Understanding Climate Change through the Lens of ESD: Contents, Skills, and Values

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Knowledge Related to Climate Variability

- The climate is always changing. Short-term variations in climate are easily noticed by people.
- However, subtle changes over long time-scales such as decades or centuries are more easily identified in instrumental data records.
- The detection of long-term climate change requires long, good quality climate records.
Climate Change: What & Where?

A change in the long-term weather patterns that characterize the regions of the world, affecting everything from the flora and fauna which inhabit a region.
Comparison of Modeled and Observed Temperature
1890 - 2000

Climate Change: How?

A major cause of global climate change--increased concentrations of atmospheric carbon dioxide (CO$_2$), which is responsible for 55% of the greenhouse effect.

The greenhouse effect is a natural occurrence that keeps all Earth's heat from escaping to the outer atmosphere. Greenhouse gases are responsible for the greenhouse effect. The greenhouse effect is a necessary phenomenon. It balances the effects of the earth-cooling processes. The greenhouse effect helps maintain Earth's average temperature at approximately 60 degrees Fahrenheit, which is necessary for life to exist on this planet.

http://www.cotf.edu/ete/modules/climate/GCcarbon1.html
The Greenhouse Effect

NATURAL GREENHOUSE EFFECT
The greenhouse effect is a natural warming process. Carbon dioxide (CO₂) and certain other gases are always present in the atmosphere. These gases create a warming effect that has some similarity to the warming inside a greenhouse, hence the name “greenhouse effect.”

ENHANCED GREENHOUSE EFFECT
Increasing the amount of greenhouse gases intensifies the greenhouse effect. This side of the globe simulates conditions today, roughly two centuries after the Industrial Revolution began.

Illustration of the greenhouse effect (courtesy of the Marion Koshland Science Museum of the National Academy of Sciences). Visible sunlight passes through the atmosphere without being absorbed. Some of the sunlight striking the earth 1 is absorbed and converted to heat, which warms the surface. The surface 2 emits infrared radiation to the atmosphere, where some of it 3 is absorbed by greenhouse gases and 4 re-emitted toward the surface; some of the heat is not trapped by greenhouse gases and 5 escapes into space. Human activities that emit additional greenhouse gases to the atmosphere 6 increase the amount of infrared radiation that gets absorbed before escaping into space, thus enhancing the greenhouse effect and amplifying the warming of the earth.

Image Source: The National Academy of Sciences
Climate Change: The Concern

In recent years, the concentration of CO₂ in the earth's atmosphere has steadily increased, which may lead to an imbalance between the greenhouse effect and the processes that cool Earth. The result could be a net increase in the earth's average temperature.

http://elmhc9.elmhurst.edu

http://www.worldclimatereport.com
Climate Change: Good or Bad?

- Global climate change could **impact** agriculture, **ecosystems**, forests, sea level, regional weather, human health, **and human** economics.

- When climate begins to change, all living things **must adapt** their lifestyles in order **to survive**.

http://mendocoastcurrent.wordpress.com
Agriculture potential expands northward and to higher elevation

Water springs may delay planting

More crop damage by pests due to greater numbers and increased winter survival

Decreased winter cold injury

Longer grazing season

Drier summers reduce fungal disease

Hotter, drier summers increase requirement for irrigation; where water supply is limited productivity is reduced

Warmer temperatures increase growing season

Reduced winter heating and increased summer cooling costs for greenhouse production

Introduction of new crops suited to longer warmer growing season

Impacts of climate change on agriculture
Climate change and weather-related extreme events

• Climate change and global warming appears to affect significantly the weather patterns of our planet.

• Whereas the extent of this influence cannot be accurately determined, in recent decades, there has been an apparent increase in the intensity and frequency of wildfires, hurricanes, and storms and in the losses of life and property due to weather-related disasters.
Human Vulnerability

• In recent years, weather-related disasters such as heavy rains, storms, floods and flash floods, have affected the lives of thousands in many major cities.

• There have been major demographic shifts and greater concentration of populations in urban areas around the world. Mega cities have emerged along coastal areas, often without adequate planning or assessment of disaster risks.

• Losses due to global warming and weather related disasters will continue to increase because of continuing population growth and the increase of the concentration of growth in vulnerable areas such as coastal regions and flood plains.
Building resilience and adaptive capacity… can influence the way people make choices and decisions in climate change and extreme events.

What we need:

- **Knowledge and Contents** for understanding causes and effects of climate change and weather-related disasters;
- **Skill** development and enhancement for awareness raising, preparedness, and mitigation to manage the hazard and the vulnerability; and,
- **Perspectives and Values** for building the culture of, as well as tools and techniques for, climate adaptation and disaster prevention.

*It’s Education for Sustainable Development!!!*
Rationale:

- Climate change education should be part of an education for sustainable development that helps people to develop the attitudes, skills and knowledge to make informed decisions for the benefit of themselves and others, now and in the future - and to act upon these decisions.

- Climate change education is an urgent need and should be interdisciplinary and holistic; integrating scientific, social, gender, economic, cultural and ethical dimensions, and incorporating local, traditional and indigenous knowledge perspectives and practices.
Integrating Climate Change in Schools

Challenges (due to the interdisciplinary nature of climate change education):

- **Materials** – need to address the ethics of climate change and the social dimensions of climate change mitigation and adaptation, and other than in English.

- **Information sharing** – need co-ordination between groups, sectors and agencies; fostering and supporting national and regional networking; and promote the access to modern communication technologies in developing countries.

- **Capacity building** – professionalism and ‘communities of practice’ (i.e. people who are interested and actively engaged in climate change and climate change education)
Integrating Climate Change in Schools

Recent Development:

Integrating Climate Change in SEA Curriculum

- SEAMEO INNOTECH is working on a project with several other SEAMEO centers to integrate climate change issues in teaching and learning materials for basic education in Southeast Asia.

- The project will integrate climate change lessons in Science, Math and English subjects, employing the contextual teaching and learning (CTL) approach.

- Part of the project’s deliverables are lesson plans, basic guidelines to effectively integrate climate change issues in basic education, a lesson plan template, as well as a teacher’s guidebook template on integrating climate change in the lessons.
**UNEP Climate Change Strategy:**

*the four thematic areas*

- Adapting by building resilience to a changing climate
- Facilitating a transition towards low carbon societies
- Improving understanding of climate change science
- Communicating and raising awareness
UNEP’s work on adaptation – building resilience:

- Assessments of ecosystem vulnerabilities and adaptation services;
- Adaptation measures to increase the resilience of key ecosystems;
- Helping support and strengthen policies, knowledge and institutional capacity;
- Development of national economic, legal, institutional and regulatory frameworks integrating climate;
- Change adaptation into national development planning; and,
- Providing technical, analytical and policy support to major climate change financing mechanisms.
UNEP’s works on mitigation – responding to opportunity:

- Facilitating access to energy markets and accelerate the development and dissemination of affordable clean energy technologies and processes through a number of collaborating centers and hands on involvement in groundbreaking international networking efforts as powerful mechanisms to catalyze change;

- Two such networking efforts include: the Global Network on Energy for Sustainable Development (GNESD) and the Renewable Energy Policy Network for the 21st Century (REN21), cohosted with the German technical cooperation enterprise GTZ. GNESD is a collaboration of more than 20 centers of excellence in both developing and industrialized countries noted for their work on energy, development and environmental issues.
**UNEP’s works on science – weighting the evidence:**

- Facilitating the development of better climate data and improved scientific methods and assessment tools for determining possible impacts, vulnerabilities and adaptation needs related to long-term climate change and short-term increased variability;

- Provides scientific expertise to **The Many Strong Voices Programme,*** which links people in the Arctic and Small Island Developing States in assessing climate change vulnerability, developing adaptation strategies and communicating the need for deep cuts in greenhouse gas emissions.

* aiming to raise awareness about the effects of climate change in two of the world’s most vulnerable regions (Arctic and SIDs)
UNEP’s works on climate change communications and outreach:

- Developing strategic communications, including through mutually reinforcing messages with the UNFCCC Secretariat, to convey a sense of urgency in dealing with climate change;
- Using media and outreach activities to help deliver key messages on climate change, especially those derived from UNEP Climate Change publications, to the media and other target groups;
- Helping communicate successful climate change programmes to key stakeholders to promote replication of best practices and success stories using the Internet and audiovisual tools.

Developing SEED initiatives and using a variety of tools including Twitter, Facebook Seal the Deal! Facebook UNEP–Tunza, RenRen social networking, the World Climate Community and Youtube
Open knowledge and learning opportunity for all

UNEP has produced resources on climate change and disaster risk reduction to facilitate the transfer of knowledge for sustainable development. Some links to related resource kits are listed below.

http://www.unep.org/climatechange/


http://unfccc.int/cc_inet/items/3514.php

http://www.unepfi.org/publications/climate_change/index.html