



# Assistance for Action

## Aviation and Climate Change Seminar

23 - 24 October 2012

ICAO Headquarters, Montréal, Canada

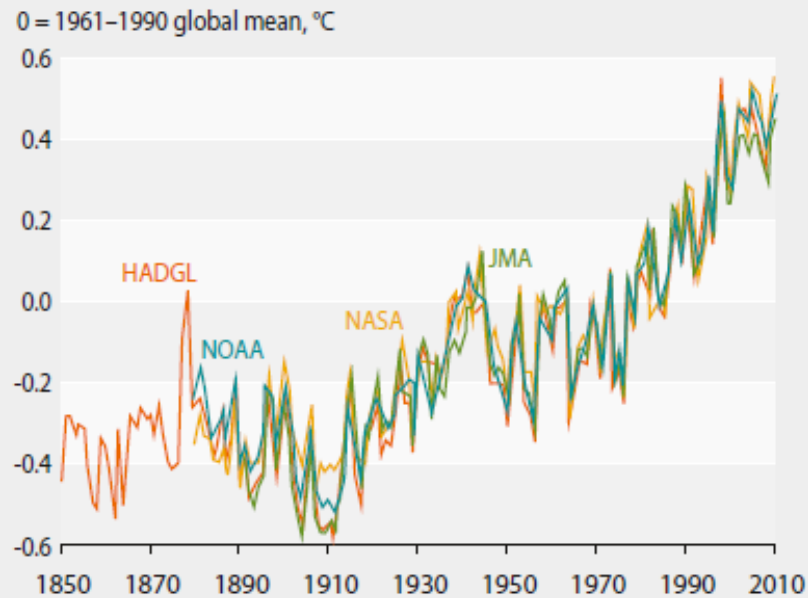


# Biofuels - Sustainability is a MUST

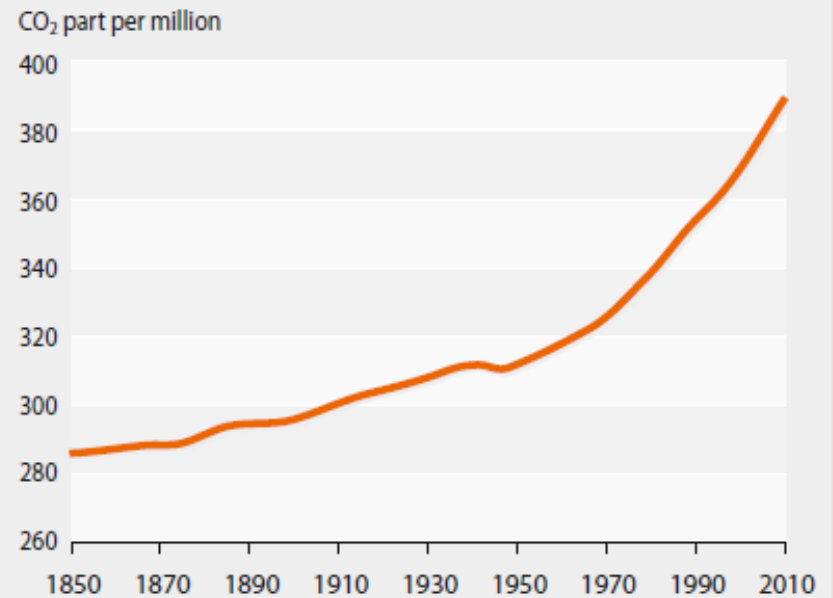
# Atmosphere

Reaching the climate goal under the UNFCCC of reducing global GHG emissions so as to hold the increase in global average temperature below 2° C above pre-industrial levels will require not only the fulfilment of current pledges but also transformative change towards a low carbon global economy.

**Figure 2: Trends in temperature change and atmospheric CO<sub>2</sub> concentrations, 1850–2010**

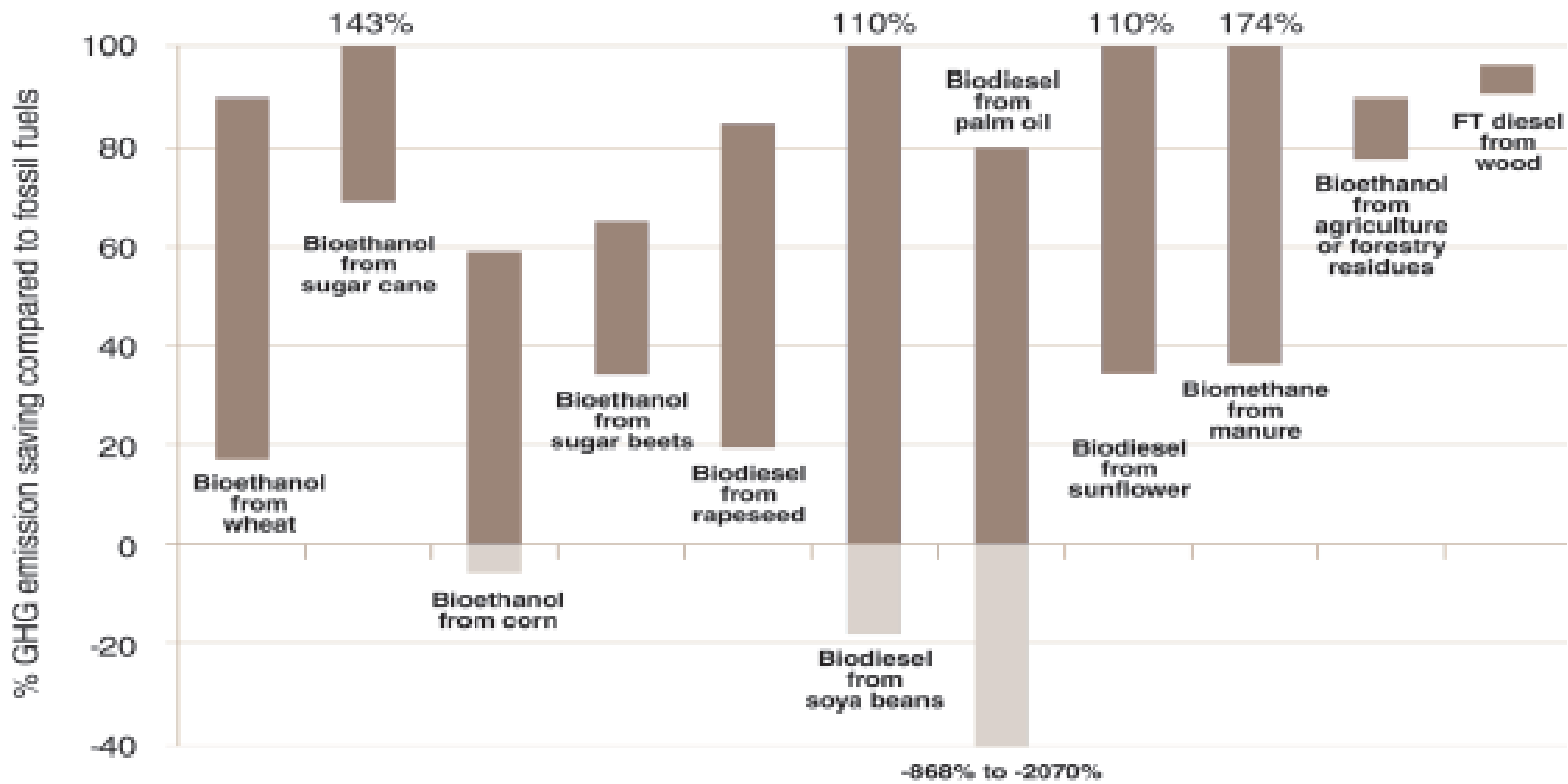


Sources: Climate Research Unit at the University of East Anglia (HADGL), NOAA NCDC, NASA GISS, Japan Meteorological Agency



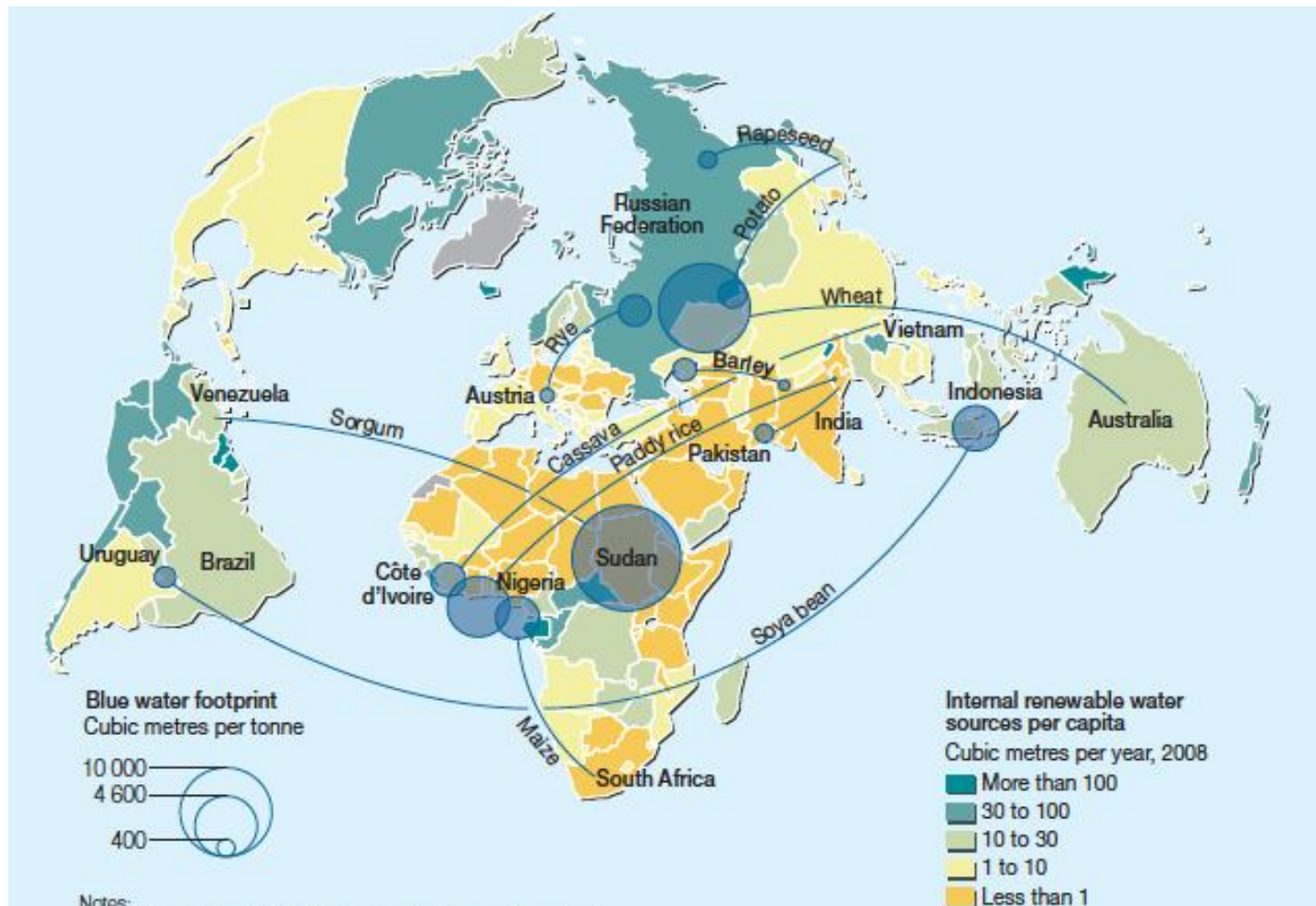
Sources: Scripps Institute of Oceanography, NOAA

# Life-cycle GHG savings of selected biofuels compared to fossil fuels



Source: own compilation based on data from Menichetti/Otto 2008 for bioethanol and biodiesel, IFEU (2007) for sugar cane ethanol, and Liska et al. (2009) for corn ethanol; RFA 2008 for biomethane, bioethanol from residues and FT diesel

# Variation in blue water footprint for selected energy crops



**Notes:**

1. The blue water footprint is the volume of surface and groundwater consumed as a result of the production of goods or services.
2. Internal renewable water resources comprise the average annual flow of rivers and groundwater generated from endogenous precipitation.

Source: Gerbens-Leenes et al., *The water footprint of bioenergy*, PNAS, 2009.

# Did you know?

The 20th century saw resource use grow **eight-fold**

7 billion tonnes per year

1900

2005



60 billion tonnes per year

The next 40 years could continue to a **tripling** resource use if the same resource intensive development paths are followed.

2050

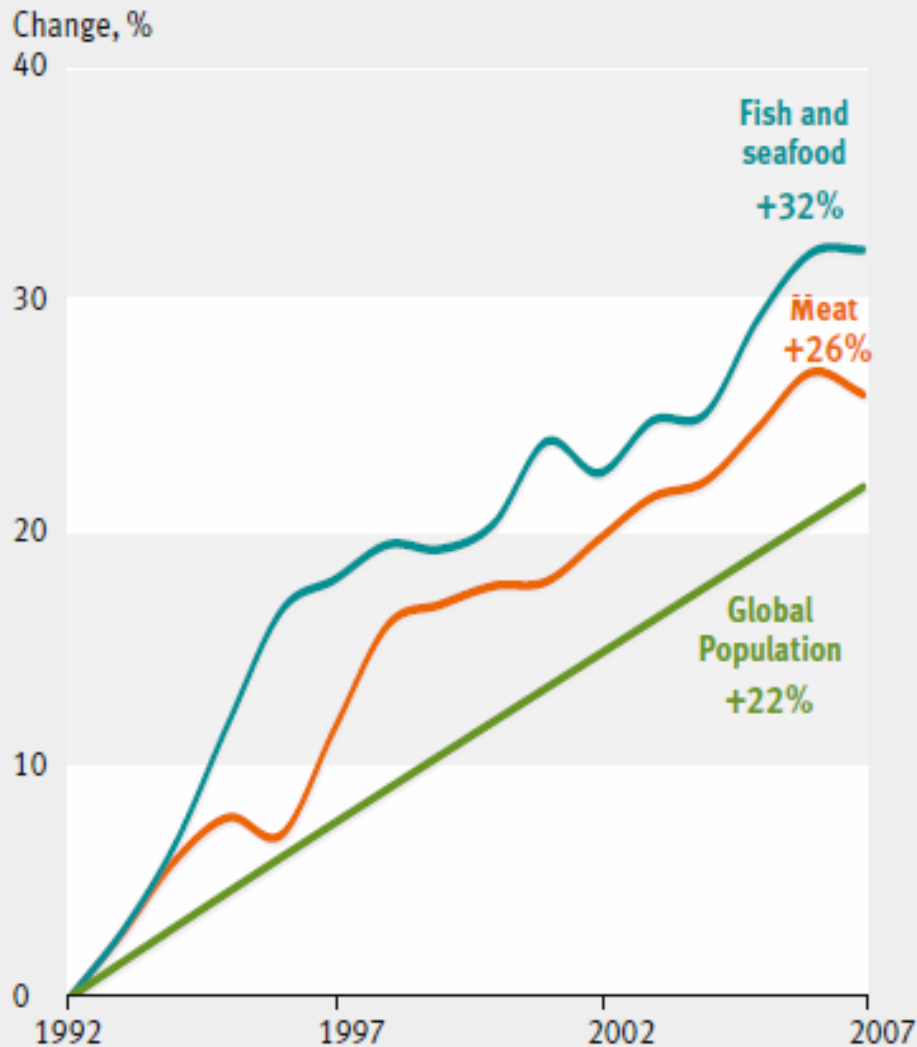
140 billion tonnes per year



International  
Resource  
Panel

[www.unep.org/resourcepanel](http://www.unep.org/resourcepanel)

**Figure 3: Change in global population and in meat, fish and seafood supplies, 1992–2007**



Source: UNEP/FAO

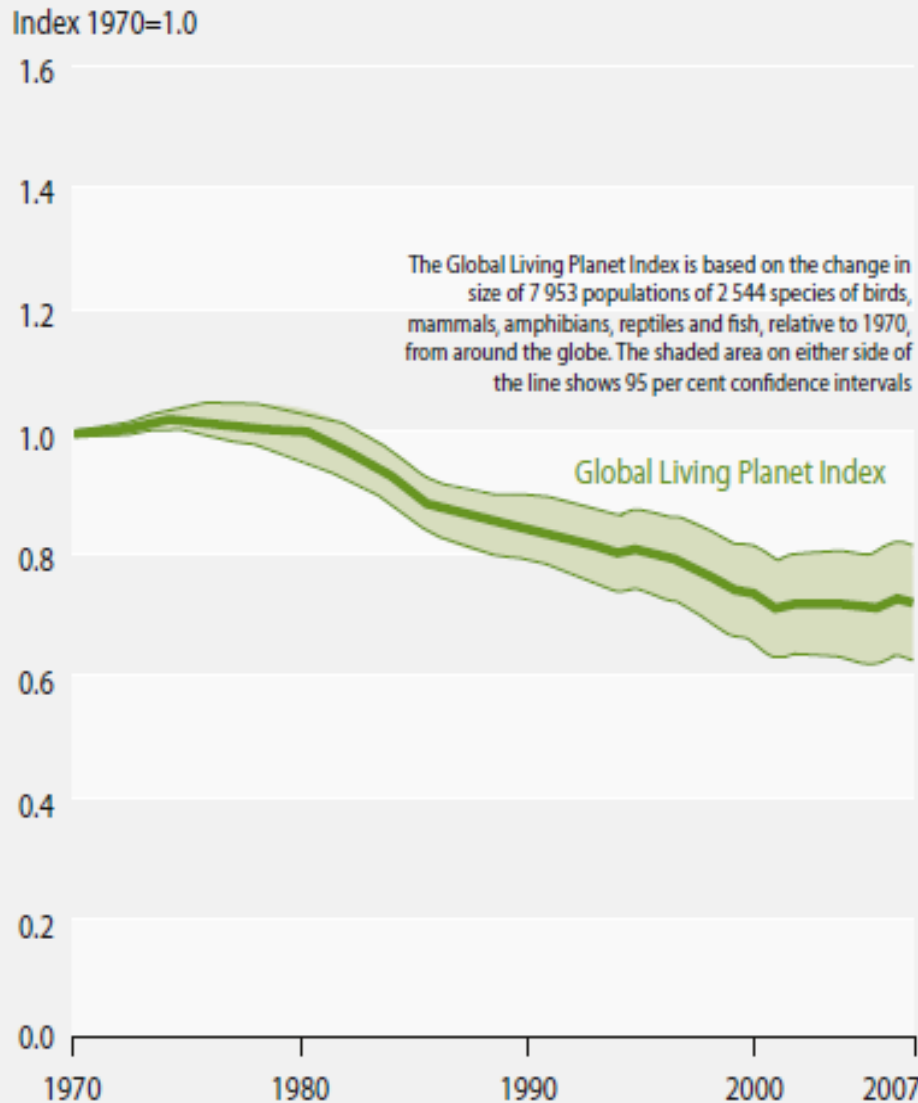
## Land under pressure

Economic growth has come at the expense of natural resources and ecosystems.

Land use decisions often fail to recognise the non-market value of ecosystem services.

Need for a dual strategy:  
Not only manage the ha currently under use in a sustainable manner, but also manage demand in a way that the number of ha does not exceed sustainable levels.

**Figure 5: Global Living Planet Index, 1970–2007**



Source: WWF

## Biodiversity declining

Up to two thirds of species in some taxa are threatened with extinction;

species populations are declining, since 1970, vertebrate populations have fallen by 30 per cent; and

since 1970 conversion and degradation has resulted in declines of 20 per cent of some natural habitats.

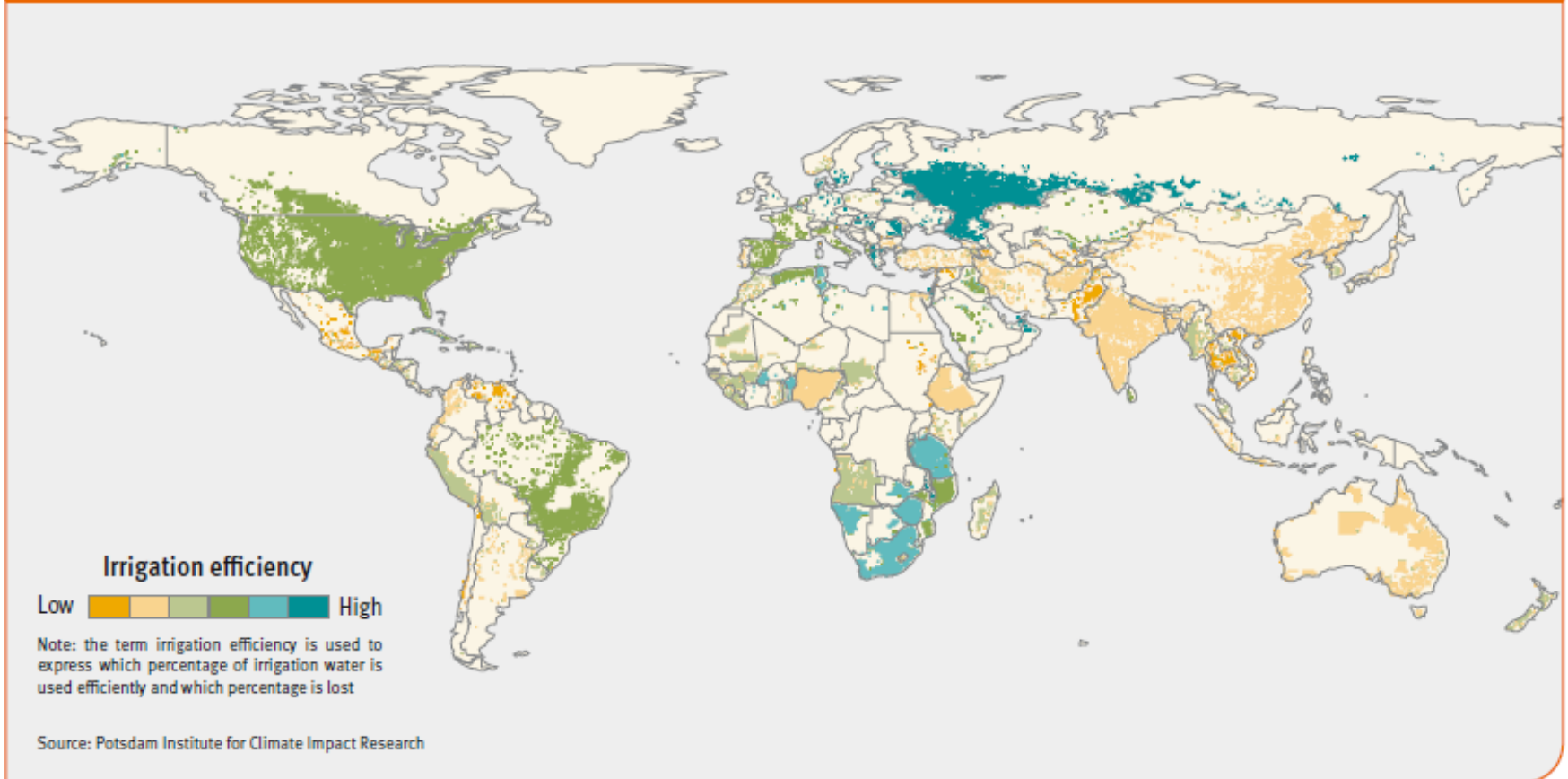
Climate change will have profound impacts on biodiversity.

# Water

The limit of sustainability of water resources, both surface- and ground-water, has already been reached or surpassed in many regions.

Demand of water continues to increase and water-related stress on both people and biodiversity is escalating rapidly.

**Figure 4: Global irrigation efficiencies, c. 2000**





# Energy

FIGURE 1. RENEWABLE ENERGY SHARE OF GLOBAL FINAL ENERGY CONSUMPTION, 2010

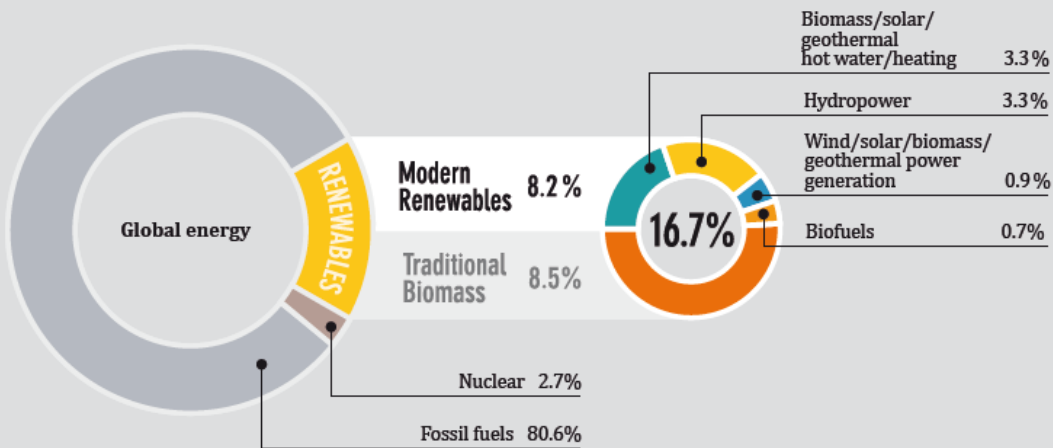
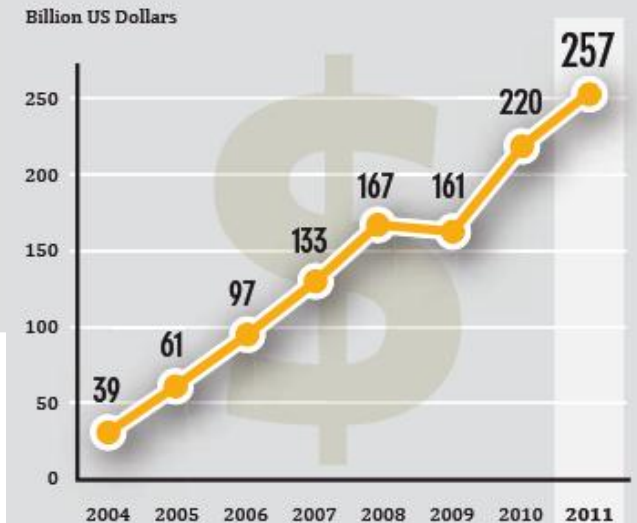


FIGURE 20. GLOBAL NEW INVESTMENTS IN RENEWABLE ENERGY, 2004–2011

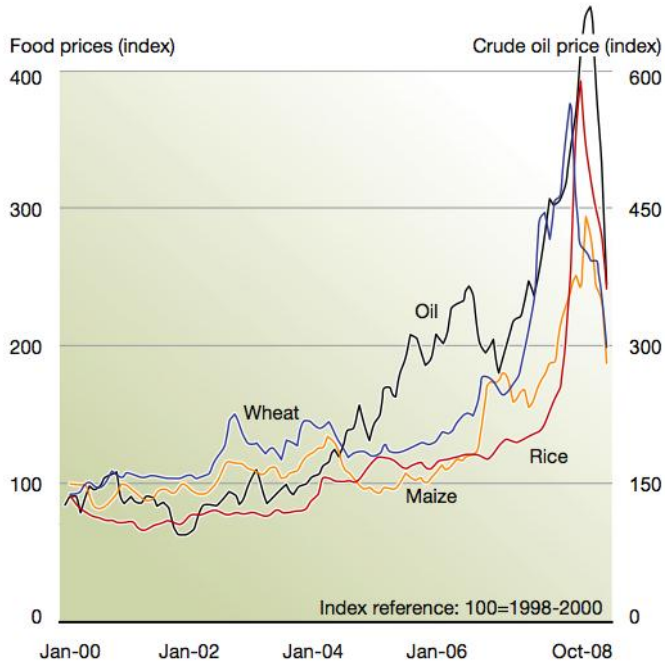


Biofuels provide currently about 3% of global road transport fuels. Ren21 GSR 2012

Thanks to new technologies by 2050, 32 exajoules of biofuels will be used globally, providing 27% of world transport fuel. IEA Biofuel Roadmap

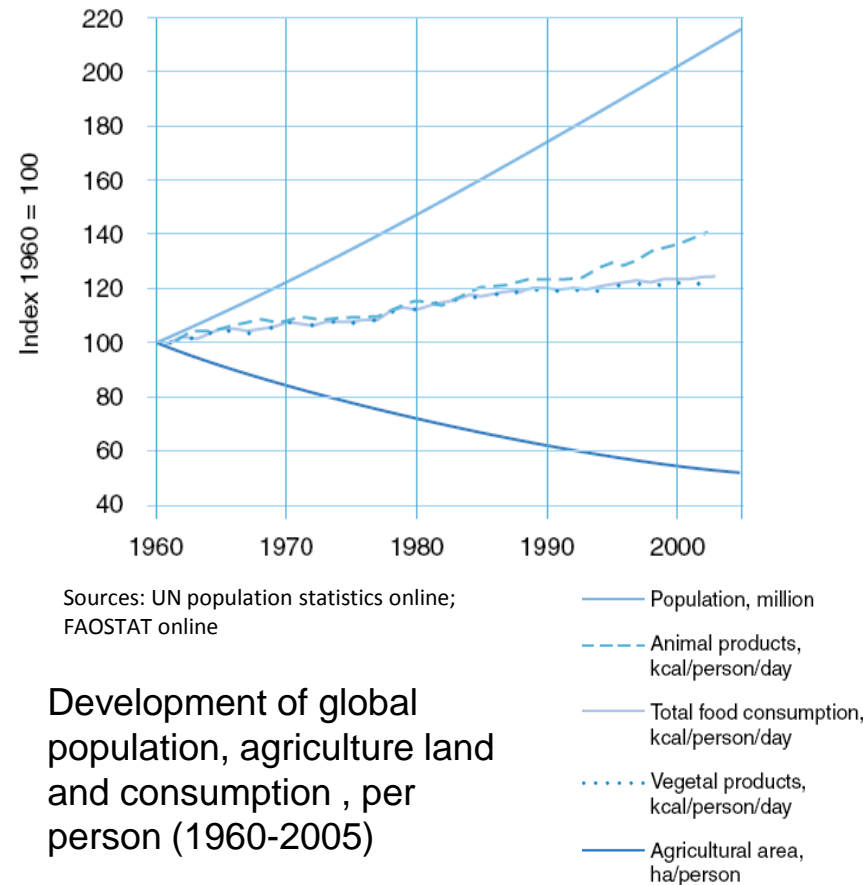
By 2050, 60 per cent of industrial fuels and heat will come from biomass. 13 per cent of building heat will come from biomass and some biomass will still be needed in the electricity mix (about 13 per cent), for balancing purposes with other RE technologies. WWF – The Energy Report. 100% RE by 2050

# FOOD AND AGRICULTURE



Price volatility

Yield developments



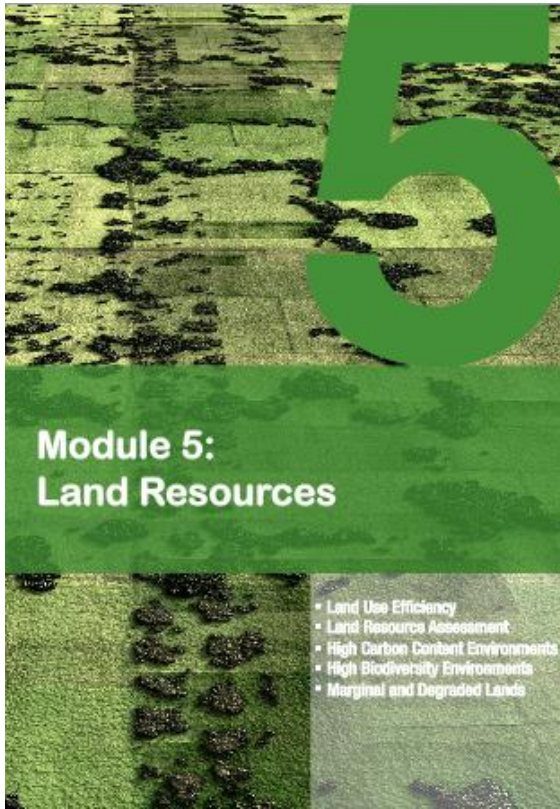
Demand increases and changing diets

Climate change

Access to markets

Food Waste

Development of global population, agriculture land and consumption, per person (1960-2005)



# Where?

Land use. Land use change.

Land use planning.

conduct a land suitability assessment ←

identify and map areas of special sensitivity, i.e. 'high risk areas' in terms of potential damage to vital ecosystem functions ←

identify and map existing agricultural production areas ←

overlay infrastructure information to evaluate market accessibility and the economic feasibility of feedstock production ←

conduct 'ground-truthing' in areas with potential for feedstock production, involving local communities and other relevant stakeholders ←

# HOW

- Scales
- Business Models
- Good Practices

## Module 7: Deployment and Good Practices

- Deployment of Bioenergy Systems
- Integrated Food Energy Systems
- Co-products
- Sustainable Agricultural Practices
- Sustainable Forest Management (SFM)

**Integrated Food Energy Systems:** integrate, intensify, and thus increase the simultaneous production of food and energy ←

**Co-products:** ←  
improve energy balance and economic viability;  
energy cascading, e.g. CHP  
non-energy: chemicals and materials

**Sustainable Agriculture Practices:** ←  
Agro-Forestry; Conservation Agriculture; Eco-Agriculture; Good Agricultural Practices; Integrated Pest Management; Invasive Species

**Sustainable Forest Management:** ←  
ensure long-term availability of resources while maintaining ecosystem services such as soil and watershed protection



# Technology Needs Assessments

- UNEP is implementing a project, funded by the GEF, to provide support to TNA and TAP in over 36 countries
- Transport – a key area to realise mitigation potential
- TNA Guidebook “Technologies for Climate Change Mitigation – Transport Sector”, following the UNEP ‘Avoid – Shift – Clean’ approach.
  
- Aviation – 5 options:
  - High-speed trains
  - ICT
  - Airport management, incl. feeder traffic
  - Regulation regarding types and age of planes



# Finance

- Since 1999, UNEP has an active clean energy finance programme, which covers innovative finance instruments along the finance continuum; e.g. entrepreneur support, end user finance.
- Work with the finance sector – UNEP FI, UNEP SEFI.
- Readiness / Pre-investment Intersection.
  
- Specifically related to Bioenergy:
  - Sustainability Guidance for GEF
  - Work with IADB
  - CDM / PoA
  - AREED



# Key messages

- Biofuels should only be part of a broader 'Avoid-Shift-Clean' strategy.
- Given competition for natural resources and in end use, a specific mandate / target for biofuels for aviation is highly sensitive, and should only be considered if:
  - Flanked by the highest standards of sustainability, both on the policy and the project levels;
  - Derived based on sound science and considering the sustainably feasible potential rather than a technology potential.
- Biofuels should only be counted against such a mandate / target if:
  - Sourced from a country where mapping / zoning was implemented. A fund could be set up that would support mapping / zoning.
  - Certified against a solid standard (ISEAL criteria, e.g multi-stakeholder, transparency, third-party auditing), and contains social criteria
- Special emphasis should be given to:
  - Low risk options
  - High GHG threshold

# UNEP's approach to bioenergy

Bioenergy is neither good nor bad per se;  
to avoid unintended consequences in the short and long-term,  
bioenergy development requires solid planning and management,  
both on the national policy and strategy and the project levels.

## Scientific assessments:

**International Panel for Sustainable Resource Management:** Assessing Biofuels report (2009)

**The Bioenergy and Water Nexus,** UNEP, IEA Bioenergy Task 43, Oeko Institut (2011)

**Issue Paper series on emerging issues:** Land use and land use change ; Bioenergy and Water; Invasive species; Stakeholder consultation; Group Certification; Facilitating Energy Access; REDD+

**Assessments & Guidelines for Sustainable Liquid Biofuel Production in Developing Countries,** funded by GEF, implemented with FAO and UNIDO, providing guidance on environmental, social and economic performance of biofuel projects.

## Tools:

**Global Bioenergy Partnership (GBEP):**

- Methodological framework for GHG calculations
- Sustainability criteria & indicators

**Roundtable on Sustainable Biofuels (RSB):**

- solid multi-stakeholder process
- all major issues are covered

**UN Energy Decision Support Tool for Sustainable Bioenergy (DST),** developed by UNEP and FAO to provide stepwise guidance to decision makers in governments to develop sustainable bioenergy policies and strategies, and to assess investment proposals.

## Finance:

**CASCADE:** enhancing African expertise to generate carbon credits in the forestry and bioenergy sectors by providing technical assistance, institutional support and training workshops.

**Jatropha-based PoA:** assessing the feasibility of a CDM Programme of Activities for rural energy generation from Jatropha oil in Mali.

**African Rural Energy Enterprise Development** promoting rural energy enterprises, includes a bioenergy component that allows to demonstrate additional environmental and social benefits resulting from 'local production for local use' projects. performance of biofuel projects, using a settings approach.

## Regional and national support:

**Bioenergy Policy Support Facility,** providing advisory services to governments developing and implementing bioenergy policies, strategies and measures, mobilizing local and international experts: targeted consultations; science-based information for decision making; advice on legal frameworks, planning and management tools; and guidance on processes to facilitate integrated decision-making.

Mapping of land suitable and available for bioenergy development:

- Methodology refined (GIS and groundtruthing)
- completed in Kenya, Uganda, Senegal





**UNEP**

Martina Otto  
Head of Policy Unit, Energy Branch  
Coordinator Bioenergy  
[martina.otto@unep.org](mailto:martina.otto@unep.org)

**[www.unep.fr/energy/bioenergy](http://www.unep.fr/energy/bioenergy)**