to help achieve MDGs include: providing multi-disciplinary opportunities to study sustainability issues, recognizing the importance of indigenous and traditional knowledge in the curriculum, conversing with students about lifestyle choices, teaching communication skills so that knowledge can be transferred and used by decisions makers and politicians, giving students the opportunity to have extended contact with people of other ethnicities and socio-economic backgrounds, and teaching skills (e.g., cultural sensitivity and listening) to help find locally relevant and culturally appropriate solutions to sustainability issues.
Education’s Contributions to Attaining the Millennium Development Goals

Rosalyn McKeown, Ph.D.
University of Tennessee

“We will have time to reach the Millennium Development Goals – worldwide and in most, or even all, individual countries – but only if we break with business as usual. We cannot win overnight. Success will require sustained action across the entire decade between now and the deadline. It takes time to train the teachers, nurses and engineers; to build the roads, schools and hospitals; to grow the small and large businesses able to create the jobs and income needed. So we must start now. And we must more than double global development assistance over the next few years. Nothing less will help to achieve the Goals.”

U.N. Secretary-General Kofi A. Annan

Rosalyn McKeown, Ph.D.
University of Tennessee
Millennium Development Goals (MDGs)

- 8 Goals
  - Eradicate extreme poverty and hunger.
  - Achieve universal primary education.
  - Promote gender equality and empower women.
  - Reduce child mortality.
  - Improve maternal health.
  - Combat HIV/AIDS, malaria, & other diseases.
  - Ensure environmental sustainability.
  - Develop a global partnership for development.

Rosalyn McKeown, Ph.D.
University of Tennessee

18 Targets of MDGs

- Primary education
  - Ensure that all boys and girls complete a full course of primary schooling
- Gender equality
  - Eliminate gender disparity in primary and secondary education preferably by 2005, and at all levels by 2015

Rosalyn McKeown, Ph.D.
University of Tennessee
18 Targets of MDGs cont.

- Environmental Sustainability
  - Integrate the principles of sustainable development into country policies and programs.
  - Reverse loss of environmental resources.
  - Reduce by half the proportion of people without sustainable access to safe drinking water.
  - Achieve significant improvement in lives of at least 100 million slum dwellers, by 2020.

Rosalyn McKeown, Ph.D.
University of Tennessee

The MGDs are interwoven; a solution addressing one goal can have positive results for another. For example, preventing the deterioration of the health of a mother with HIV allows her children to attend school rather than staying home to nurse her.

Rosalyn McKeown, Ph.D.
University of Tennessee
MDG Report 2006

The challenges the Goals represent are staggering. But there are clear signs of hope... providing every child with a primary school education is within our grasp... This should provide incentive to keep moving forward. But... There is a long way to go to keep our promises to current and future generations.

Jose Antonio Ocampo
U.N. Under Secretary-General
Economic and Social Affairs.

Rosalyn McKeown, Ph.D.
University of Tennessee

Universal primary education is in sight, though sub-Saharan Africa lags behind.

The graph shows the percentage of children enrolled in primary education in 1990 and 2003.

Rosalyn McKeown, Ph.D.
University of Tennessee
Gender gap in primary education persists

Graph shows the percentage of girls and boys out of school.

Half of developing country populations lack basic sanitation. It is unlikely target will be achieved.

Graph shows percentage of population using improved sanitation in 1990 and 2004.
Many initiatives of the United Nations contribute to progress towards Millennium Development Goals. For example, the UN Decade of Action, Water for Life 2005-2015 contributes to the MDG target of improving sanitation. UNICEF has been involved in education and health education for years. UNESCO is lead agency for the U.N. Decade of Education for Sustainable Development (UNDESDE) for which every UN agency is to contribute.

Rosalyn McKeown, Ph.D.
University of Tennessee

UN Initiatives Involve Education

- Education For All
- UN Literacy Decade
- Millennium Development Goals
- UN Decade of Education for Sustainable Development.

Rosalyn McKeown, Ph.D.
University of Tennessee
Linkages between Initiative

http://unesdoc.unesco.org/images/0014/001408/140848m.pdf

Rosalyn McKeown, Ph.D.
University of Tennessee

Education: Human Right

- 1948 Universal Declaration of Human Rights in Article 26:
  - Everyone has the right to education.
  - Elementary education is free and compulsory.
  - Directed to full development of the human personality and strengthen of respect for human rights.
  - Parents have right to choose type for children.

Rosalyn McKeown, Ph.D.
University of Tennessee
Education: Human Right

- Convention on the Rights of the Child
  - Right to an education until the age of majority.
  - Children may not be excluded from any right, including education, based on race, sex, disability, economic status, etc.

Rosalyn McKeown, Ph.D.
University of Tennessee

Exclusion from education is part of a web of human rights violations. It begins complex, progressive, and ongoing processes of segregation Prohibition, and disenfranchisement.

Rosalyn McKeown, Ph.D.
University of Tennessee
**Education For All (EFA)**

- 1990, the Jomtien Declaration on EFA
- 2000, Follow-up conference Dakar Senegal.
  - Pre-school children a chance for good care and early learning.
  - All children complete a quality primary education free of charge.
  - Adults opportunity to learn skills
  - Increase literacy rate for adults
  - Boys and girls enroll in school in equal numbers and have equal opportunity.
  - Improve the quality of education.

Rosalyn McKeown, Ph.D.
University of Tennessee

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**Education For All**

“To serve the basic learning needs of all requires more than a recommitment to basic education as it now exists. What is needed is an 'expanded vision' . . . We must seize [new possibilities] with creativity and a determination for increased effectiveness.”

(World Declaration Education for All, 1990, Article II – Shaping the Vision)

Rosalyn McKeown, Ph.D.
University of Tennessee
Increasing Enrolment in Primary School

![Graph showing total enrolment in primary education, 1980-1997.](image)

Source: 1999 UNESCO Statistical Yearbook, Table II.S.3

Rosalyn McKeown, Ph.D.
University of Tennessee

U.N. Literacy Decade: 2003-2012

- 760 million adults in the world cannot read (two-thirds are women).
- Literacy is a means to take part in society.
- Many jobs require literacy skills.

Rosalyn McKeown, Ph.D.
University of Tennessee
U.N. Literacy Decade Goals

- 50% more people can read and write by 2015, giving special attention to women.
- Contribute to other EFA goals.
- Help learners read, write, and calculate as well as think critically, have positive values as citizens and to acquire other skills as needed.
- Help people use their literacy in creative ways.
- Make life better through less poverty, better health, participating in civil society, and knowing rights and duties of citizens.

Rosalyn McKeown, Ph.D.
University of Tennessee


- Educating for a more sustainable future.
  - Access to quality basic education
  - Reorienting existing education to address sustainability
  - Raising public awareness
  - Providing training for government, business, industry, etc.

Rosalyn McKeown, Ph.D.
University of Tennessee
ESD

Education for Sustainable Development
United Nations Decade (2005-2014)

- Incorporates principles of sustainability throughout formal and free-choice learning.
- Involves:
  - Knowledge and skill base.
  - The ways we live.
  - Our values.
  - Our behavior.

Rosalyn McKeown, Ph.D.
University of Tennessee

These four initiatives—MDGs, UNLD, EFA, and UNDESD have overlapping goals and targets, and are synergistic. Working on one initiative can progress other initiatives.

Rosalyn McKeown, Ph.D.
University of Tennessee
Let’s look at ways that education has improved the lives of people around the world.

**Benefits of Education to Women**

- Gains higher status and an enhanced sense of efficacy,
- Tends to marry later,
- Has greater bargaining power and success in marriage,
- Has greater bargaining power in the household after marriage, and
- Seek the health care necessary to have a smaller family.

Rosalyn McKeown, Ph.D.
University of Tennessee
Benefits of Education of Women to Her Family

- She has fewer healthier children.
- She has high educational and career expectations of her children, both boys and girls.
- Quality of life improves for the entire family.

Rosalyn McKeown, Ph.D.
University of Tennessee

Infant Mortality & Literacy Rate

Infant mortality rates and estimated female adult literacy rates by country, 1997

Source: UNESCO World Education Report 2000

Rosalyn McKeown, Ph.D.
University of Tennessee
Fertility Rate and Years of Education

Total fertility rates according to women's years of education in selected countries


Rosalyn McKeown, Ph.D.
University of Tennessee

Fertility Rate and Literacy Rate

Total fertility rate and estimated female adult literacy rate by country, 1997

Source: UNESCO World Education Report 2000

Rosalyn McKeown, Ph.D.
University of Tennessee
“Once all the benefits are recognized, investments in the education of girls may well be the highest-return investment available in the developing world.”

Lawrence H. Summers
Chief Economist of the World Bank

With education we can make progress on seemingly intractable problems.

Rosalyn McKeown, Ph.D.
University of Tennessee
We have evidence that education improves quality of life. What next?

Address Hidden Barriers to Schooling

- School fees
  - Example Botswana
- Uniforms
  - Example South Africa
- HIV/AIDS
  - Example Sub-Saharan Africa--Children stay home from school to care for parents
- Lack of funds to enroll more students
Educational Issues: International level

- Quality of education varies greatly from place to place.
- Drop out rate is high, educational pyramid narrows at secondary.
- Government finance.
- How much are students learning?

- Teaching profession is under stress.
  - Low pay.
  - Many lack credentials.
  - Large class size.
  - Many leaving the profession.

Magnitude of Educational Issues

- Quality of education varies greatly from place to place. (rote vs. inquiry)
- Drop out rate is high, educational pyramid narrows at secondary. (9.2 years schooling avg.)
- Government finance. (.05 - 15% of GDP)
- How much are students learning?

- Teaching profession is under stress.
  - Low pay. (High absenteeism rate for second job.)
  - Many lack credentials.
  - Large class size (60).
  - Many leaving the profession.
    - Zambia 815 teachers died of AIDS in 2001; 45% of teachers trained.

Rosalyn McKeown, Ph.D.
University of Tennessee
What can institutions of higher education (IHEs) do to help the world reach the MDGs?

Rosalyn McKeown, Ph.D.
University of Tennessee

Study & Research in 3 SD Realms

- Environment,
- Society, and
- Economy.

And go beyond.

Current and potential contributions of IHEs to sustainability were revealed in UNESCO World Conference on Science.

Rosalyn McKeown, Ph.D.
University of Tennessee
Challenges to IHEs: Achieving MDGs

- Provide multi-disciplinary and trans-disciplinary opportunities to study and research sustainability issues.

Rosalyn McKeown, Ph.D.
University of Tennessee

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Challenges to IHEs: Achieving MDGs

- Recognize indigenous and traditional knowledge in the curriculum.

Rosalyn McKeown, Ph.D.
University of Tennessee
Challenges to IHEs: Achieving MDGs

- Converse with students about lifestyle choices.
  - Consumption at home drives resource extraction around the world.

Rosalyn McKeown, Ph.D.
University of Tennessee

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Challenges to IHEs: Achieving MDGs

- Teach/learn better communication skills so that knowledge can be transferred and used by decision makers and politicians.

Rosalyn McKeown, Ph.D.
University of Tennessee
Challenges to IHEs: Achieving MDGs

- Give our students the opportunity to have extended contact with people of other ethnicities and socio-economic backgrounds.

Photo source: http://warc.jaib.de/warcajsp/side.jsp?news_id=599&part_id=0&navi=5

Rosalyn McKeown, Ph.D.
University of Tennessee

We must find ways to spend regular, consistent time with people who are on the margins. Over time we must develop friendships with folks who are excluded from their communities: religiously, economically, politically. This is hard work and requires a significant commitment for busy people whose worlds don’t overlap with people on the margins.

Gustave Gutierrez

Rosalyn McKeown, Ph.D.
University of Tennessee
Challenges to IHEs: Achieving MDGs

- Teach/learn skills (e.g., cultural sensitivity and listening) to help find locally relevant and culturally appropriate solutions to sustainability problems.

Rosalyn McKeown, Ph.D.
University of Tennessee

Too often, people of power assume they know what is best for those on the margins without taking the time and being committed enough to become close to those for whom they’re attempting to advocate.

Rick Ufford-Chase

Rosalyn McKeown, Ph.D.
University of Tennessee
Reorienting IHEs Is Challenging

- Inspiration
- Guidelines and Recommendations for Reorienting Teacher Education to Address Sustainability
- 8 Case Studies of Good Practices

Rosalyn McKeown, Ph.D.
University of Tennessee

IHEs are in a precarious position. If we continue to educate as we did in the last decade, we will be accused of complicity—of teaching and supporting a system that begets unsustainable lifestyles, environmental destruction, social inequities, and poverty for half of the world’s population.

Rosalyn McKeown, Ph.D.
University of Tennessee
“The difference between a sustainable or chaotic future is learning.”

Stephen Sterling, 2001

References

References

- UNU. Mobilizing for ESD: Towards a Global Learning Space Based on Regional Centers of Expertise.

Rosalyn McKeown, Ph.D.
University of Tennessee

Contact Information

Dr. Rosalyn McKeown, Director
Center for Geography and Environmental Education
University of Tennessee
311 Conference Center Bldg.
Knoxville TN 37996-4134
USA
Email mckeowni@utk.edu
Telephone 1 865 974-1835
Fax 1 865 974-1838

Rosalyn McKeown, Ph.D.
University of Tennessee
Sustainability is easy to discuss, but difficult to define. Talking about sustainability is interesting because of its diversity and complexity, but it is difficult to come up with common and holistic understandings on it because of the same reason. How to teach something that is not clearly defined? The University of Tokyo (UT) has been involved in the organization of two short and intensive programs on sustainability: Youth Encounter on Sustainability (YES) and Intensive Program on Sustainability (IPoS). Through these experiences, we have realized the importance of developing literacy of sustainability within students, which should include: 1) structured knowledge on sustainability, 2) respect on diversity (cultural, academic, linguistic, etc) and minority, 3) practical skills for decision making and consensus building, and 4) systems thinking and imagination for holistic approaches. Now, UT is in the process of establishing a new Master’s program on sustainability in collaboration with IR3S partner universities. In this program, we will test our strategies and concepts for sustainability education that have been developed through YES and IPoS.
Teaching Sustainability: Challenges and Opportunities for Japanese Universities

Professor at Graduate School of Frontier Sciences
Adjunct Professor at Integrated System for Sustainability Science (IR3S)
The University of Tokyo
MINO Takashi

Today’s Presentation

• Introduction: Teaching Sustainability
• Experiences in Experimental Short Program on Sustainability (YES & IPoS)
• Lessons from YES & IPoS
• Regular Program on Sustainability at Master’s Level (Under Development)
• Conclusion
Today’s Presentation

• Introduction: Teaching Sustainability
• Experiences in Experimental Short Program on Sustainability (YES & IPoS)
• Lessons from YES & IPoS
• Regular Program on Sustainability at Master’s Level (Under Development)
• Conclusion

Sustainability

• Sustainability is easy to discuss, but difficult to define.
• Talking about sustainability is interesting because of its diversity and complexity, but it is difficult to come up with common and holistic understandings on it because of the same reason.
Traditional Understanding of “Sustainability”

Society

Economy

Ecosystem Environment

Three important dimensions of sustainability

Definition of Sustainability Science

A new academic discipline that seeks to understand the interactions within and between global, social, and human systems, the complex mechanisms that lead to degradation of these systems, and concomitant risks to human well-being and security, and then to propose visions and methods for protecting and/or restoring these systems and linkages.
February 13, 2007, International Workshop on Sustainability Education: “Mobilizing Science and Technology towards Sustainability”

**Linkages among three systems**

**Global system**
- Climate system
- Energy and Resources
- Ecosystem
- Human Security
- Infectious diseases
- Natural disaster

**Social system**
- Politics
- Economy
- Industry
- Technology
- Mass production, consumption, destruction

**Human system**
- Security/Safety
- Lifestyle
- Health
- Norms and values

Resource-circulating society

**Transdisciplinary approach**

**Physics, Chemistry, Biology, Ecology, Earth Sc**

**Law, Policy Sc., Economics, Sociology, Management**

CO2

Environment tax

Disaster prediction

Awareness for disaster prevention

Amount of Waste

Lifestyles

**Ethics, Religious St., Medical Sc., Psychology, Philosophy**

Sustainability Science fuses Natural and Social Sciences with indicators
Sustainability Science emphasizes on:

- **Objectivity**: Benchmarks and indicators
- **Diversity**: Natural and cultural characteristics of the region/nation
- **Simultaneous pursuit of**: Understanding of phenomena and search for solutions/new systems
  - Uncertainties may remain in future prediction, yet actions should be taken.
- **Precautionary approach**

**Today’s Presentation**

- **Introduction**: Teaching Sustainability
- **Experiences in Experimental Short Program on Sustainability (YES & IPoS)**
- Lessons from YES & IPoS
- **Regular Program on Sustainability at Master’s Level (Under Development)**
- **Conclusion**
Educational Components of IR3S at UT

• Experimental short programs
  – Youth Encounter on Sustainability (YES)
  – Intensive Program on Sustainability (IPoS)

• Development of Master’s Program on Sustainability Science
  – Associated with Institute of Environmental Studies, Graduate School of Frontier Sciences, UT
  – Start in October, 2007

Experimental Short Programs

Intensive Program on Sustainability (IPoS)
2004 - Present
Looking to Sustainability in Asia, collaboration with Asian Institute of Technology
Financial support by Nissan Science Foundation

Youth Encounter on Sustainability (YES)
1999 - Present
Initiative by Swiss Federal Institute of Technology
Y.E.S.
Youth Encounter on Sustainability
(Formerly: Youth Environmental Summit)

- Started by AGS (Alliance for Global Sustainability) in 2000, and currently is operated by Swiss Federal Institute of Technology (ETH).
- A short (2 weeks) program that intends to educate undergraduate and postgraduate students who should become future leaders so that they can understand the concept of sustainability and play a key role in sustainable development in international settings.
- Regularly held in a small village (Braunwald) in Switzerland, but sometimes organized in other parts of the world (Costa Rica, Slovakia, etc.).
- 30-40 undergraduate and postgraduate students from more than 20 countries all over the world with diverse academic backgrounds.
- An experiment to develop contents and pedagogy for and to find practical problems and critical issues in environmental / sustainability education.

Contents of YES

- 2 weeks program, multidisciplinary and crosscultural in nature
- 4 modules
  - Social
  - Energy and Climate
  - Food and Water
  - Technology
- Excursion, discussion, different types of exercises, in addition to basic lectures
- Discussion among students
- Group work throughout the program followed by final presentation
IPoS
(Intensive Program on Sustainability)

- A program developed by UT and AIT to contribute to sustainable development in Asian regions
- Started in 2004 in Thailand and continues till now.
- 10 students from UT, 12 from AIT and a few from AGS partners (MIT, ETH and Chalmers) as well as IR3S universities (Kyoto U, Osaka U, Hokkaido U and Ibaragi U).
- Emphasis on Asia in terms of way of thinking, culture, regional factors, etc.
- A sub-topic under the big umbrella of sustainability is defined each year (ex. food safety and security for 2004, food and energy production for 2005/6). A special course of IPoS on transportation, sponsored by Nissan Science Foundation will be held in Japan in the coming December.

Basic Framework of IPoS 2006
- Food and Energy Production -

**Main Stream Concept:**
Biomass energy production should replace a part of food production in Southeast Asia

- Group definition
- Identification of key questions about the feasibility of the main stream concept and its relevance to sustainability
- Excursions and related exercises
- Group Work
- Overviews on selected key issues
- Lectures and exercises on selected topics
- Final Proposal:
An overall or specific decision(s) on the main stream concept for Southeast Asia, and a master plan and/or a few specific proposals associated with the main stream concept.
Today’s Presentation

• Introduction: Teaching Sustainability
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• Conclusion

Key Issues at Y.E.S./IPoS (1)
- Diversity -

• Sustainability contains diverse concepts in nature, and its definition may vary depending on culture, social background and economic conditions.
• Experiences to seriously discuss various aspects of sustainability with different people from different disciplines and cultures may be very useful and important for future leaders.
Key Issues at Y.E.S./IPoS (2)
- Consensus -

• The more a problem is complicated, more stakeholders and experts are needed to solve the problem. Therefore, mutual understanding and consensus building among the concerned people get more and more difficult, but important.

• The “best” solution in terms of sustainability may not be accepted by the society. Similarly, something that may be good for the environment are not always favored by the people.

Key Issues at Y.E.S./IPoS (3)
- Minorities -

• “Minority” is a group of people who do not have access to decision making process because of several reasons. Without understanding of minorities, true consensus may not be achieved or decision making leading to sustainable society may not take place.
  – Globalization creates minorities.

• Social factors actually make the problem more complicated.
  – Poverty, discrimination,
  – Terrorism, war
  – Diversity in religion, culture and language
Key Issues in Sustainability Education

• **Transdisciplinary, multicultural and highly diverse nature of sustainability issues**
  – Academic discipline dealing with sustainability
  – Communication: ex. engineers vs social scientists
  – Handling of unequality/unequity/minority

• **Analytical or integrative**
  – Incentive system in research and education

• **Pedagogy**
  – Knowledge-based or experiential/ teaching or facilitating

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Today’s Presentation

• **Introduction: Teaching Sustainability**

• **Experiences in Experimental Short Program on Sustainability (YES & IPoS)**

• **Lessons from YES & IPoS**

• **Regular Program on Sustainability at Master’s Level (Under Development)**

• **Conclusion**
Sustainability Science Education program aims at:

- Training Experts with a global perspective
- Equipping the younger generation with leadership skills,
  management capabilities,
  practical ability (e.g. consensus-building know-how)
  the broad knowledge and perspective,
  far-sighted thinking

To solve problems that hinder global sustainability
To create new global, social and human systems

Masters Program on Sustainability Science

- A flagship project in IR3S, associated with Graduate School of Frontier Sciences
- Transdisciplinary program
- Case studies and field work (through collaboration with international organizations in Asia)
- Aims to develop curricula and pedagogy for sustainability education
- Collaboration with other IR3S universities
Integrated Master’s Program on Sustainability Science under IR3S

The University of Tokyo

- IR3S - Integrated research System for Sustainability Science

Kashiwa Campus
(Transdisciplinary approaches to develop new academic disciplines)

<Metropolitan Tokyo>

Hongo Campus
Center of tripolar Structure, traditional discipline oriented

Komaba Campus
(Interdisciplinary approaches)

<Kashiwa City>
Development of Education Program for Environment & Sustainability at Kashiwa Campus, UT

- Institute of Environmental Studies (1999) – 5 Departments, 70 faculty members, 600 students
- Environmental Management Program (2004) – Leading to title of “Environmental Planner”
- Integrated Environmental Design Program (2006) – Designing urban, rural, natural, social or human environment
- Master’s Program on Sustainability Science (2007) – Initiative by IR3S, collaboration with TIGS – Leading to Master’s Degree on Sustainability Science

Master’s Program on Sustainability Science

- Outlines -

- Aims to train students so that they may **practically contribute to development of sustainable society** in various international and local scenes.
- Educate future leader by exposing them to discussions on sustainability under multidisciplinary and crosscultural environment so that they can actually **gain key literacy for Sustainability**
- Develop a benchmark educational program on sustainability at master’s level leading to “Master in Sustainability Science”
Master’s Program on Sustainability Science
- Curricula -

• Two types of courses will be offered: 1) knowledge-and-concept-oriented courses on complex nature of sustainability and 2) experiential learning and skill-oriented exercises
• Taught in English. (International students will be admitted)
• Exchange credits among IR3S partners (distance learning)

• Masters Degree on Sustainability Sciences
• Dual degree between two IR3S universities in the future

Curriculum Structure - Tentative

Knowledge-and-Concept-Oriented Courses
- Intro to Sustainability
- Environmental Economics
- Environmental Planning and Management
- Natural Systems
- Technology and Sustainability
- Sustainable Water Systems
- International Governance
- Resource Management
- Project Management
- Environmental and Sustainability Education
  etc.

Experiential Learning and Skill-Oriented Exercises
- Case Studies on Sustainability (Global and Local Perspectives)
- Systems Thinking
- Consensus Building
- Intensive Program on Sustainability: IPoS (As a part of the Masters Degree Program)
  etc.

Masters Thesis
- Masters Thesis on Sustainability
Today’s Presentation

• Introduction: Teaching Sustainability
• Experiences in Experimental Short Program on Sustainability (YES & IPoS)
• Lessons from YES & IPoS
• Regular Program on Sustainability at Master’s Level (Under Development)
• Conclusion

How to teach something that is not clearly defined?

• Share roles among elementary, secondary, higher, long-life, and other educations.
• Organize essential knowledge in order.
• Develop skills needed for achieving sustainability goals.
  – Systems thinking, consensus building, etc.
• Define frames for understanding of sustainability
  – Spatial and temporal boundary, trade-off, and uncertainty, etc.
• Overcome practical difficulties in action
  – Finance, international/regional governance, values, etc.
Education - (Kyou-iku)

- (Kyou) + (Iku)
  - Kyou = To teach
  - Iku = To grow

- Education should be a process
  - to open eyes for something
  - to facilitate learning

=> This aspect is particularly important in sustainability education.

Sustainability Education - My View

- **Objective of sustainability education at University Level:**
  - To develop literacy of sustainability

- **Literacy of sustainability includes:**
  - Fundamental knowledge on sustainability
  - Respect on diversity (cultural, academic, linguistic, etc) and minority
  - Practical skills for decision making and consensus building
  - Systems thinking and imagination for holistic approaches

- **Keys**
  - Respect for diversity
  - Case studies and experiential learning
  - Balance between analytical and integrative approaches
Thank you for your attention!

Kashiwa Campus, the Univ Tokyo

MINO Takashi
Speaker’s Profile
Pim Martens

Education
1991 Msc., Biological Health Sciences, Maastricht University, The Netherlands
Traineeship: Department of Medical Microbiology, University Hospital Maastricht.
1993 M.Sc., Environmental Health Sciences, Maastricht University, The Netherlands
Traineeship: Department of Mathematics, Maastricht University
1997 Ph.D., Department of Mathematics, Maastricht University, The Netherlands

Professional Career
1993-1997 PhD-student, Maastricht University, Department of Mathematics, Maastricht, the Netherlands
1997-1998 Assistant Professor, Maastricht University, Department of Mathematics, Maastricht, The Netherlands
1998-2004 Senior Researcher International Centre for Integrated assessment and Sustainable development (ICIS), Maastricht University, Maastricht, The Netherlands
2001-2003 Honorary Senior Lecturer, Department of Epidemiology and Population Health, London School of Hygiene and Tropical Medicine, UK
2004-present Full Professor ‘Sustainable Development’, Maastricht University

Management duties
2001-2004 Deputy Director International Centre for Integrated assessment and Sustainable development (ICIS), Maastricht University, the Netherlands.
2004-present Director International Centre for Integrated assessment and Sustainable development (ICIS), Maastricht University, the Netherlands.

Committee/Boards
2002-present Book-Series Editor ‘Integrated Assessment Studies’, Swets & Zeitlinger Publisher.
2006-present Member Strategic Advisory Board UNESCO/UNU Regional Centre of Expertise ‘Learning for Sustainable Development’.
2006-present Member Think-tank ‘Sustainable Limburg’, Province of Limburg.
2006-present Research Director ‘KNW-Onderzoeksschool’ SENSE (Socio-Economic and Natural Sciences of the Environment).
Research Fields/Interests
Sustainable Development/ Sustainability Science, Globalisation, Environmental Change and Society, Emerging Infectious Diseases, Integrated Assessment, Complex Adaptive Systems

Selected Publications
Peijun Shi,

Education
1978 – 1982 Bachelor of Geography Department of Inner Mongolia Normal University, China
1982 - 1984 Master of Lanzhou Desert Research Institute, Chinese Academic Institute, China
1986 - 1988 Doctor of Geography Department in Beijing Normal University, China
1995 - 1997 Post doctor of College of Natural Recourses and Environment Management, University of California at Berkeley, USA

Professional Career
1984 - 1986 Instructor, Institute of Natural Resources of Inner Mongolia, China
1988 - 1992 Associate Professor, Dept. of Geography, Beijing Normal University, China
1992 - 2003 Professor, College of Resources & Environment, Beijing Normal University, China,
2003. - Professor, College of Resources Science & Technology, Beijing Normal University, China

Committee/Boards:
Deputy Director, Earth Science Group of the Scientific & Technological Committee of Ministry of Education of the PRC.
Committeeman, Consultative Committee of Science & Technology of State Environmental Protection Administration of China.
Deputy Syndic in Chief, Geographical Society of China.
Deputy Syndic in Chief, China Society of Natural Resources.

Research Fields/ Interests:
Environment change and natural disaster, especially on disaster risk assessment and disaster risk governance.
Organized and promoted the National Key Technologies R&D Program of China during the 11th Five-Year Plan Period “Key Technology in Integrated Risk Governance Research and Demonstration”.
Assisted to organize the project National Key Technologies Supporting Program of China during the 11th Five-Year Plan Period “Key Technology in National Emergency Platform System Research and Demonstration”.

Selected Publications (max 5)
Peijun Shi, et al. Palynological records of environmental changes in the middle part of Inner

Rosalyn McKeown

**Education**
1986 Ph.D. University of Oregon, Geography.
1977 M.A. University of Oregon, Geography.
2006 M.S. University of Tennessee, Teacher Education.
1974 B.A. University of California, Los Angeles, Geography.

**Professional Career**
Director - Center for Geography and Environmental Education, University of Tennessee, Knoxville

2005 - 2006 Adjunct Senior Fellow, United Nations University – Institute for Advanced Studies
September

2003 – 2004 Teacher - Spanish I and II, Oliver Springs High School


2002 Joint Faculty - University of Tennessee / Oak Ridge National Laboratory

2000 – 2001 Visiting Associate Professor - York University, Toronto, Ontario, Canada

1990 – 1993 Assistant Professor - College of Education, University of Tennessee

1991 – 1993 Director - Department of Energy / Lyndhurst Secondary Teacher Education Program

1990 – 1991 Co-director - Center for Environmental / Energy / Science Education

1987 – 1990 Assistant Professor - Center for Science, Mathematics and Technology Education, SUNY Stony Brook

**Committee/Boards**
1999 – present Secretariat, UNITWIN/UNESCO Chair in Reorienting Teacher Education to Address Sustainability,

2000 – 2003 National Science Foundation Advisory Committee for Environmental Research and Education.


1997 – 2002 Secretary, Board of Director, North American Association for Environmental Education

1997 - 1999 President, Tennessee Environmental Education Association

**Research Fields/Interests**
For more than a decade, I have focused on defining and assessing environmental literacy. As part
of this effort, I created the Environmental Literacy and Citizenship Assessment Instrument (ELCAI) for assessing the effectiveness of college and university programs in raising the environmental literacy of undergraduate students. For the ELCAI, I identified the socio-political-cultural foundations of environmental education and created a valid framework for teaching, learning, and assessing environmental issues. I also created a conceptual framework for education for sustainable development (ESD).

Selected Publications


MINO Takashi

Education
1978  Batchelor’s Degree: Department of Urban and Environmental Engineering, The University of Tokyo
1979  Master’s Degree: Department of Urban and Environmental Engineering, The University of Tokyo
1983  PhD Degree: Department of Urban and Environmental Engineering, The University of Tokyo

Professional Career
1983-1999  Research Associate, Assistant professor, Associate professor and professor at Department of Urban and Environmental Engineering, Faculty/Graduate School of Engineering, the University of Tokyo
1999-Present  Professor at Department of Socio-cultural Environmental Studies, Graduate School of Frontier Sciences, the University of Tokyo
1989-1991  Associate Professor at Department of Environmental Engineering, Asian Institute of Technology (Thailand)
1996-1997  Visiting Scholar at Department of Bioprocess Technology, Delft University of technology (The Netherlands)
2002-2004  Visiting Professor at Department of Water Environment Transportation, Chalmers University of Technology (Sweden)
2006-Present  Adjunct Professor at Integrated Research System for Sustainability Science, the University of Tokyo
Part-time Lecturer at Tsukuba University, Meisei University, Nagaoka University of Technology, Kyushu University, Nihon University, etc.

Committee/Boards
Member, Scientific Program Committee, International Water Association
Member, Editorial Board, Water Science and Technology, International Water Association
Executive Secretary, Environmental Engineering Committee, Japan Association of Civil Engineers
Chairman, Technology Evaluation Committee, Japan Sewage Works Association

Research Fields/Interests
Biological wastewater treatment; nutrient removal from wastewaters; activated sludge mathematical modeling; applied and environmental microbiology; microbial molecular ecology; environmental technology management; water pollution control; environmental education; sustainability education.

Selected Publications
Mino T., Kawakami T., and Matsuo T. (1984) "Location of Phos-phorus in Activated Sludge
and Function of Intracellular Polyphosphates in Biological Phosphorus Removal Process."

*Wat. Sci. Tech.*, Vol.17, Amsterdam, pp93-106; (S. H. Jenkins Award 1986, the best paper published in journals issued by International Association on Water Pollution Research and Control in a two years' period)


Tomo Suzuki

Education
Bsc. in Management; Meiji University
Msc. in Philosophy of Science, London School of Economics (LSE), University of London
D.Phil in Epistemology of Economic Reality, University of Oxford

Professional Career
Certified Public Accountant (Japan)
Senior Lecturer, University of London
University Lecturer and Official Fellow, Said Business School, Oxford University

Committee/Boards
Socio-Economic Review editorial board, and gust Editor
Accounting Organizations and Society editorial board
Price of Wales Trust, Accounting for Sustainability Principal Researcher

Research Fields/Interests
Epistemology of economic reality
Accounting for environment and sustainability
Institutional design for sustainability practices

Selected Publications
International Workshop on Sustainability Education:
“Mobilizing Science and Technology towards Sustainability”