Education for Sustainability (ESD)

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Contents

- Introduction
- Sustainable Development
- Dimensions of Sustainability
- What is Education for Sustainable Development (ESD)
- UNESCO Perspective
- (United Nations Educational Scientific Cultural Organization)
- Good Practice Examples
- Six Goals for Sustainable Development- Rio +20

Current Business Externalities

- Externalities – External consequences of trade.
- Externalities – Impact on -Depletion of resources, Use of materials, electricity, social, water, CO_2 emission, waste, pollution, land use.
- 3000 largest companies cause **$1 Trillion** of Externalities.

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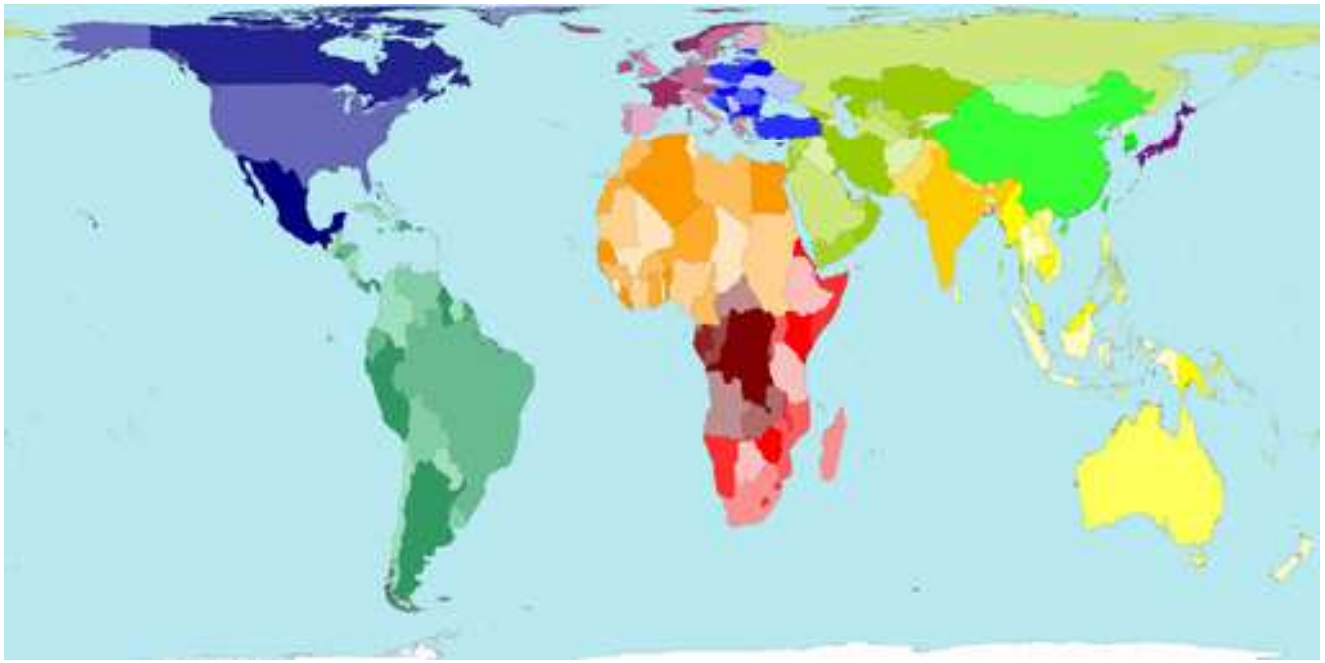
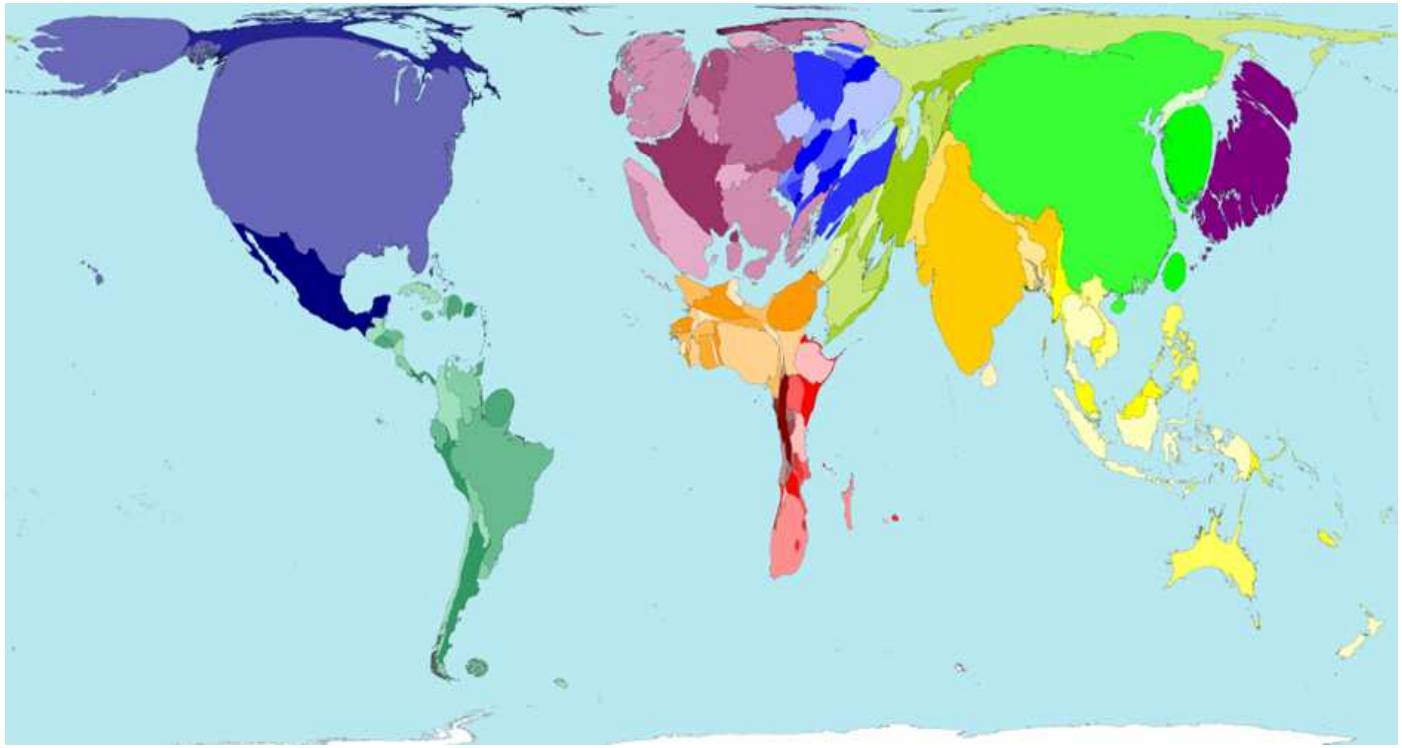
World mapper –Land mass



Ecological Foot print :

The ecological footprint is a measure of the area needed to support a population's lifestyle. This includes the consumption of food, fuel, wood, and fibre, pollution such as CO_2 emission etc.

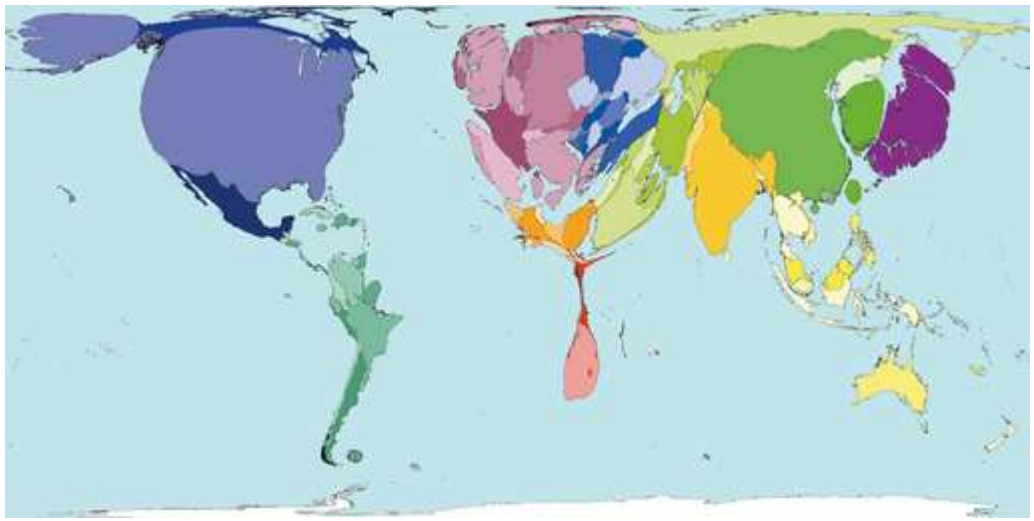


Ecological Footprint

- The United States, China and India have the largest ecological footprints.
- Large populations live in China and India. In both territories resource use is below the world average.
- The per person footprint in the United States is almost five times the world average, and almost ten times what would be sustainable.

Carbon Emission 2005

- Carbon dioxide causes roughly 60% of the ‘enhanced greenhouse effect’ or global warming resulting from certain gases emitted by human activities.
- In 2005 23 billion tonnes of carbon dioxide emitted worldwide. Of this, 28% came from North American territories; 0.09% came from Central African territories.



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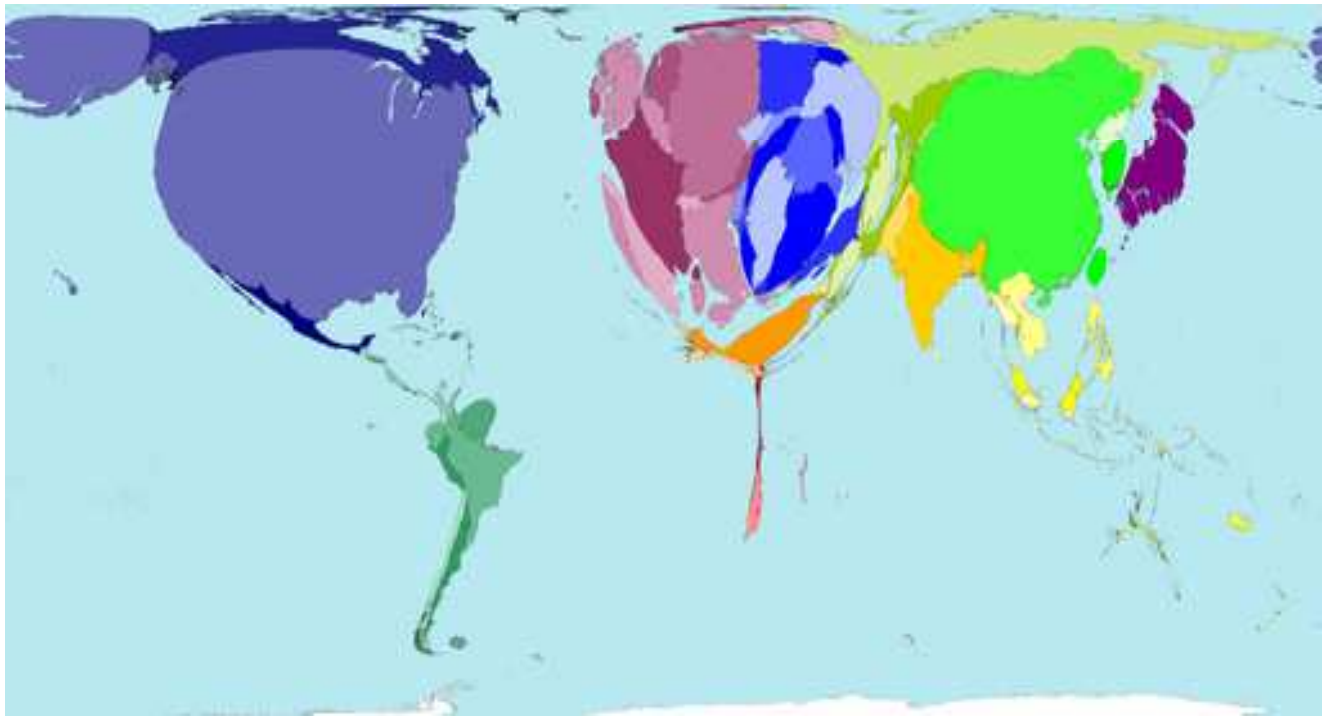
Water usage 2005



Sustainable Development

- “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs” **
- Three components: Environment, Society, and Economy.
- The well-being of these three areas is intertwined, not separate.

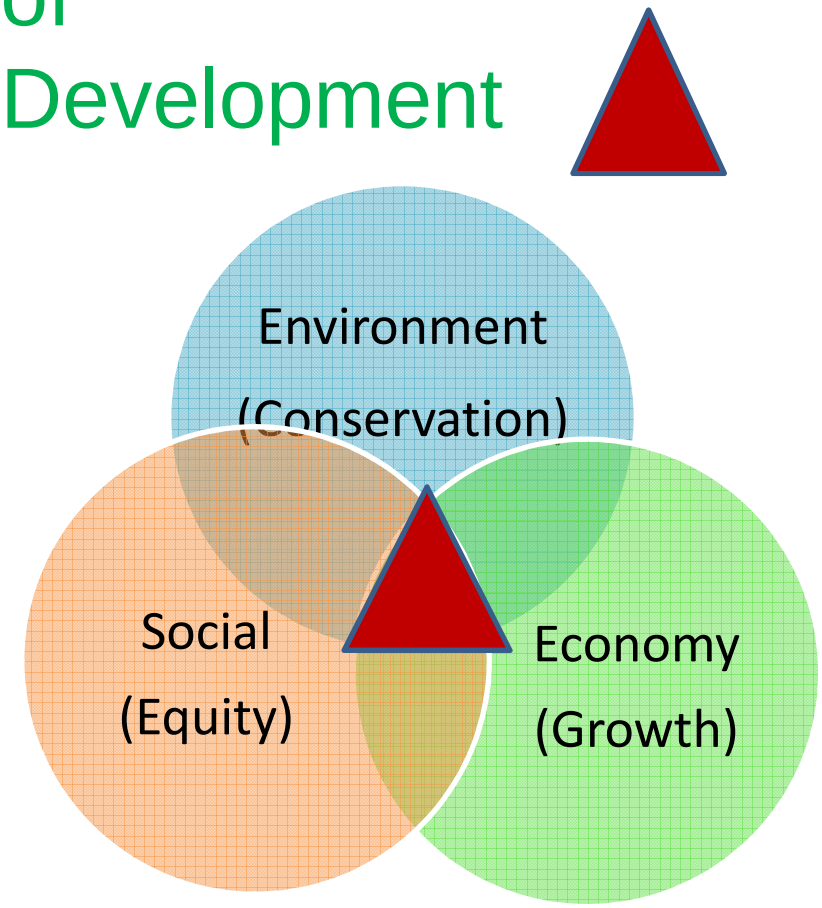
** World Commission on Environment and Development, 1987, p 43.

Sustainable Development

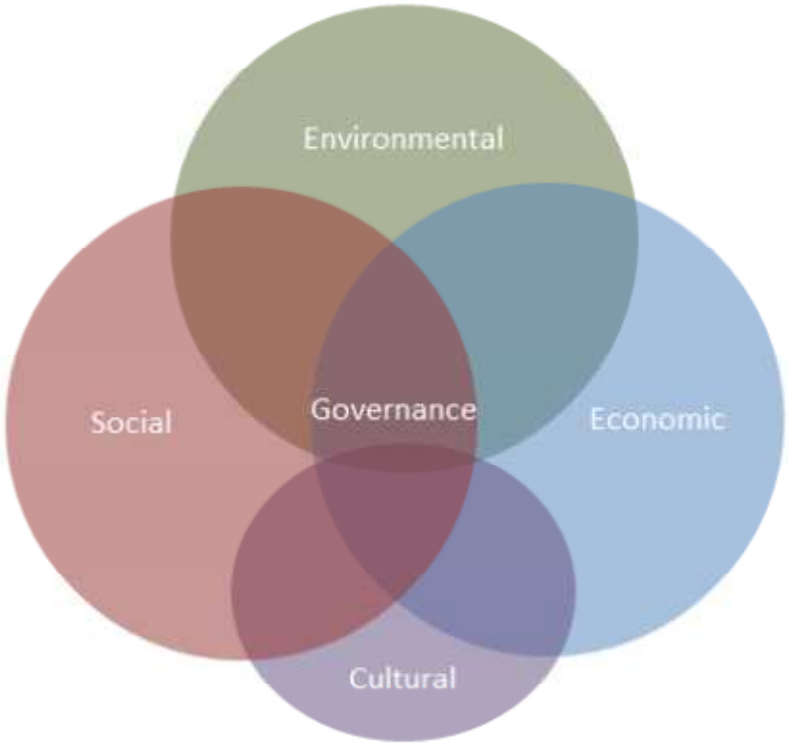
- For example, A healthy, prosperous society relies on a healthy environment to provide food and resources, safe drinking water, and clean air for its citizens.
- A paradigm for thinking about a future in which **environmental, societal, and economic** considerations are balanced in the pursuit of development and improved quality of life.

MODELS OF SUSTAINABLE DEVELOPMENT

Dimensions of Sustainable Development



Core elements of Sustainability



Sustainability Framework**

- **Economic development** – reducing and seeking to eradicate income poverty.
- **Social development** –improving the quality of education, health, housing and other aspects of the welfare of individuals and communities;
- **Environmental protection** – reducing pollution and other negative impacts on the environment, mitigating the effects of industrialization and human activity, and seeking to achieve sustainable use of resources in the interest of future generations.

**1992-2002

Five elements

- Two further elements might be added to these dimensions of sustainability:

- **Cultural diversity** – the continuance of diverse human cultures within globalization of communications, economy and society

- **Governance** –rules and norms that include decision-making and behaviour by governments, businesses and citizens.

Achieving Sustainability

- To produce sustainably – by increasing efficiency and reducing material used in production
- To consume sustainably – by reducing consumption patterns while enabling real improvements in the quality of life
- To organize sustainably – by encouraging participation, and by improving the quality, efficiency and sustainability of planning, government policies, business strategies and personal lifestyles

Education for Sustainable Development

- Education for sustainable development (ESD),
- Education for sustainability (EfS).

- The first is an awareness lesson. The second is the use of education as a tool to achieve sustainability.

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UNESCO PERSPECTIVE

Education for Sustainable Development allows the acquisition of:

Knowledge, Skills, Attitudes and Values necessary to shape a sustainable future.

Education for Sustainable Development means including key sustainable development issues into teaching and learning; for example, climate change, disaster risk reduction, biodiversity, poverty reduction, and sustainable consumption.

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UNESCO PERSPECTIVE

Education for Sustainable Development promotes competencies like :

- critical thinking,
- imagining future scenarios
- making decisions in a collaborative way.
- requires far-reaching changes in the way education is often practised today.

ESD

- Objective - Giving people knowledge and skills for lifelong learning to help them find new solutions to their environmental, economic, and social issues.

EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)

… TRANSFORMS EDUCATION

- ESD uses innovative teaching and learning styles; empowering students and makes them agents in the educational process.

- …PROMOTES EQUITY AND RESPECT

  Education for Sustainable Development helps understand the outlook and needs of people who live in other parts of the world or belong to another generation.

EDUCATION FOR SUSTAINABLE DEVELOPMENT

… **HELPS ADDRESS CLIMATE CHANGE**

- 175 million children are likely to be affected by disasters related to climate change within the next decade. Education for Sustainable Development prepares learners to adapt to the impact of climate change and empowers them to address its causes.

… **BUILDS GREEN SOCIETIES**

- Education for Sustainable Development equips students with skills for green jobs that help preserve or restore the quality of the environment, and improve human well-being and social equity.

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UNESCO Good Practices

Young Masters Programme on Sustainable Development,
Run by a Swedish Foundation-

Free global internet-based education network.

Secondary students and teachers from all over the world use online teaching material to develop understanding of sustainability issues.
Virtual classrooms, Ideas Exchange and Results discussion rooms.

Students also develop their own local sustainability projects.

Group of Indonesian students helped poor urban families in Surabaya to collect old newspapers, which were then recycled into braided baskets and sold. Idea has spread to other deprived areas.
(www.goymp.org)

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UNESCO Good Practice

The Sierra Gorda Earth Center Roberto Ruiz Obregón,
within the Sierra Gorda Biosphere Reserve in Mexico:

Organizes courses and workshops for those working for natural protected areas.

Offers an online diploma course adapting the UNESCO “Teaching and Learning for a Sustainable Future” programme to local needs.

(www.unesco.org/education/tlsf;
www.sierragorda.net/cursos-talleres/diplomado.php)

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UNESCO Good Practices

Asian RICE project: “Regional Initiative for Cooperation for ESD Promotion through rice”
from Asia-Pacific Cultural Centre for UNESCO:

Brings together schools and communities in the Asia-Pacific region around the theme of rice.

Linking UNESCO Associated Schools and their local communities who address **global sustainability** through the theme of rice within and outside the curriculum.

The schools share activities and experiences on the project website. (www.accu.or.jp/jp/en)

What Policy Makers can do

- Incorporate teaching of sustainable development issues, into education at all levels, from early childhood to higher education;
- Train teachers and trainers in sustainability issues
- Ensure that updated and new curricula incorporate the economic, social, and environmental dimensions of sustainable development;
- Encourage research on Education for Sustainable Development to strengthen its evidence base;

What Educators can do

- Address sustainable development issues such as climate change and poverty reduction in the classroom;
- Use participatory teaching methods such as project-oriented learning;
- Encourage learners to organize and participate in activities and projects in favour of sustainable development in their communities;
- Explain the link between concepts in school curricula and sustainable development at the global and the local level.

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UNESCO'S Contribution

- Organizes capacity development workshops for policy-makers
- Provides teachers with tools on Education for Sustainable Development;
- Establishes Education for Sustainable Development partnerships and networks to promote exchange between practitioners and experts from all world regions;
- Provides easy access to hundreds of resources on Climate Change Education through a web clearinghouse.

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UNESCO'S Contribution to ESD

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- Shares good examples of Education for Sustainable Development practice, with policy-makers, educators and civil society;
- Monitors progress on ESD in countries around the world;
- Promotes relevance of ESD at the international level.
- Coordinates the UN Decade of Education for Sustainable Development,
- Leading to UNESCO World Conference on Education for Sustainable Development in 2014 in Japan.

www.unesco.org/education/desd

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"The Future We Want,"

- A process to establish sustainable development goals;
- Use of green economy can be used as a tool to achieve sustainable development;
- Establishing a new forum for sustainable development;
- Promoting corporate sustainability reporting measures;
- Going beyond GDP to assess the well-being of a country;
- Strategy for sustainable development financing;
- Framework for tackling sustainable consumption and production;
- Focusing on improving gender equality;
- Engaging civil society and incorporate science into policy; and
- Recognizing the importance of voluntary commitments on sustainable development.

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Initiatives on Sustainable Development

- **Biodiversity** The Man and the Biosphere (MAB) project
- **Climate Change Education UN** Decade of Education for Sustainable Development (DESD)
- **Cultural Diversity**
- **Indigenous Knowledge** -Local and Indigenous Knowledge Systems (LINKS)
- **Disaster Risk Reduction- "**Education for DRR -building disaster-resilient societies"
- **Poverty Reduction** -Technical and Vocational Education and Training (TVET) and "second chance"

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Initiatives on Sustainable Development

- **Gender Equality** - UNITWIN Networks on gender and women issues .
- **Health Promotion** - EDUCAIDS and the UNAIDS Inter-Agency Task Team (IATT) on Education,
- **Sustainable Lifestyles** - iYouthXchangeProject. YouthXChange (YXC) is a “train-the-trainer” kit
- **Water** - UNESCO Associated Schools (ASPnet) Regional Flagship Project on Water Education
- **Sustainable Urbanisation** -UNESCO used the theme “Building Sustainable, Inclusive and Creative Cities” for the Shanghai World Expo 2010 “Better Cities, Better Life”

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Education for Sustainable Development 2014
World Conference, Aichi-Nagoya, 10-12 November
Stakeholder Meetings, Okayama, 4-8 November

UNESCO World Conference ESD-
Learning Today for a Sustainable Future
10-12 November 2014, Aichi-Nagoya, Japan

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1. **Celebrating a Decade of Action**
   "What have we achieved, what are the lessons learnt?"
2. **Reorienting Education to Build a Better Future for All**
   "How does ESD reinforce quality education?"
3. **Accelerating Action for Sustainable Development**
   "How are sustainability challenges addressed through ESD"
4. **Setting the Agenda for ESD beyond 2014**
   "What are the strategies for our common future?"

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MPhil in Engineering for Sustainable Development
global challenges, engineering solutions

- **Inner Core Modules**
- **Outer core modules**
- **Electives**
- **Dissertations/Project (three months)**

MPhil in Engineering for Sustainable Development global challenges, engineering solutions

Inner Core Modules

- ESD100 Concepts Values and Change
- ESD200 Sustainability Methods and Metrics
- MOTI Management of Technology and Innovation

–Outer core modules

- ESD300 Sustainability Assessment of Large Infrastructure projects
- ESD400 Economic, Legal and Regulation Issues
- ESD500 Sustainable Design and Implementation
- ESD600 Development Engineering

MPhil in Engineering for Sustainable Development global challenges, engineering solutions

Elective Modules

- Environmental Engineering
- Solar-electronic power: generation and distribution
- Renewable Electrical Power
- Architectural Engineering
- Electricity and the Environment
- Introduction to Technology Policy
- Strategic Valuation: Uncertainty and Real Options in System Design
- System Dynamics for Policy and Management
- Environment and Sustainability
- Environmental Design for Architecture 1

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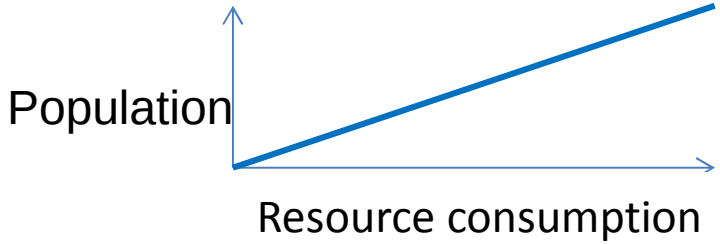
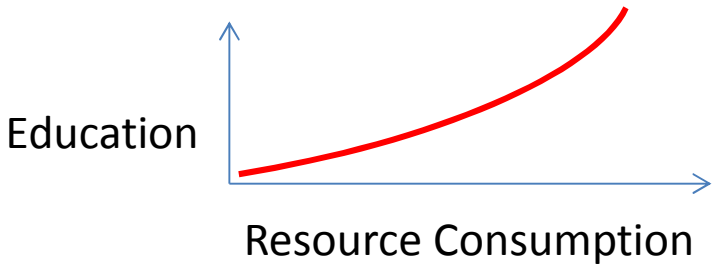
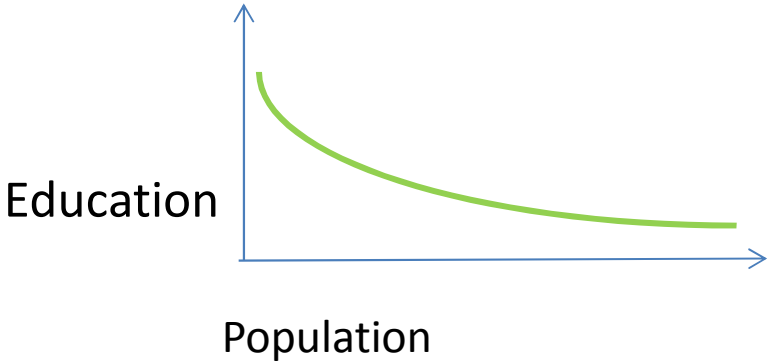
Elective Modules

- Politics, Society and Nature
- Fundamentals of environmental economics
- Sustainable Water Engineering
- Environmental Fluid Mechanics
- International Business Economics
- Project Management
- Sustainable Energy
- Complexity and negotiations
- Government Policy towards Technology Development
- Sustainability and international environmental policy
- Aspects of environmental policy-making
- Climate change policy and land development

Education: Promise and Paradox





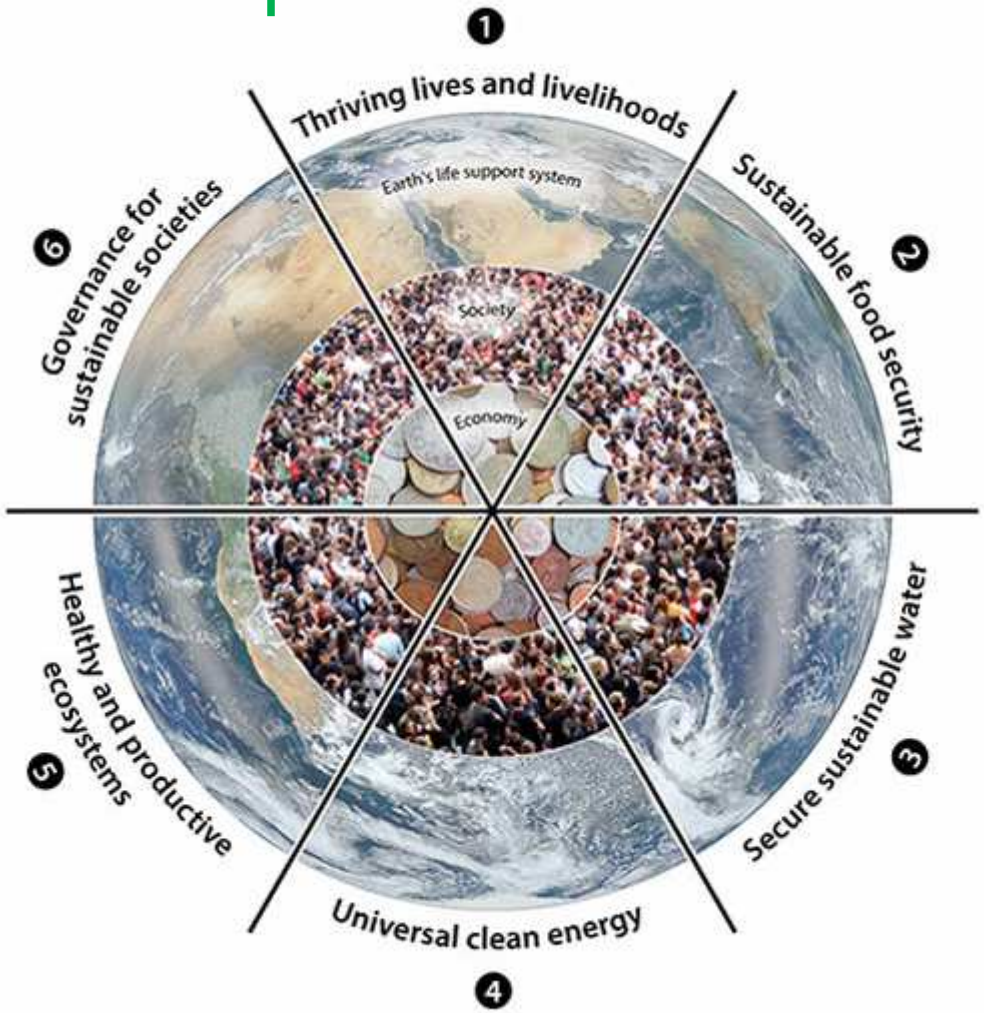


US statistics

(UNESCO Stat Year book)

- More than 80% of population has some post-secondary education, and about 25% of population has a four-year degree from a university.
- Per-capita energy use and waste generation in the United States are nearly the highest in the world.
- More education has not led to sustainability.

Six Goals for Sustainable Development



(Credit: Sustainable Development Goals for people and planet, Nature, Griggs et al (2013))

Six Goals for Sustainable Development

- Thriving lives and livelihoods
- Food security,
- Water security,
- Clean energy,
- Healthy and Productive Ecosystems
- Governance for sustainable societies —

The targets beneath each goal include updates - ending poverty and hunger, combating HIV/aids, and improving maternal and child health.

A Sustainable Planet?

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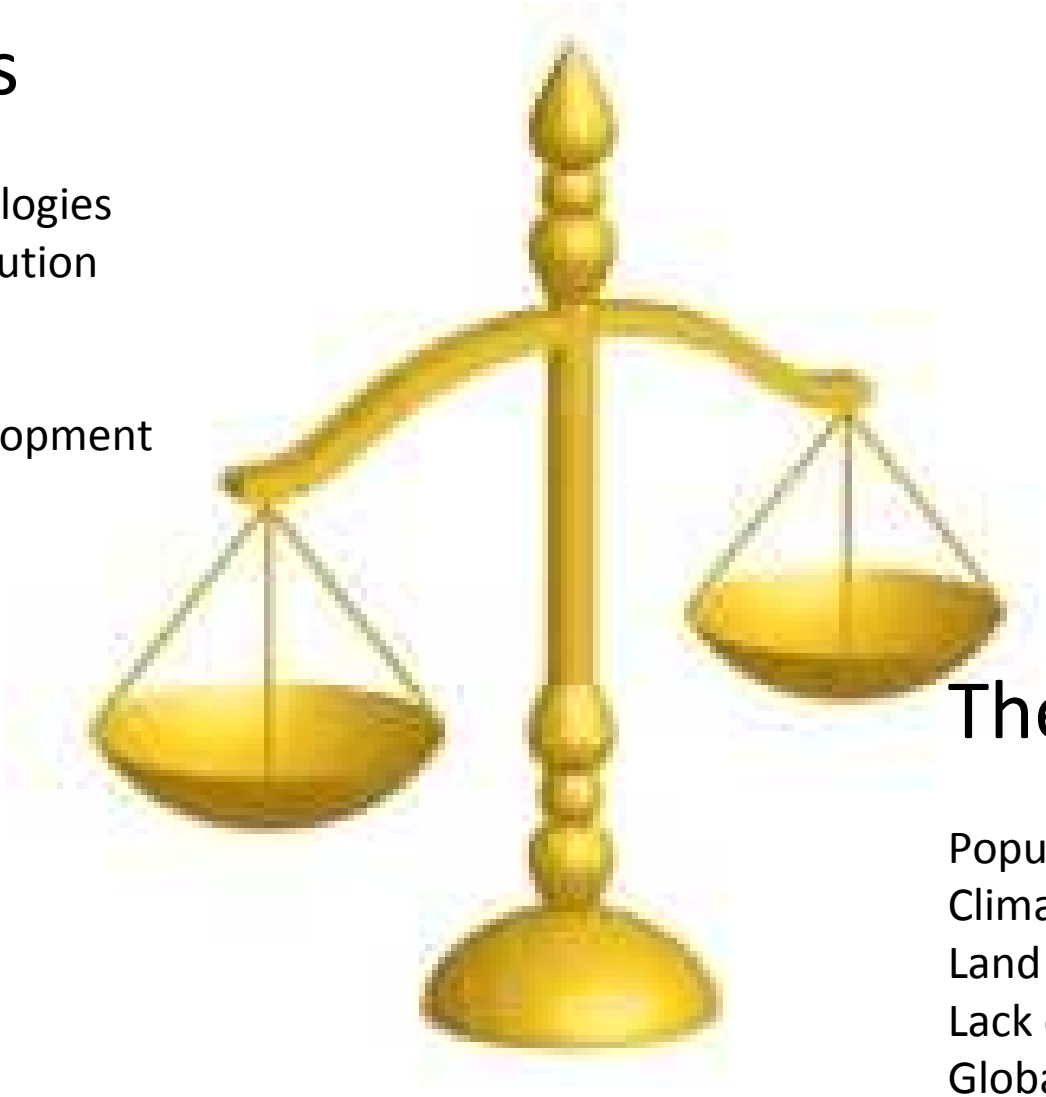
The Pluses

Advanced Technologies
Information revolution
Corporate SD
    Leadership
Sustainable Development
    Goals



The Minuses

Population Pressures
Climate Change
Land Grabs
Lack of Planning
Global lawlessness

Africa is big

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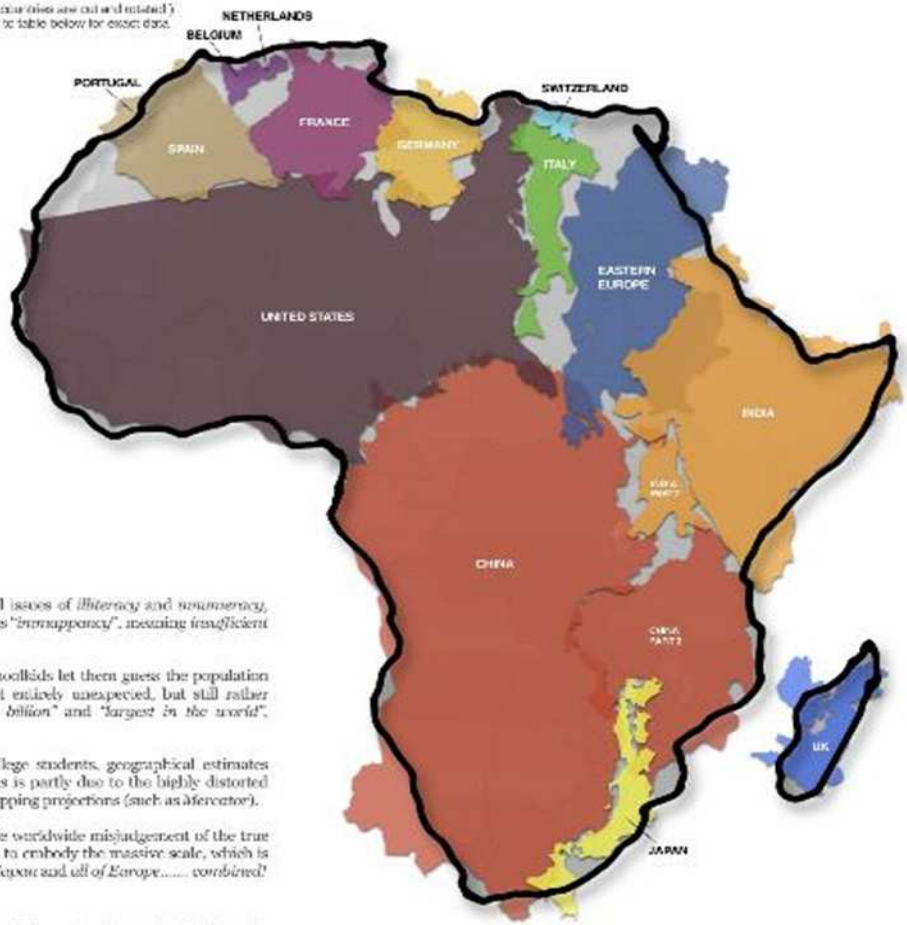
The True Size of Africa

A small contribution to the fight against rampant Innumeracy by Kai Krause

Graphic layout for visualization only (some countries are cut and rotated).
But the conclusions are very accurate; refer to table below for exact data.

COUNTRY	AREA (1000 km²)
China	9.597
USA	9.629
India	3.287
Mexico	1.964
Peru	1.285
France	633
Spain	506
Papua New Guinea	462
Sweden	441
Japan	378
Germany	357
Norway	324
Italy	301
New Zealand	270
United Kingdom	243
Nepal	147
Bangladesh	144
Greece	132
TOTAL	**30.102**
AFRICA	**30.221**



In addition to the well known social issues of *illiteracy* and *innumeracy*, there also should be such a concept as "*Innuppancy*", meaning *insufficient geographical knowledge*.

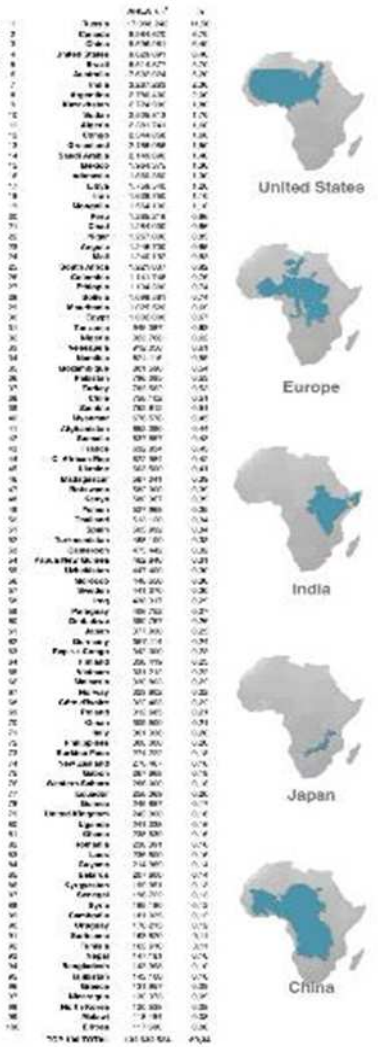
A survey with random American schoolkids let them guess the population and land area of their country. Not entirely unexpected, but still rather unsettling, the majority chose "*1-2 billion*" and "*largest in the world*", respectively.

Even with Asian and European college students, geographical estimates were often off by factors of 2-3. This is partly due to the highly distorted nature of the predominantly used mapping projections (such as Mercator).

A particularly extreme example is the worldwide misjudgement of the true size of Africa. This single image tries to embody the massive scale, which is larger than the USA, China, India, Japan and all of Europe..... combined!

Top 100 Countries

Area in square kilometers, Percentage of World Total
Source: Wikipedia, Wikipedia (Mercator 1979)



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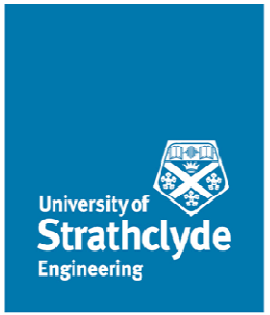
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ICT and Sustainability -Opportunities

- Enhance capacity to model, monitor, and control environmental ecosystems
- Enable more efficient uses of energy through the development of “smart” energy, transportation, building, manufacturing, water, agricultural, and resource management systems;
- Help innovators and entrepreneurs create green jobs throughout the economy and sustainable social enterprises;
- Provide communities with access to information and tools that enable them to make more sustainable choices.

Source: Essays **Sustainable Communication** 2013 Open Canada. org

ICT and Sustainability -Threat

- Fastest-growing source of greenhouse gas emissions
- Increase efficiency of unsustainable production processes and business practices
- Eliminate jobs and entire economic sectors as part of the process of “creative destruction” that accompanies innovation;

Source: **Essays Sustainable Communication**

Challenges

- Countering cyber-crime and ensuring cyber-security in cyber-space;
- Protecting privacy and creating confidence and trust in the online environment;
- Managing critical resources for the stability and security of the internet
- Ensuring adequate and continuous investment in ever-higher capacity-fixed and mobile telecommunications infrastructures;

- Two issues are necessary to maximize the opportunities presented by ICTs and minimize the threats and the internet.

Two issues

The first essential is a global ICT governance regime:

- Designed to support the technical, economic, social, and environmental sustainability of the ICT and internet sector
- Responds to the very serious challenges it now faces on each of these dimensions.

Source: **Essays** **Sustainable Communication** 2013 Open Canada. org

Second essential

A sustainable development Governance regime that:

- Takes account of the ways in which ICTs and the internet are transforming economies and societies.
- Supports development of policies, programs, and processes aimed at generating sustainability
- Includes regulatory, incentive, subsidy, and procurement mechanisms designed to influence the behaviour of businesses

The challenge of sustainability in the world economy, society and environment is:

- The transformations in economy, society, politics and culture that are resulting from the spread of information and communications technologies (ICTs) and especially the Internet.

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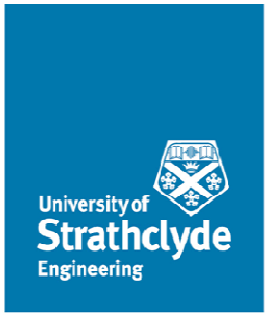
Impact of ICT and Internet on:

- Economic Development
- Social change
- Environment (protection), “smart systems”

Impact

- What impacts are new media and the Internet having on the achievability of the core elements of sustainability—economic and social development, environmental protection, cultural diversity and governance—and on the balance between them?
- To what extent do these impacts enhance sustainability and to what extent do they, on the contrary, raise new sustainability challenges?
- Do the economic, social, political and cultural implications of these impacts imply that we need to revise, rethink or readjust our understanding of what sustainability means?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