Objectives and structure of this session

- Objectives:
  - To learn the concept of sustainable development
  - To learn the importance of water issues in sustainable development
  - To understand the difficulty in finding solutions

- Structure of this session:
  - Lecture (40 min, with interactions)
  - Group discussion (50 min)
  - Preparation of presentation (20 min)
  - Group presentation (5 min × 8 groups, 40 min)
What is Sustainable Development (SD)?

- **Brief history**
  - Kenneth Boulding (1966) Spaceship “Earth”: propose new economic system within limited resources, like in a spaceship.
  - Donnela Meadows et al. (1972) The Limits to Growth: Based on global simulation results, it demonstrated how limited resources and environmental capacity will affect.

**The Stockholm UN conference on the human environment (1972)**
- The first world summit on environment issues.
- Sharp conflict between “environment” and “development”.
- United Nations Environment Programme (UNEP) was established.

Evolution of the concept of SD

- **Beyond “Environment vs. Development” trade-off**
  - Sound environment is the very basis of economic development.
  - Japan demonstrated the potential to achieve economic growth through investment in environmental conservation. During 1970-80s Japanese GDP increased by 122%, while SOx decreased by 82% and NOx by 21%, with huge pollution abatement and control expenditure equivalent to 1.6% of national GDP (→ Porter hypothesis).

**Brundtland Report (1987)**
- Final report of the World Commission on Environment and Development (WCED), submitted to the UN General Assembly in 1987.
- WCED was established in 1983, based on the proposal from the Japanese government. The chair was Dr. Gro Harlem Brundtland (former prime minister of Norway).
- This report established the concept of SD as the main global political goal.
- This report served as the driving force to hold **1992 Rio Earth Summit**.
Sustainable Development à la Brundtland Report

Brundtland Report (WCED 1987) defined SD as ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ (p.43).

1. Interlinkages between poverty and environmental degradation
   ‘Poverty is a major cause and effect of global environmental problems’ (p.3)

2. Limited carrying capacity
   ‘There are thresholds that cannot be crossed without endangering the basic integrity of the system’ (p.32)

3. Overriding priority to current poverty problem
   ‘(...) the essential needs of the world’s poor, to which overriding priority should be given’ (p.43)

Confusion over SD concepts

- Rio Earth Summit (1992)
  - 172 countries participated (108 countries sent the head of state)
  - Optimism for win-win solution of environment and development.
  - Several important international agreements (e.g., UNFCCC). In particular, “Agenda 21” has served as the basis of global environmental policy.

- After Rio Earth Summit, many governments and international organisations have adopted SD as the main policy goal.
  - Often the practical definition of SD is not clarified. Only vague rhetoric.

Developed countries: Want to restrict development for the sake of environmental conservation.
Developing countries: Want to prioritise development for the sake of poverty reduction.

  - Big failure. No important international agreements.
Why confusing? Various value judgments

- Anthropocentric approach vs. ecocentric approach (deep ecology):
  - Anthropocentric approach: Environmental conservation is a necessary "mean" to pursue well-being of human.
  - Ecocentric approach: Environmental conservation is an "end" regardless of human benefit. E.g., nature has a right to be conserved.

- Technological optimism vs. Limits to growth:
  - Technological optimism: Technology improvement will overcome resource scarcity by substituting the natural resources with man-made resources.

- Intergenerational equity vs. intra-generational equity:
  - Intergenerational equity: Not to worse-off future generations.
  - Intra-generational equity: Not to treat anyone in the current generation unfair (e.g. poverty).

No “right” answer exists. Without clarifying our own value judgment, discussion on SD issues will be unproductive with going round and round.

Where we are? Global poverty situation

- The Millennium Development Goal Report (2005) describes the current world as:
  - More than 1 billion subsist on less than $1/day.
  - More than 0.8 billion are undernourished due to poverty.
  - More than a quarter of children in the developing countries are undernourished.
  - Maternal mortality in Sub-Saharan region is 240 times higher than that in the developed countries.
  - More than 1.1 billion do not have access to safe water.
  - More than 2.6 billion do not have access to proper sanitation facility.

I believe that it is high time to revisit the concept of SD à la Brundtland with focusing on the 3 basic principles: (1) interlinkages between poverty and environmental degradation, (2) limited carrying capacity, and (3). Overriding priority to current poverty problem.
Water and SD

- Water as essential productive natural resource
  - Drinking water is essential for human survival.
  - Production of food, another essential goods for human survival, requires water as input.
  - Many industries also requires water as input.

- Water as environmental and ecological resource:
  - Water is essential for many ecosystem functions (fish, animals, climate systems, nutrient cycles, etc.).
  - Many water systems (lakes, rivers, etc.) provide cultural and spiritual services.
  - Lack of safe water access causes health problems.

SD cannot be achieved without proper management of water!

Water crisis

“If the wars of 20th century were fought over oil, the wars of 21st century will be fought over water”. Ismail Serageldin (1995), then vice president of World Bank

- Aggravating water issues:
  - More than one-half of the world’s major rivers are being seriously depleted and polluted, degrading and poisoning the surrounding ecosystems (World Commission on Water for the 21st century).
  - 1.1 billion people lack access to safe drinking water.
  - 2.6 billion people lack adequate sanitation.
  - 3900 children die every day from water borne diseases.
  - 80% of illness and deaths in the developing world are the result of water born diseases.

Water crisis has several dimensions. Physical scarcity, pollution, flooding, etc.
Water crisis: the case of the Aral Sea (Central Asia)

- Due to inflow water overexploitation for cotton irrigation, the surface area has reduced by 90%!
- Fishing industry was important economic activity in this region, but it was destroyed.
- Depletion of the Aral Sea may have caused local climate change, hotter and drier summer, longer and colder winter.

Water scarcity

Areas of physical and economic water scarcity

Economic water scarcity = lack the funds to meet the water demands

(Source: International Water Management Institute 2006)
Virtual water trade and water scarcity

Virtual water = the water needed for the production of the product.

Physically or economically water scarce regions tend to export virtual water. **Mismatch!**


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Food and virtual water (global average)

<table>
<thead>
<tr>
<th>Food</th>
<th>Virtual Water (€/kg or €/one piece)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef</td>
<td>15,500 €/kg of beef</td>
</tr>
<tr>
<td>Pork</td>
<td>4,800 €/kg of pork</td>
</tr>
<tr>
<td>Hamburger</td>
<td>2,400 €/one piece</td>
</tr>
<tr>
<td>Rice</td>
<td>3,400 €/kg of rice</td>
</tr>
<tr>
<td>Wheat</td>
<td>1,300 €/kg of wheat</td>
</tr>
<tr>
<td>Sugar</td>
<td>1,500 €/kg of sugar</td>
</tr>
</tbody>
</table>

Source: Water Footprint Network (http://www.waterfootprint.org/)
“Water–Education–Poverty” linkages

- Lack of safe water access deprives education opportunity
  - Many children, particularly girls, bear the burden of carrying water for many hours.
  - Fetching water is labour-intensive and time-consuming activity. It deprives opportunity to go to school from many children.

- Lack of adequate sanitation also deprives education opportunity
  - In Bangladesh, a school sanitation project providing separate facilities for boys and girls boosted girls’ school attendance (WaterAid Bangladesh).

This education aspect is also important when we address water and SD.

“Water – Environment” linkages

- Climate change seriously affects water issues
  - Glacier provides stable water resources for many countries, while most of the world’s glaciers will be disappeared by a 4ºC rise, according to WWF.
  - Occurrence of extreme climate events (droughts and flooding) tend to increase in many regions.
    - Severe impacts on livelihood.

- Disrupted hydrology seriously affects ecosystems
  - Many ecosystems are dependent on water. Water shortage and contamination will destruct both aquatic and terrestrial ecosystems.
    - Severe impacts on livelihood.
Water is expensive

- Water utilisation needs infrastructure:
  - Harnessing water: well (relatively cheap), water intake from river + conduit, dam (expensive)
  - Water distribution: pipelines, pumping stations (expensive with energy inputs)
  - Wastewater treatment: on-site sanitation (relatively cheap, but problematic), sewage collection system (expensive), sewage treatment facility (expensive)

The fact that water is very expensive is not surprising. Historically, water management was a major driver to organise cities and governments because of its huge demand of human, financial and technological resources.

“Economic water scarcity” is a challenge but also an opportunity for SD.

Aspiration: some innovative water technologies

- Water saving technologies for agriculture
  - Drip irrigation
  - Agro-forestry

- Water recycling through advanced wastewater treatment
How to promote SD through addressing water issues?

- **Financial solution: allocating sufficient financial resource**
  - Most of lack of safe water access and adequate sanitation can be addressed.
  - Economic water scarcity can be addressed.

- **Technological solution: applying innovative technologies**
  - A part of physical water scarcity can be addressed by water recycling with advanced technologies.
  - However, technological solution may cause another problems, for example energy shortage.

- **Structural solution: redesign economic structure**
  - Restructure global production (and trade) patterns in consistent with water availability.
    - Also, we need to reconsider our consumption patterns.
  - Price must reflect real costs in terms of negative impacts on sustainable development (e.g. water depletion/contamination, environmental impacts of energy use, etc.).

Is it impossible? No, it's a matter of the political will as a global society!

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How serious are we?

- **Political will of developed countries:**
  - OECD/DAC (Development Assistance Committee) countries commit to spend 0.7% of Gross National Income for international aid. 2010 average of DAC countries is 0.31%.
  - Devarajan et al. (2002) estimated the annual costs to achieve the health-related Millennium Development Goals at US$20 to 25 billion, while the United States spent on average US$60 billion a year on the Iraq War between 2003 and 2005 (Bennis et al. 2005).

- **Political will of developing countries:**
  - Due to widespread corruption in recipient countries, significant portion of ODA money is wasted (means stolen!).

 Reality is gloomy, but it is clear that the real barrier against SD is human disaster (lack of political will) rather than natural disaster.

 We can change the situation, if more and more of us seriously tackle this challenge!!!
Group Discussion

Outline of the group discussion

- Each group is assigned 1 country as follows:
  - Group 1: Cambodia
  - Group 2: China
  - Group 3: India
  - Group 4: Kazakhstan
  - Group 5: Mauritania
  - Group 6: Mongolia
  - Group 7: Pakistan
  - Group 8: Saudi Arabia

- Each country has different characteristics (see Country Data Sheet):
  - Economic development, Climate (precipitation, etc.), Water endowment, Industrial structure, etc.

- Imagine that you are members of the development council of each country:
  - Identify (with imagination!) one water-related key development problem of your country.
  - Propose a project (or policy) addressing the key development problem.
How to proceed

- Each group will briefly report the results (max 5 min). Time allocation may be:
  - Discussion (50 min)
  - Preparation of your presentation (20 min)
  - Presentation (40 min = 5 min × 8 groups)

- Structure of your presentation:
  - Identified water-related development problem, with brief description of your country
  - Brief description of proposed project (or policy), with financial source for the necessary costs.
  - Expected direct benefits of your proposal (for example, X% improvement in the rate of safe water access)
  - Expected development impacts (for example, Y% higher school enrollment because of improved safe water access)

Let’s enjoy! You may find the time is very limited…
Hope you enjoy this session.

Good luck for the whole program!

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