

The Challenge of Sustainability on Planet Earth

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Outline

A. Global Sustainability Challenges

B. Global Sustainability Science

- Knowledge Gaps

- Frontier S&T for Sustainability

C. Linking Sustainability Science to Education

D. Linking Sustainability Science to Policy

A. Global Sustainability Challenges

Global Sustainability Challenges

Critical Issues

Rio+10 (2002)

- ❖ Water
- ❖ Energy
- ❖ Health
- ❖ Agriculture
- ❖ Biodiversity

→ MDGs

Rio+20 (2012)

- ❖ Water
- ❖ Energy
- ❖ Food
- ❖ **Jobs**
- ❖ **Cities**
- ❖ **Oceans**
- ❖ **Disasters**

→ SDGs

Cross– Cutting Critical issues:

- *Poverty*
- *Climate Change*

Poverty

- ❖ MDG 1 on extreme poverty not achieved
- ❖ 1.2 billion people live on less than 1 dollar a day
- ❖ 3 billion people live on less than 2 dollars a day
- ❖ Poverty eradication is essential for **global** security, economy and environment



Climate change

- ❖ Most serious global problem with multiple impacts on water, food, biodiversity, oceans, disasters, ...
- ❖ Poor countries are most vulnerable because of their fragile ecosystems and weak adaptation capacity.
- ❖ Increase in extreme weather events enhances severity of natural disasters



Natural Disasters

- ❖ Disasters arising from floods, droughts, hurricanes, earthquakes, tsunamis,.. have devastating impacts on all **sustainability challenges**.
- ❖ In last 20 years, disasters killed 1.3 million people and caused \$2 trillion of damage
- ❖ 90% of disasters are caused by water/climate hazards



Challenges to Science

- ❖ More reliable forecast of timing and location of disasters
- ❖ Better assessment of impact, vulnerability and resilience
- ❖ Improvement of early warning and response systems
- ❖ Building better and sustainable community services in the aftermath of disasters



Water

- ❖ Safe drinking water is a basic human right challenge
- ❖ Over 1 billion people lack access to safe drinking water.
- ❖ 80% of infectious diseases in developing countries caused by contaminated water.
- ❖ Impact of disasters on fresh water supply and management (*drought, floods, earthquakes*)



Oceans

- ❖ Oceans cover 71% of planet earth, contains 97% of its water and drive global systems that support life.
- ❖ Marine life (*50% of all species on Earth*) is most threatened ecosystem: *dumping of hazardous waste, ocean acidification, overfishing,...*
- ❖ Continuing sea-level rise threatens coral reefs and inhabitants of coastal zones
(*30% of World population live within 100 km from sea shores*)



Energy

- ❖ Energy is central to all global sustainability challenges
- ❖ 1.5 billion people in developing countries have no access to electricity.
- ❖ 2.5 billion rely on traditional biomass for fuel
- ❖ Challenge: clean, sustainable, affordable and **safe** energy.
- ❖ Impact of Natural disasters on energy systems and services (*earthquakes, tsunami*)



Twenty-Three Nuclear Power Plants Found to Be in Tsunami Risk Areas

Sep. 21, 2012—Tsunamis are synonymous with the destruction of cities and homes and since the Japanese coast was devastated in March 2011 we now know that they cause nuclear disaster, endanger the safety of the population and pollute the environment. As such phenomena are still difficult to predict, a team of scientists has assessed "potentially dangerous" areas that are home to completed nuclear plants or those under construction.

***2011 earthquake in Turkey : 100 miles
From nuclear plant in Armenia***



Food

- ❖ 2 billion people worldwide face food insecurity.
- ❖ Some 300 million children go to bed hungry every night
- ❖ 40% of the world's agricultural land is seriously degraded.
- ❖ Impact of weather-related disasters on food production



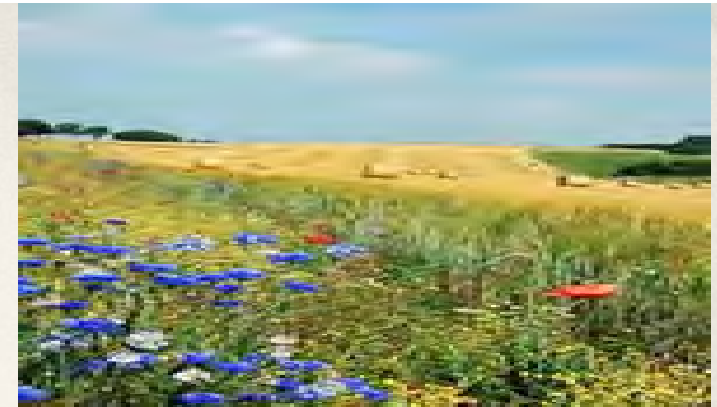
Health

- ❖ WHO Constitution :
“the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being...”
- ❖ 1 million people die of malaria each year, half of them children under 5 years.
- ❖ HIV infects some 36 million people worldwide.
- ❖ Infectious disease outbreak in the aftermath of disasters



Biodiversity

- ❖ Biodiversity is critical to ecosystem services, human health, economy, leisure and culture
- ❖ 60% of ecosystem services degraded over the last 50 years.
- ❖ 30% of all species will be extinct by 2050.
- ❖ Impact of natural disasters on biodiversity (*climate change, wildfires*)



Jobs

- ❖ Rising youth unemployment worldwide is a serious challenge to global sustainability and social cohesion
 - *13% globally (North Africa 25%)*
 - *16% OECD (Spain 53%, Italy, 35%, US 20%)*
 - *50% of unemployed African 15 – 24*
- ❖ Challenge: stimulate global investments in green technologies to generate new **green jobs**



Cities

- ❖ Over 50% of world population live in cities and 90% of urbanization is in developing countries
- ❖ Natural disasters such as earthquakes and floods cause devastation to cities
- ❖ Challenges to science and engineering:
 - develop/improve pre-disaster mitigation and resilience plans for cities
 - rebuild sustainable green cities and services to replace cities ravaged by natural disasters



Japanese
Delegation Visits
Greensburg in
December 2012