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Beyond 2015

Role of STI in Shaping the Future We Want for All

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UNESCO Regional Science Bureau for Asia and the Pacific

Sustainability Science, International event, Kuala Lumpur, 4-5 April, 2013

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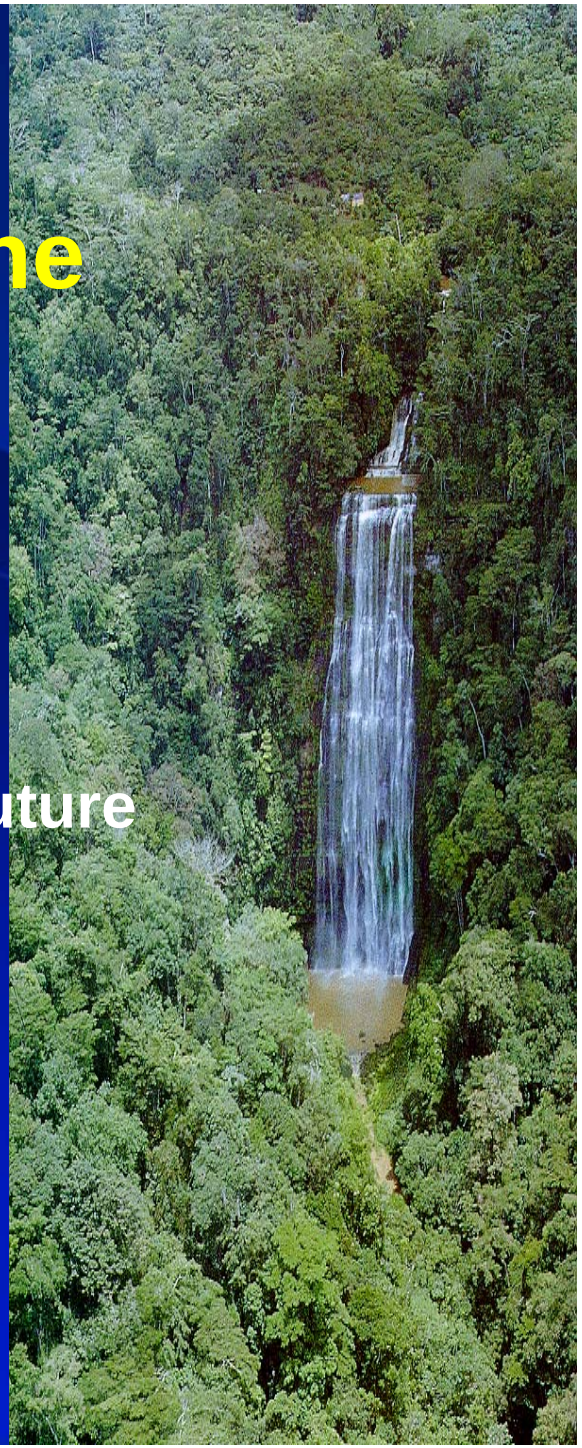
Presentation Outline

- Key global challenges
- From MDGs to Post-2015 Agenda
- The role of STI – Past, Present and Future
- Why Sustainability Science?



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Global Challenges

We live in a world that is alarmingly out of balance:

- **This relates to the severe imbalance between people and planet earth, and**
- **The persistent imbalance between people**

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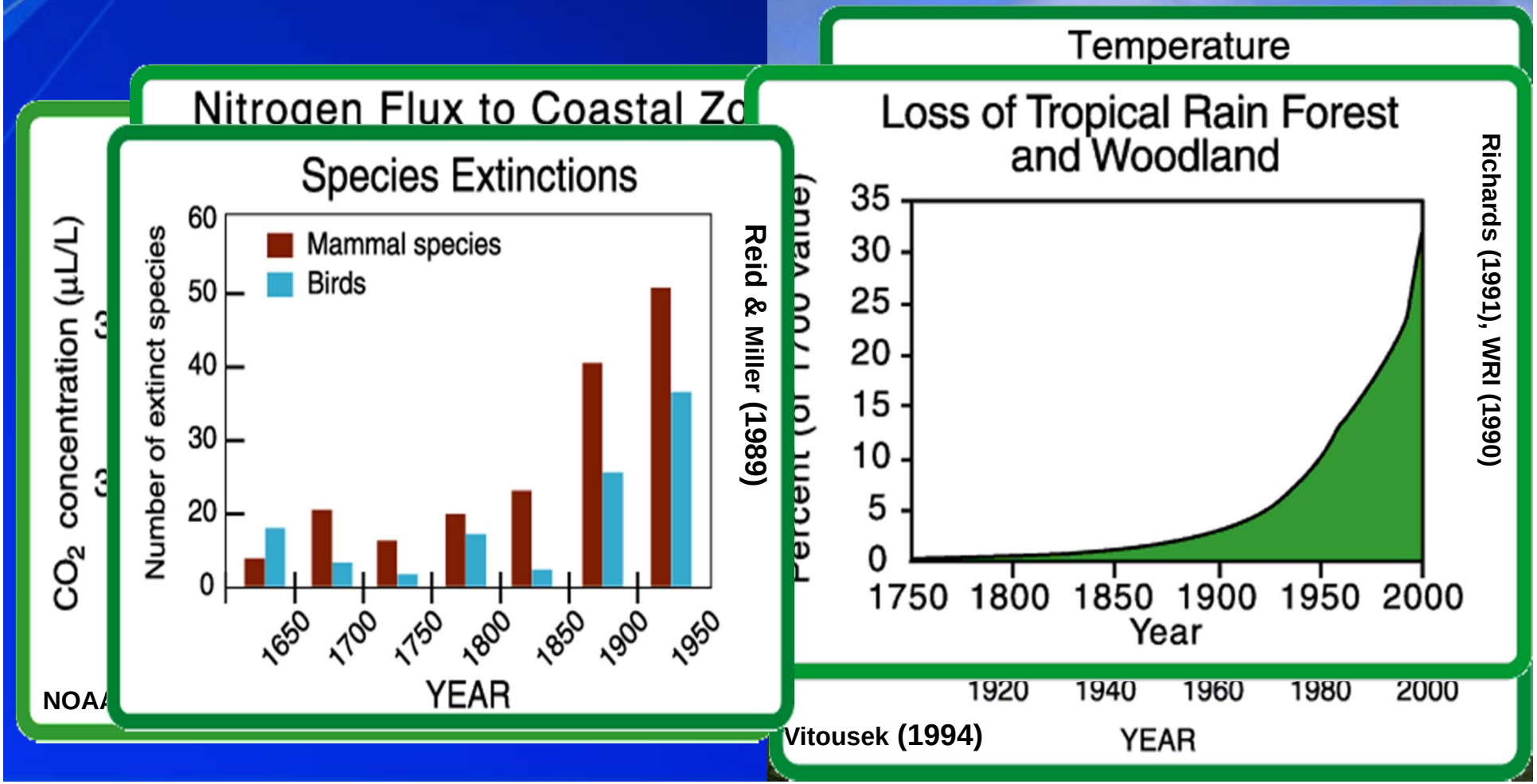
Imbalance between people and planet

Global Change is more than Global Climate Change



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Massive Pollution

- Water resources destruction
- Soil, air pollution
- Diffuse pollution (e.g. fertilzer, pestices)
- Environmental and public health impacts

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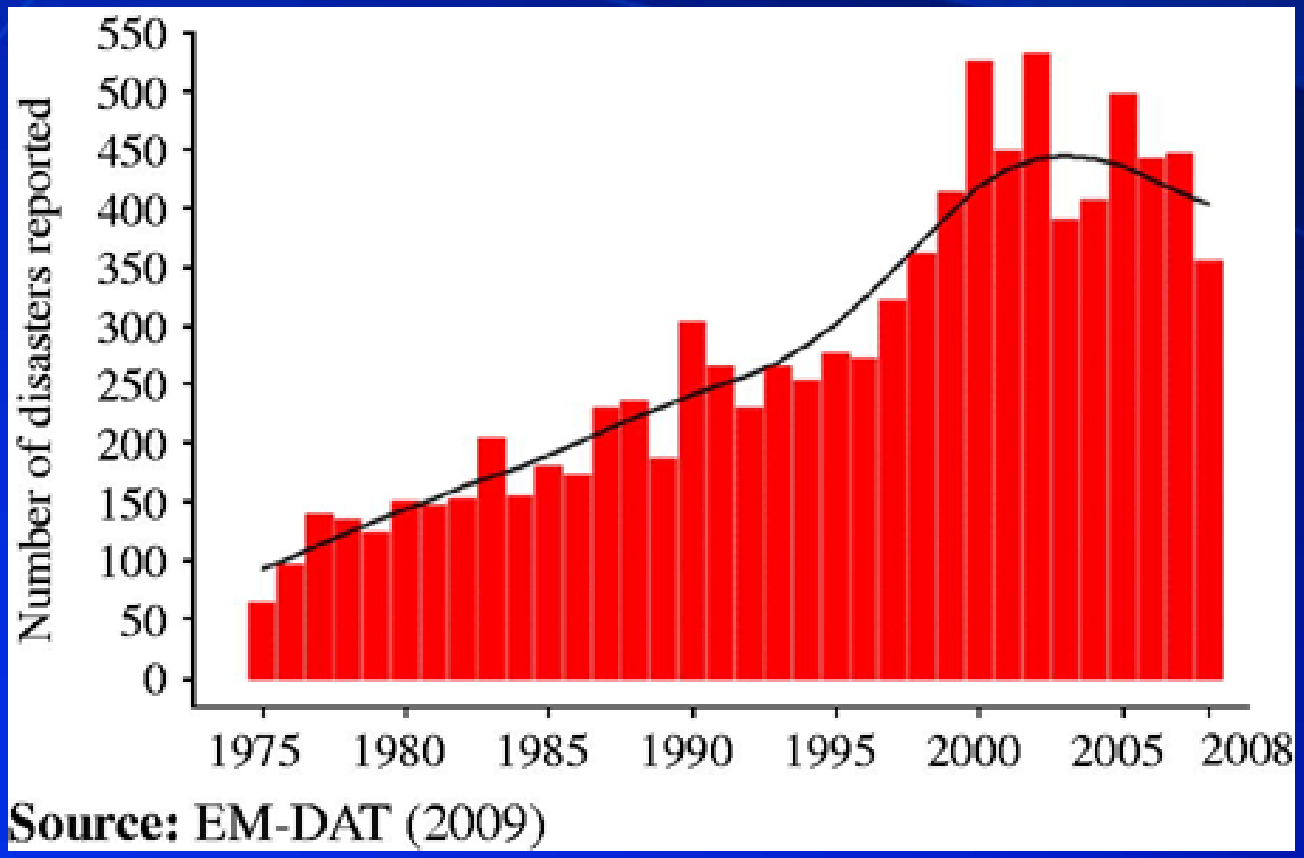
‘Natural’ Disasters



Source: EM-DAT (2009)

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Oceans at Risk

- Pollution
- Over-fishing
- Acidification
- Coral bleaching
- Species extinction
- Sea level rise – island and coastal ecosystems

“There will never be the future we want without the ocean we need”.

Prof. Alex Rogers

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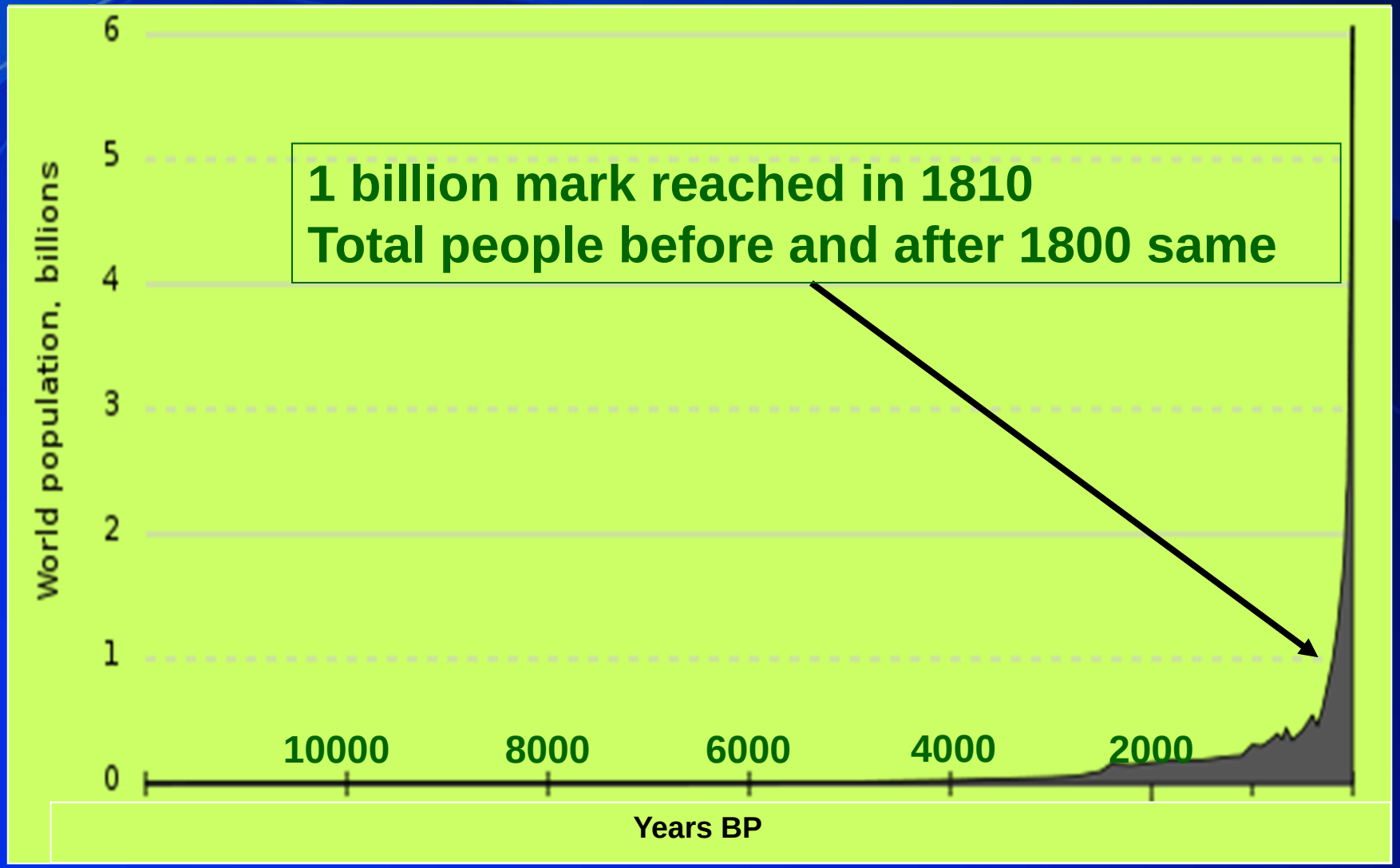
World population growth



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The Earth in Turmoil

- Population to 9 billion by 2050
- Increasing per capita consumption of resources
- Increasing per capita production of waste
- Much of the oil reserves build up in 2.5 billion years burned in <200 years

But: …. finite resources !!!

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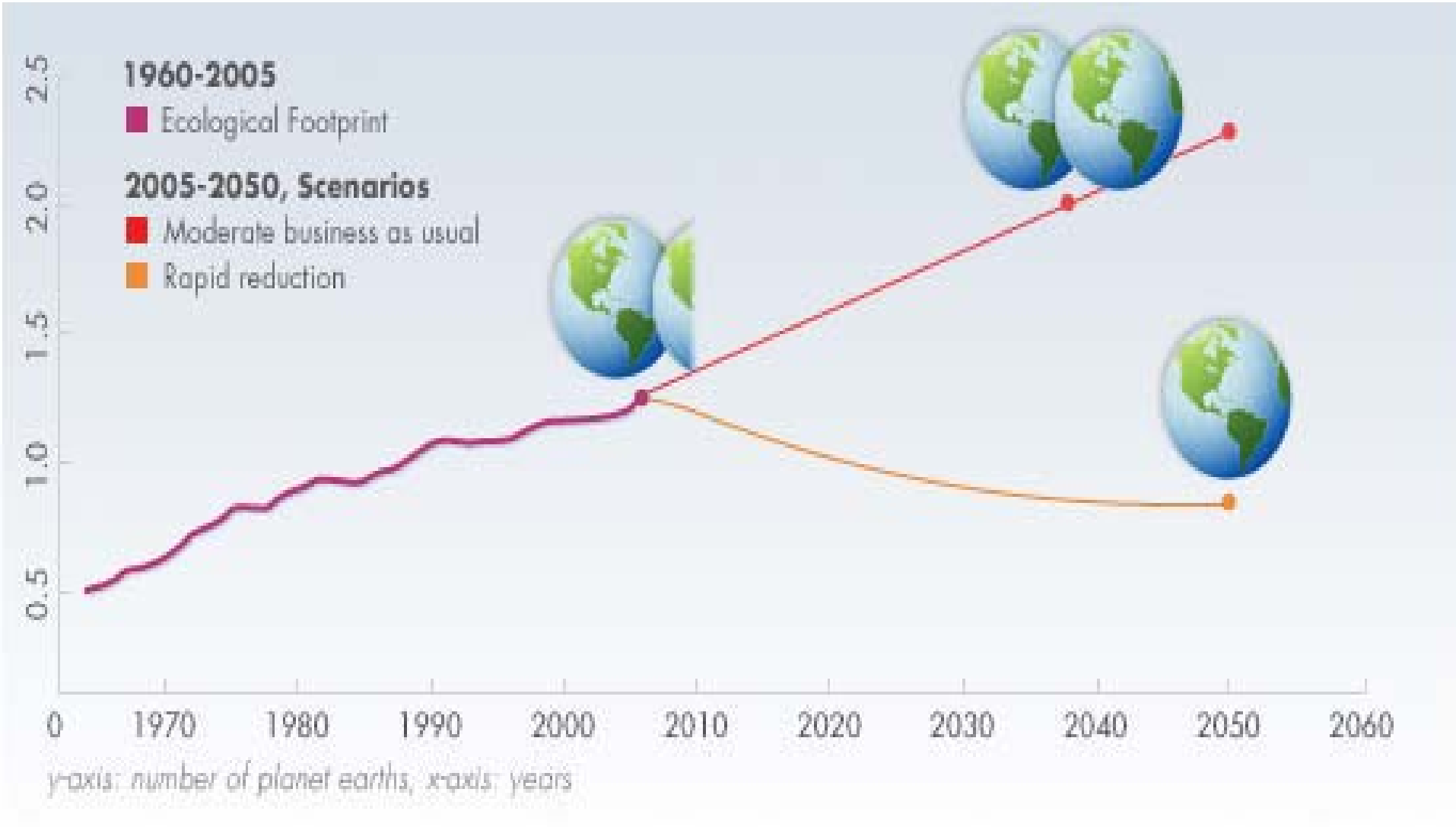
Ecological footprint



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Imbalance between people

- The richest 1% of adults own 40% of global assets
- The bottom 50% of adults own 1% of global wealth
- Women earn only 10% of global income
- Modern medicine has answers to many diseases, yet millions die every year of curable disease
- Many developed nations produce surpluses of food, while close to a billion people suffer from hunger

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Challenge and Opportunity

The Challenge:

- The past 3-4 decades have seen the emergence of complex global challenges

The Opportunity:

- We have 3-4 decades to move towards a sustainable development path

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A Defining Moment in Time

MDGs

2015

Post-2015 Agenda

The future we want for all

2000 — 2015 — 2030 — 2050

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10 Key Global Challenges

- Poverty eradication
- Pollution
- Population growth and urbanization
- Food security and sustainable production
- Old and New diseases
- Energy
- Disasters
- Water and environmental resources
- Climate change
- Peace and security

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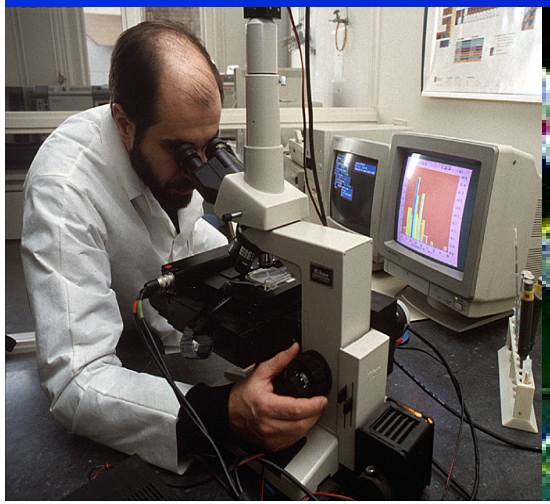
The Role of STI

Past, Present and Future



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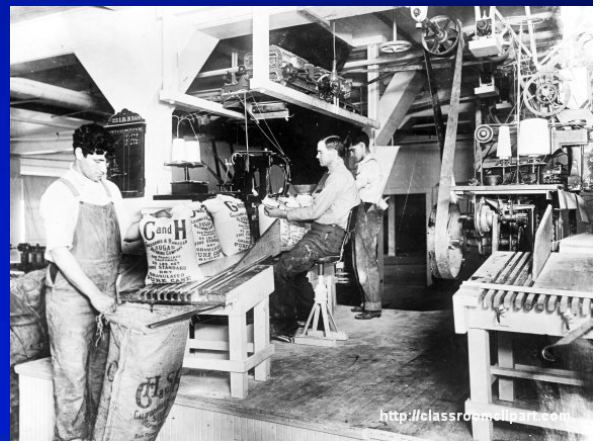
The role of Science

The Past

- **Industrial revolution** (1686 – steam engine; later: electricity, mechanisation, mass production)
- **Medical revolution** (19th century – discovery mircoorganisms, 20th century – antibiotics, farmaceutical industry)
- **Green revolution** (20th century – fertiliser, pesticides, crop improvement)



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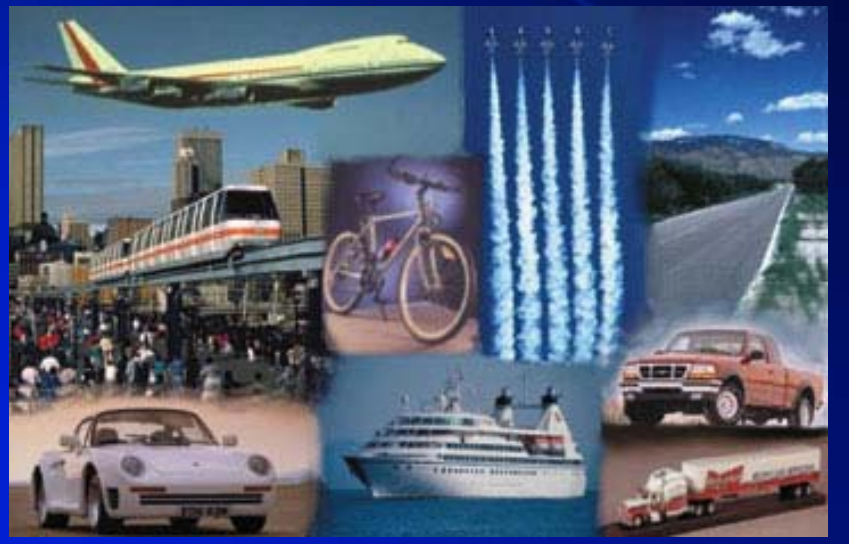
Mobility

- **Transportation revolution**
  (1790 first bicycle)



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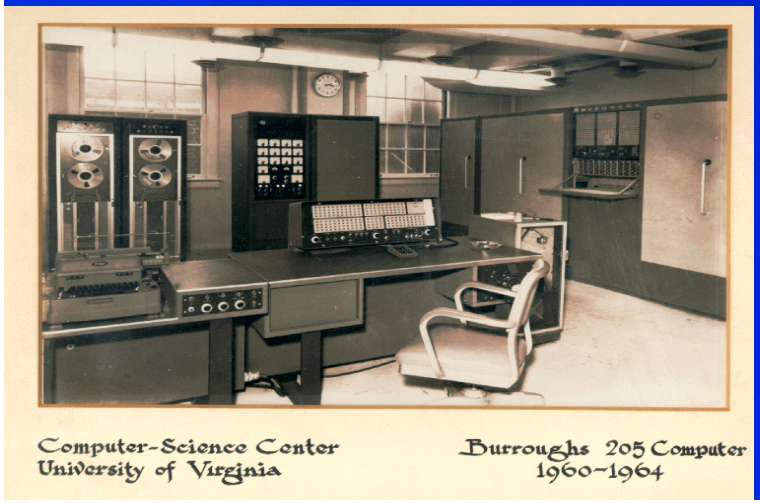
Science for Development

Present

ICT Revolution

"If the automobile and airplane business had developed like ICT, a Rolls Royce would cost $2.75 and would run for 3 million miles on one gallon of gas. And a Boeing 767 would cost just $500 and would circle the globe in 20 minutes on five gallons of gas." - Tom Forester



Computer-Science Center
University of Virginia

Burroughs 205 Computer
1960-1964

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Science for Development

The Future

- Biotechnology revolution?
- Nanotechnology?
- Combinations of above with ICT.....

We need:

A Sustainable Development Revolution

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Science Based Revolutions

Lights and shadows

- **Brought enormous economic growth and prosperity for many, but……..**

- **Many others were left behind (MDGs)**
- **The benefits came at huge 'environmental costs'**

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We need
A Sustainable Development Revolution

But this requires that we:

- **Uplift the position of S&T on national and international agenda and in the hierarchy of institutions**
- **Ensure a more forward looking approach to minimise negative consequences of new solutions**
- **Apply inter- and trans-disciplinary approaches**

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Science a priority?

- How much do we spend on R&D?
- Political interest in STI?
- How is STI positioned in the MDGs?
- How will it be integrated into the Post-2015 Agenda?
- How ensure we generate full benefits from STI?
- What can we learn from the past?

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Millennium Declaration

Methodological note: The bigger the word, the more often it is mentioned in the text.

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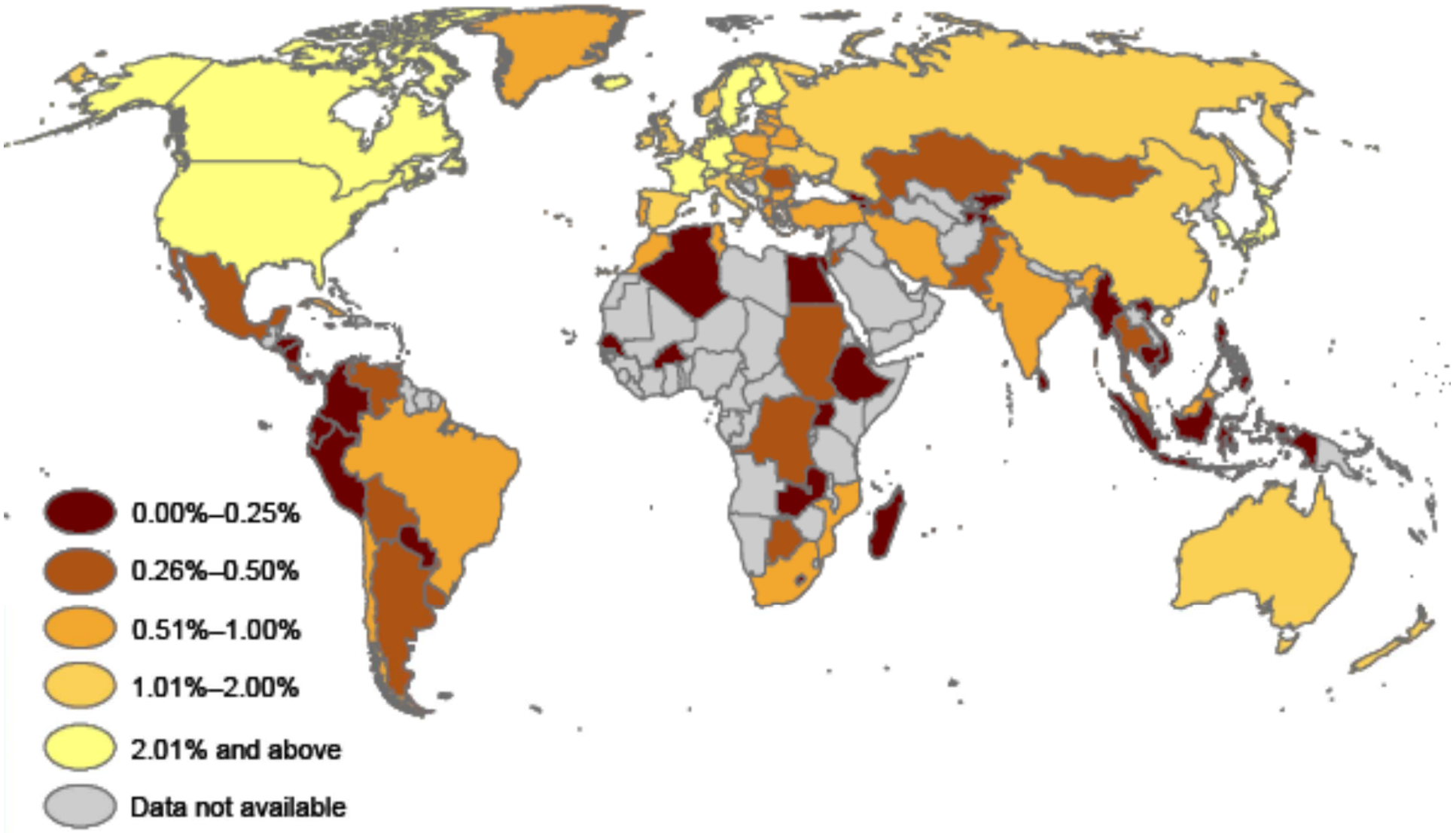
Expenditure on R&D as % of GDP



UNESCO Institute for Statistics, September 2007

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10 Key Global Challenges

Role of STI

- Poverty eradication
- Population growth and urbanization
- Food security
- Pollution
- Old and New diseases
- Sustainable Energy
- Disasters
- Water and environmental resources
- Climate change
- Peace and security

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Complex challenges

All these challenges are inter-related, e.g.

Food – Water – Energy nexus……

- relates also to poverty
- and to pollution
- to environmental resources
- to mobility, and
- to climate change
- And ultimately also to peace and security

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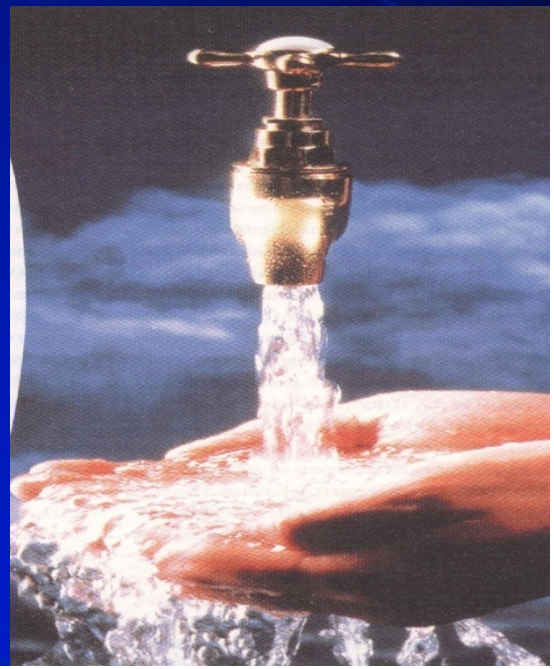
Example:
Contradiction Target 7c – MDG7

Vision21: Safe water for all by 2025

This means that 8 billion people will produce:

- **580 x 10^9 m^3 sewage per year**
- **116 x 10^6 ton BOD per year**
- **18 x 10^6 ton N per year**



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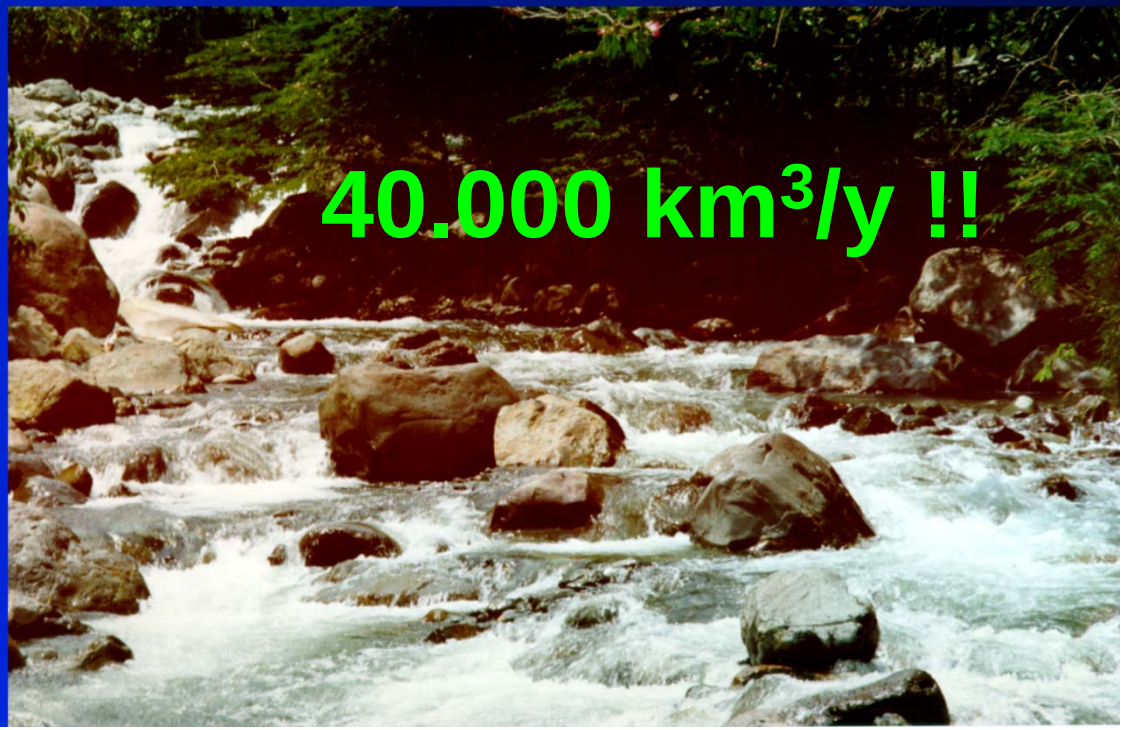
How does that affect water resources?

1 l sewage destroys 100 l of fresh water, so annually 58.000 km^3 water resource will be affected!

Renewable water:



Is this the future of our water resources?
Achieving Target 7c jeopardizes the Goal, and also negatively impacts on other MDG 1, 3, 4, 6

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Why Sustainability Science?

- To manage complexities and inter-relatedness of challenges
- To provide a stronger analytical and scientific underpinning of the concept ‘sustainability’
- To employ inter- and trans-disciplinary approaches
- To advance understanding of human-environment systems

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Example:
Food Security

- **The challenge is to produce sufficient protein/cal for 9 billion people in 2050**
- **Key limiting factors: water, land, energy, disease, disaster, pollution**

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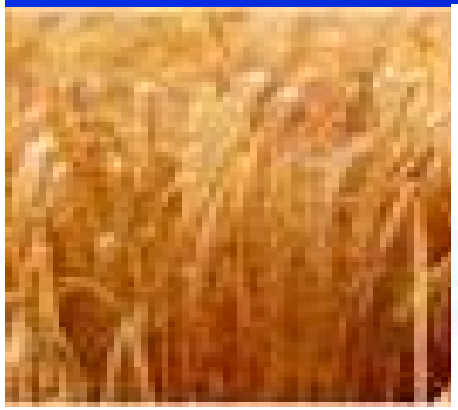
Food Security for the 21st Century

- Increasing crop yield
- Reduce crop vulnerability to environmental stress
- Reduce dependence on fertiliser, pesticides
- Reduce water dependence
- Increase nutritional status
- New Food



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New Food

Science or Science Fiction?

The idea of food produced in factories is not so far from reality as we might think

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New Energy

- **1970-ties:** first signs that oil dependence is not sustainable
- **Past 25 years:** emergence of climate change awareness and interest in other energy sources
- **Coming 25 years:** diversification of energy sources
- **2035-2050:** convergence to 1 or 2 main sources of renewable energy
- **New energy:** from biotechnology or existing natural source (sun, geothermal or other)?

Example – New Water
SWITCH to the Future

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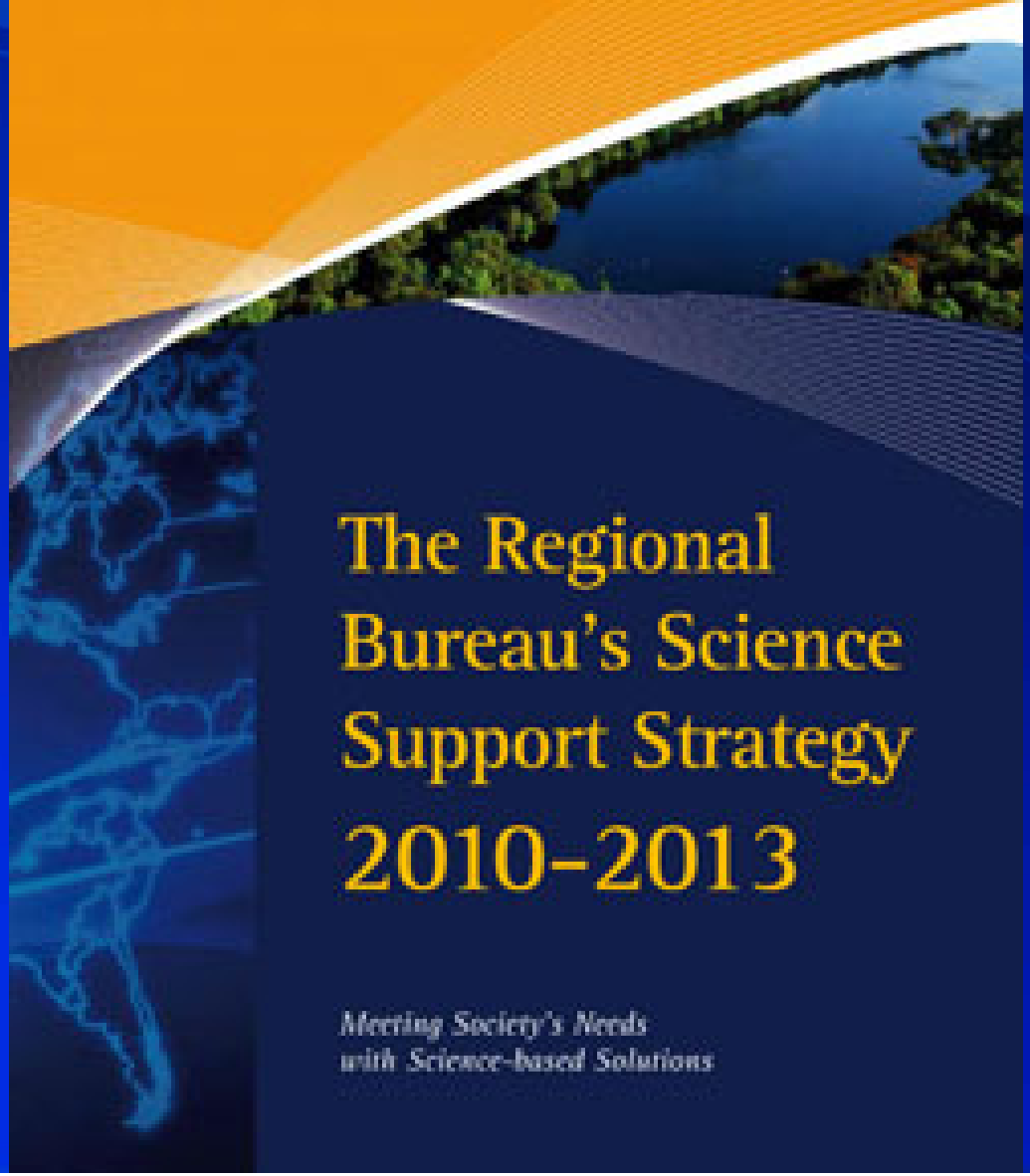
UNESCO Jakarta
Asia and the Pacific Regional Science Bureau



The Regional Bureau's Science Support Strategy 2010-2013

Meeting Society's Needs with Science-based Solutions

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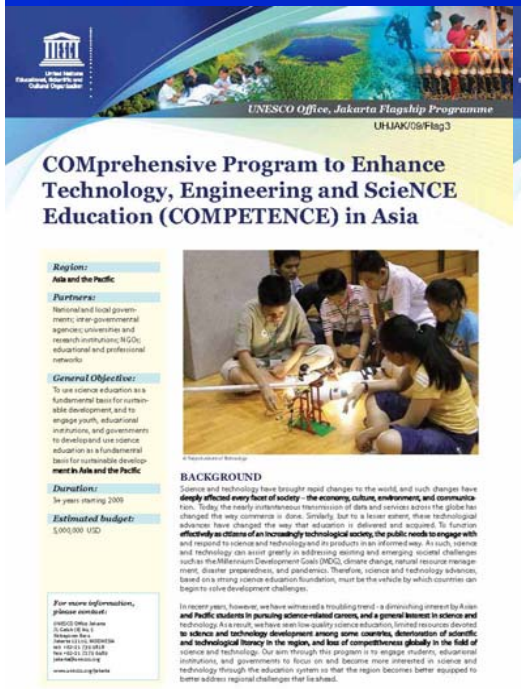
Strategy

Regional flagship Programmes

JFIT – UNESCO Science Programme
on Global Challenges in Asia and the Pacific Region


UNESCO Office, Jakarta Flagship Programme
UHJAK/09/Flag3

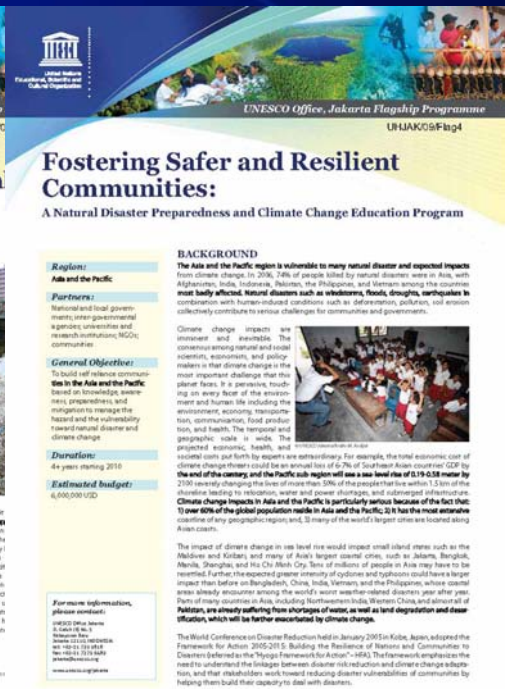
COMprehensive Program to Enhance Technology, Engineering and ScieNCE Education (COMPETENCE) in Asia

UNESCO Office, Jakarta Flagship Programme
UHJAK/09/Flag1

Biosphere Reserves for Environmental and Economic Security (BREES):
A Climate Change and Poverty Alleviation Programme

UNESCO Office, Jakarta Flagship
UHJAK/

Sustainable Water Management Improves Tomorrow's Cities Hea (SWITCH) *-in-Asia*


UNESCO Office, Jakarta Flagship Programme
UHJAK/09/Flag4

Fostering Safer and Resilient Communities:
A Natural Disaster Preparedness and Climate Change Education Program

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Educating for a Sustainable Future

- UN Decade ESD 2005 – 2015
- Post 2015- Educating for a sustainable future
- Green School Programme
- Link ESD and SE
- World Conference on ESD 2014

World Conference on Education
for Sustainable Development 2014

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Conclusions

- We have 3-4 decades to address and solve the key Global Challenges of our time
- The Post-2015 Agenda needs to be based on sound science, technology and innovation
- We need to learn from mistakes of the past
- Sustainability Science should play a major role in providing answers to complex global challenges

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Conclusions

This requires

- **Full understanding of complexities and inter-actions, and use of inter- and trans-disciplinary approaches**
- **Cooperation and partnerships at all levels**
- **A more forward looking approach, aimed at minimising externalities and maximising benefits**
- **Effective SC-Policy linkages and commitment to SC ($$, capacities, institutional, policies)**
- **Global awareness and 'Educating for SD'**

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Partner in Building

The future we want for all

Thank You!

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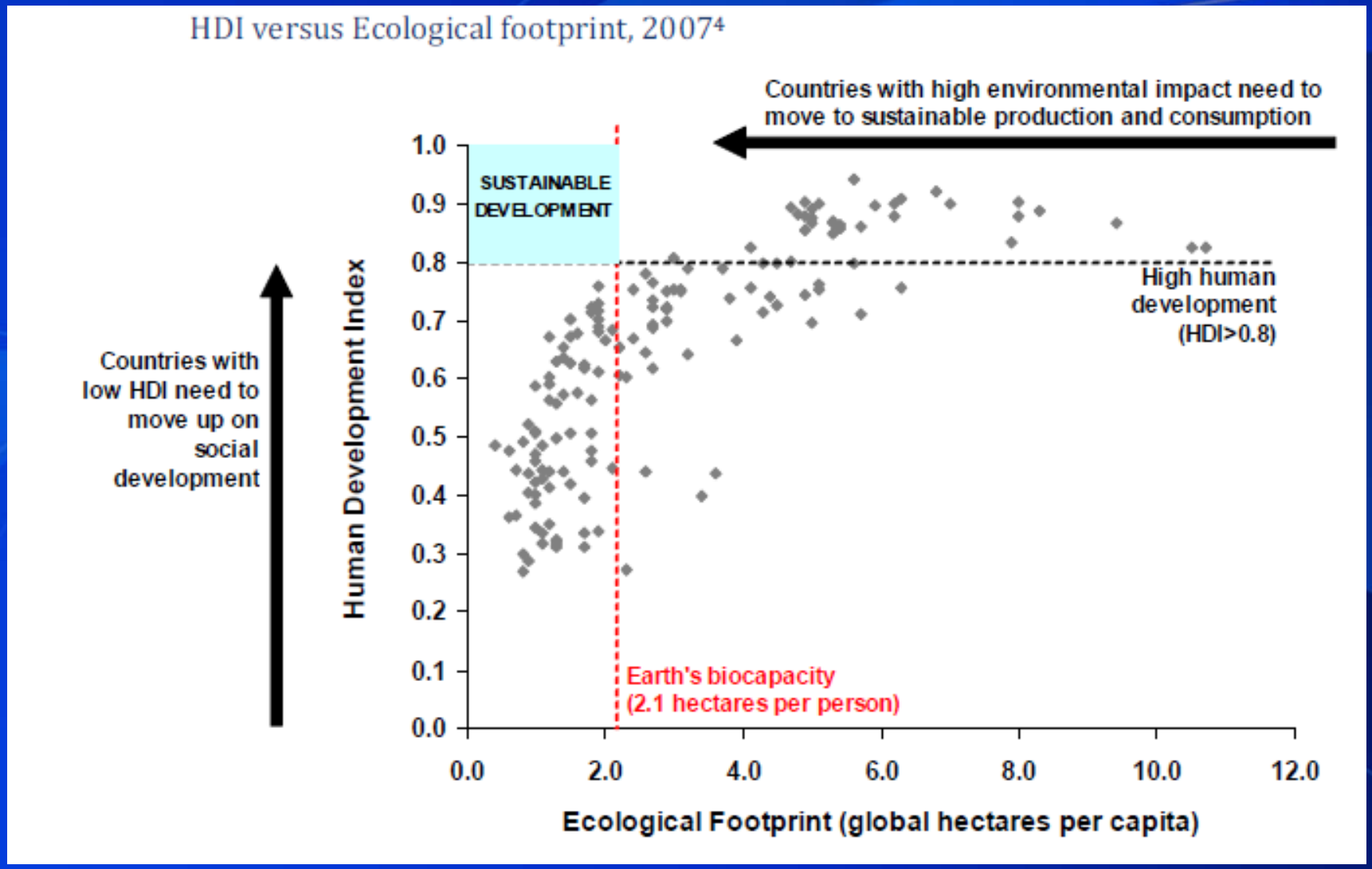
Ecological footprint



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The Future We Want -
Four Core Dimensions

- Environmental Sustainability
- Peace and Security
- Inclusive Social Development
- Inclusive Economic Development

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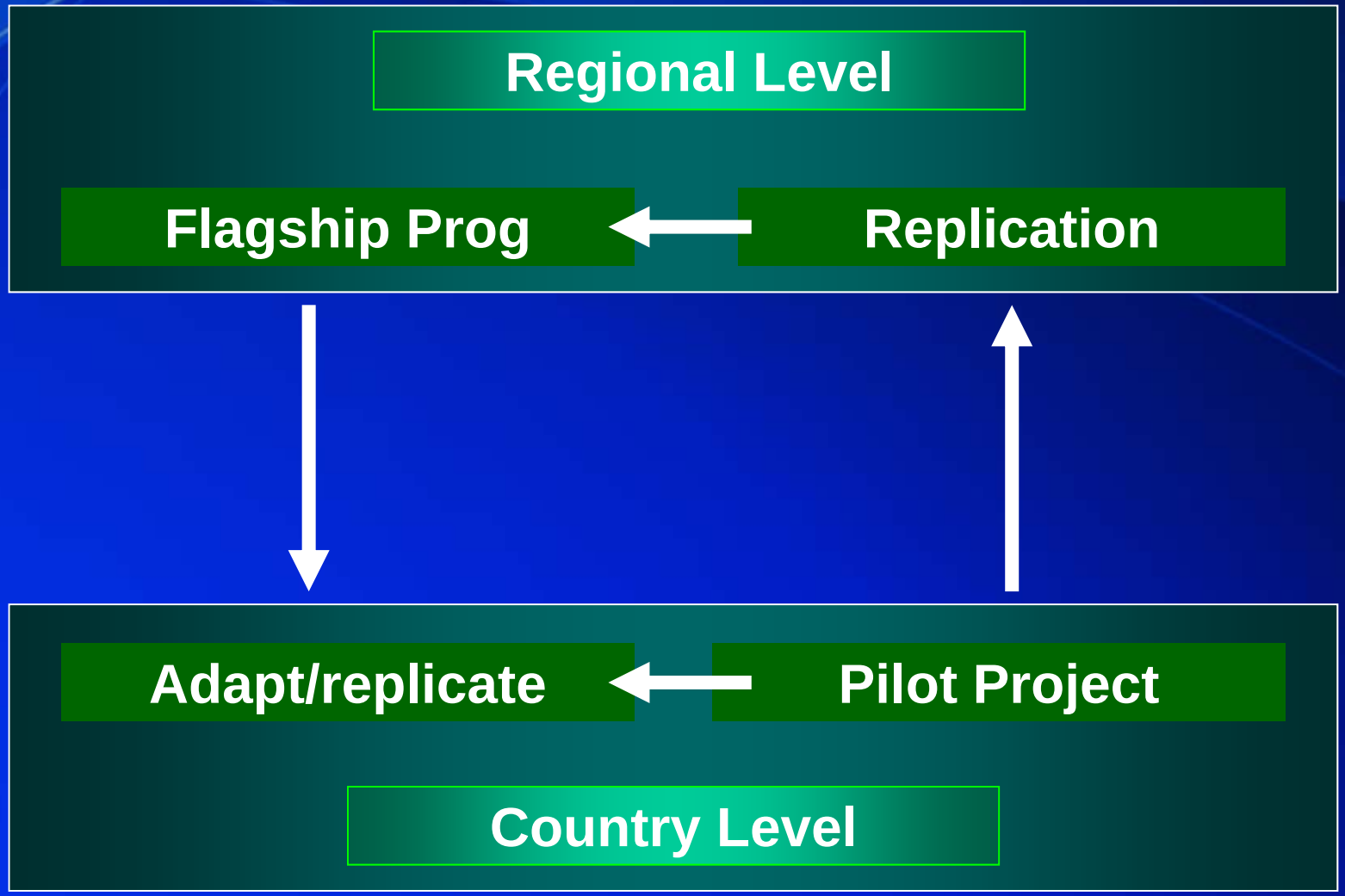
Regional and Country Level



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Problems in conventional food production

- High water consumption
- Vulnerable to environmental stresses
- Vulnerable to disease
- Highly polluting (diffuse pollution!)
- Issues of animal well being and massive killing of animals to satisfy our protein needs