

Living with Environmental Change Managing Ecosystem Services

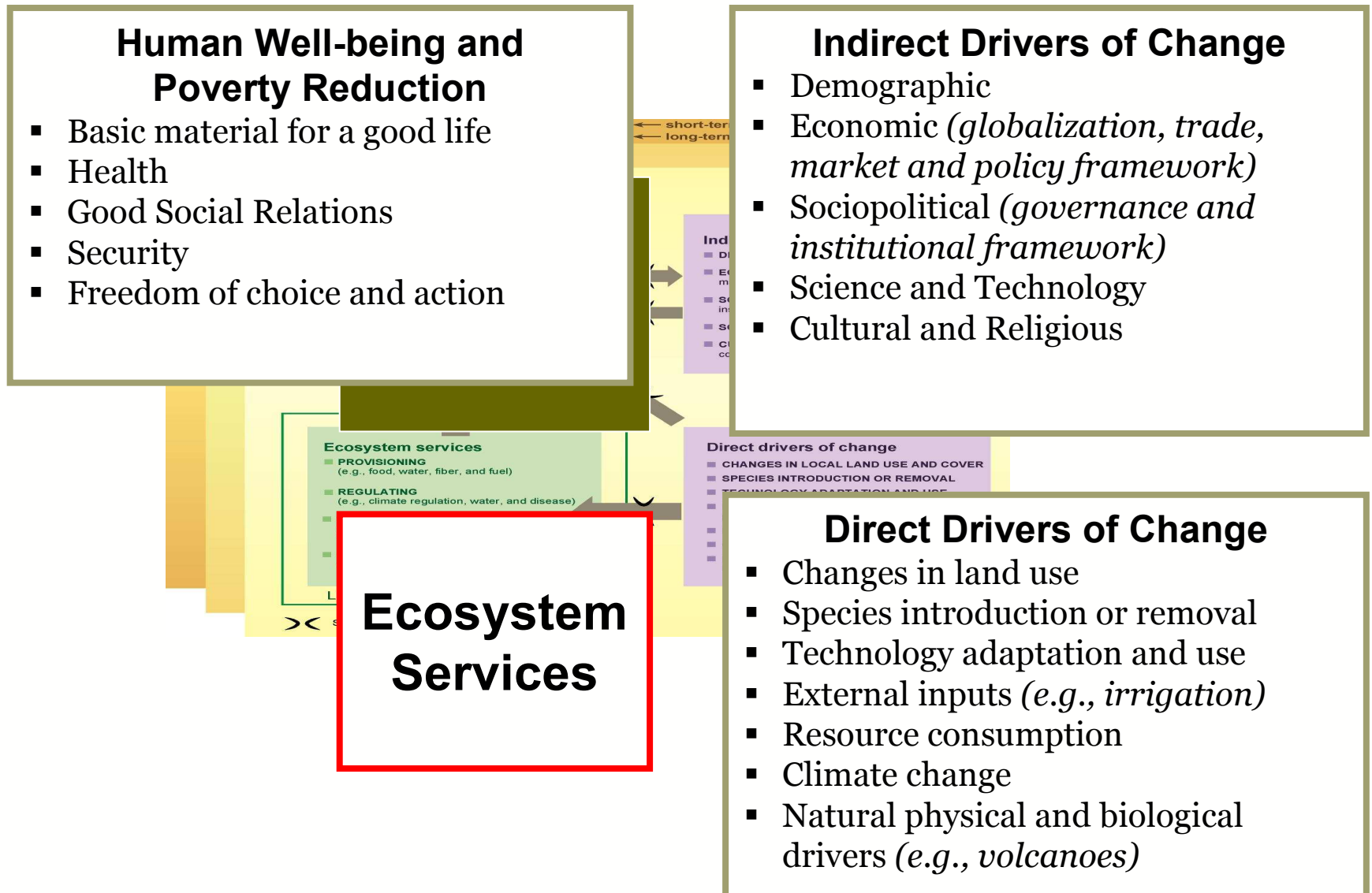
Robert Watson
Chief Scientific Advisor
Defra

Fresh Seminar
Nottingham University
October 24, 2007

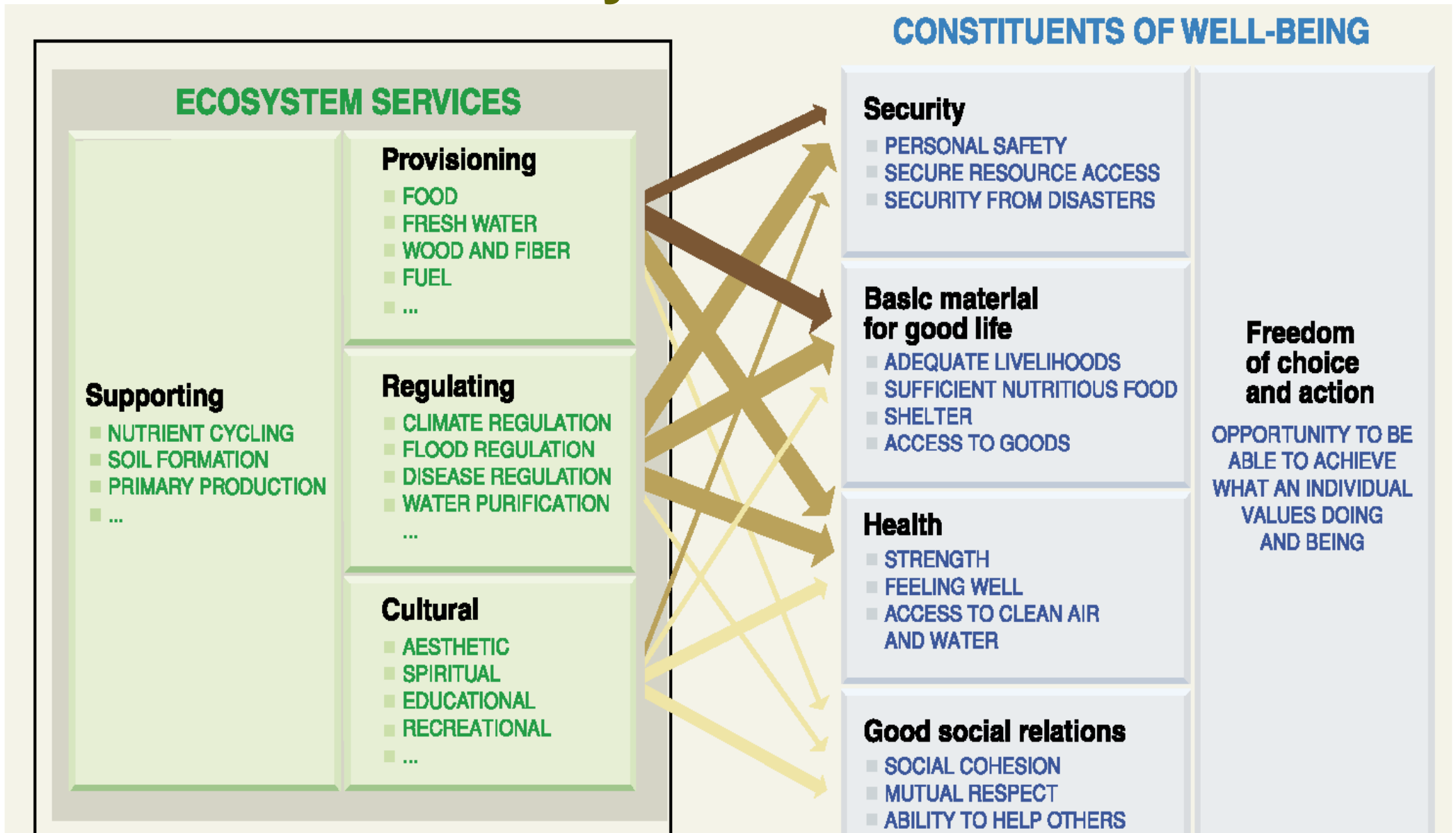
Context

- UN Millennium Ecosystem Assessment
- UK Sustainable Development Strategy
- New Public Sector Agreement framework for CSR07 and other government initiatives

MA Framework

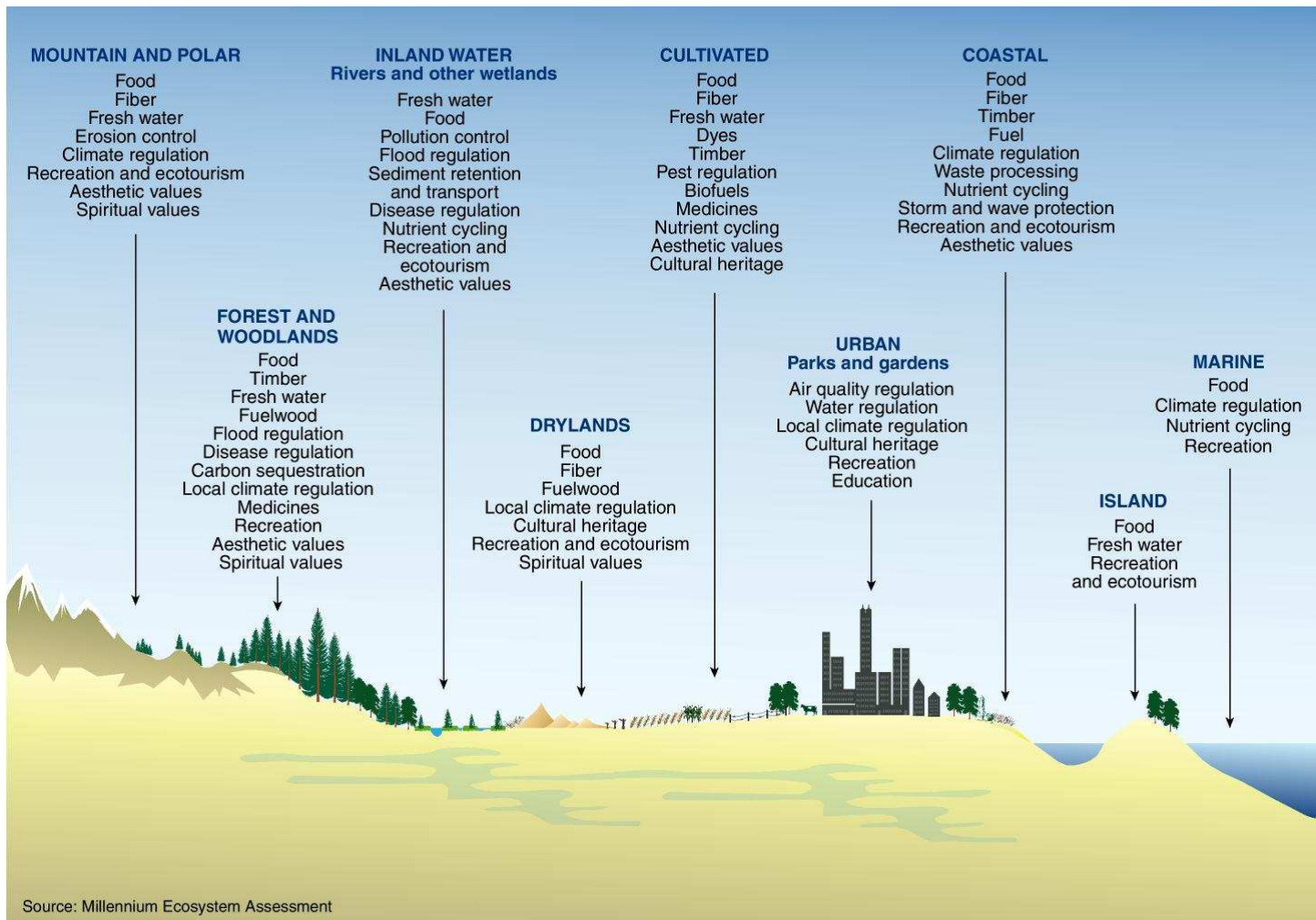


Ecosystem services

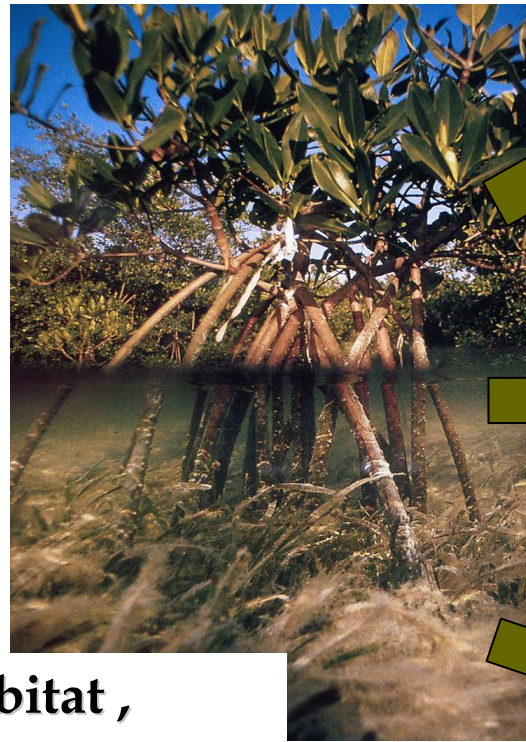


Ecosystem Services

- Everyone in the world depends on nature and ecosystem services to provide the conditions for a decent, healthy, and secure life



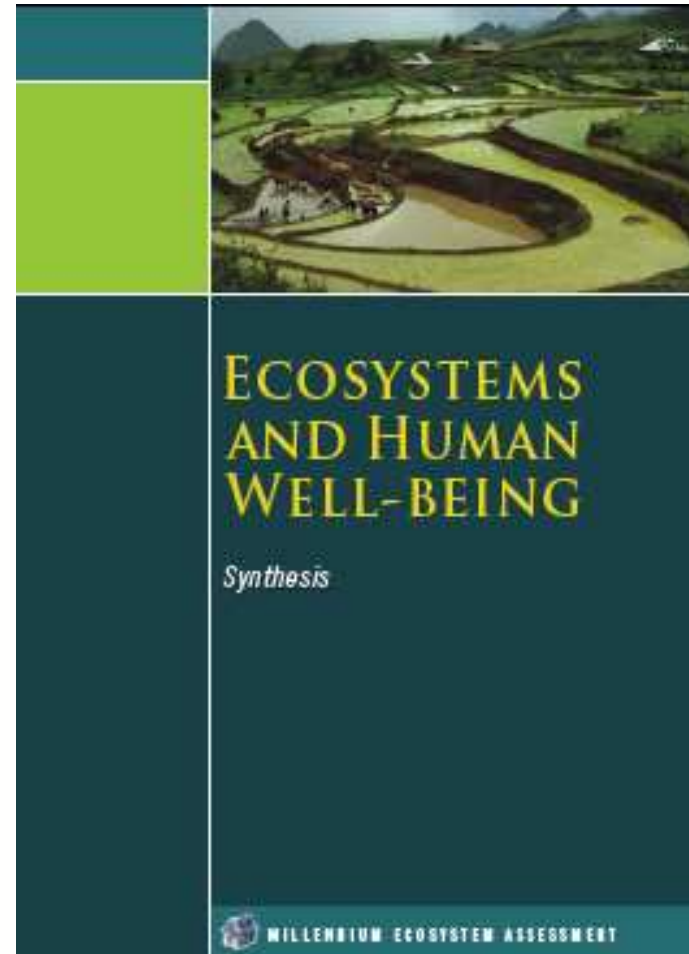
Converting an ecosystem means losing some services and gaining others – e.g., A mangrove ecosystem:



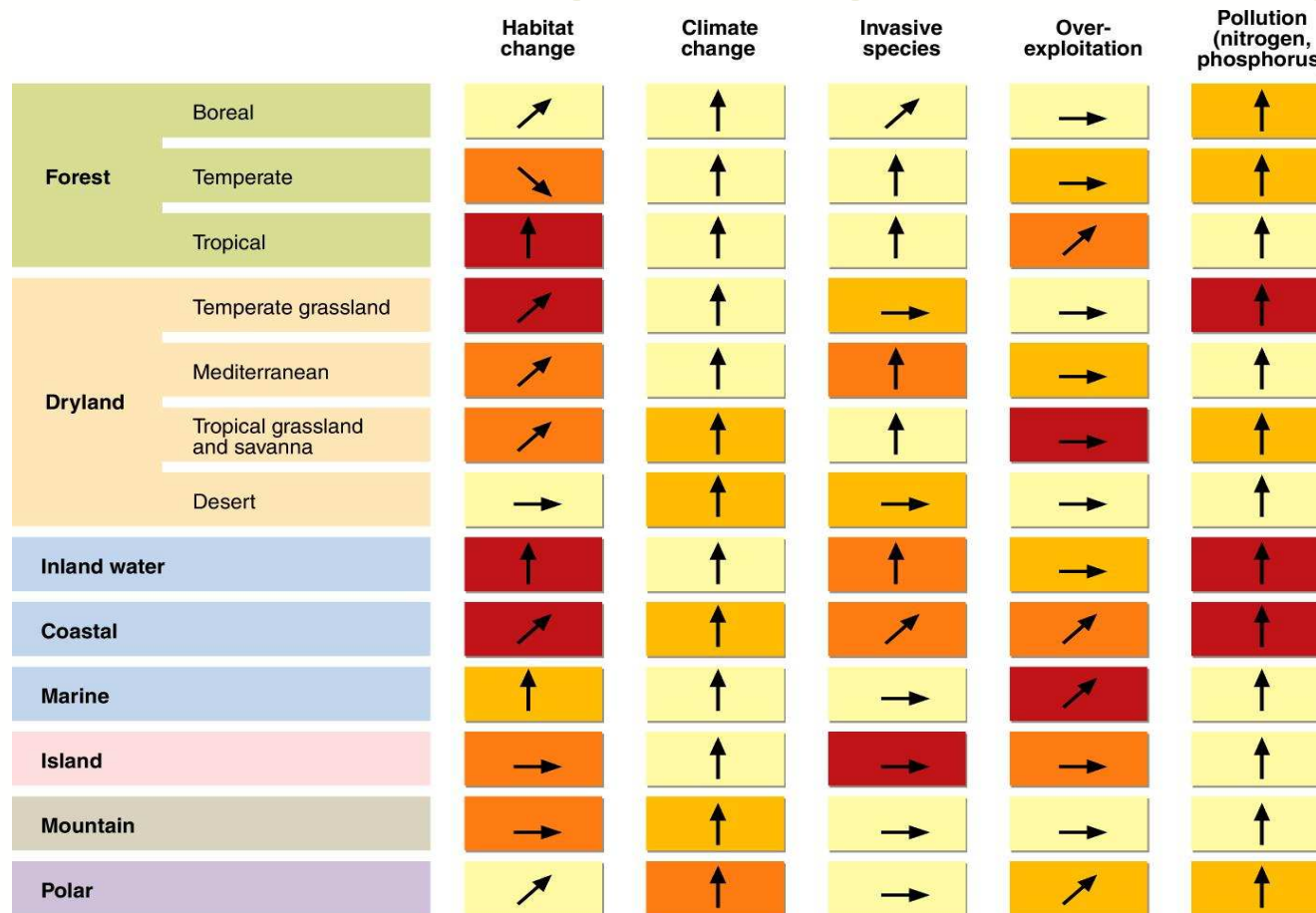
Provides nursery and adult habitat,
Seafood, fuelwood, & timber;
traps sediment; detoxifies pollutants;
protects coastline from erosion & disaster

Millennium Ecosystem Assessment

- Two thirds of ecosystem services in decline globally
- Degradation set to worsen and a barrier to achieving Millennium Development Goals
- Actions needed by governments and the private sector



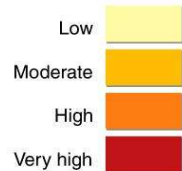
Direct drivers growing in intensity



Most direct drivers of degradation in ecosystem services remain constant or are growing in intensity in most ecosystems

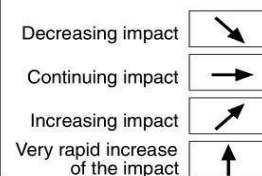
RESULT OF PAST EVOLUTION

Driver's impact on biodiversity over the last century



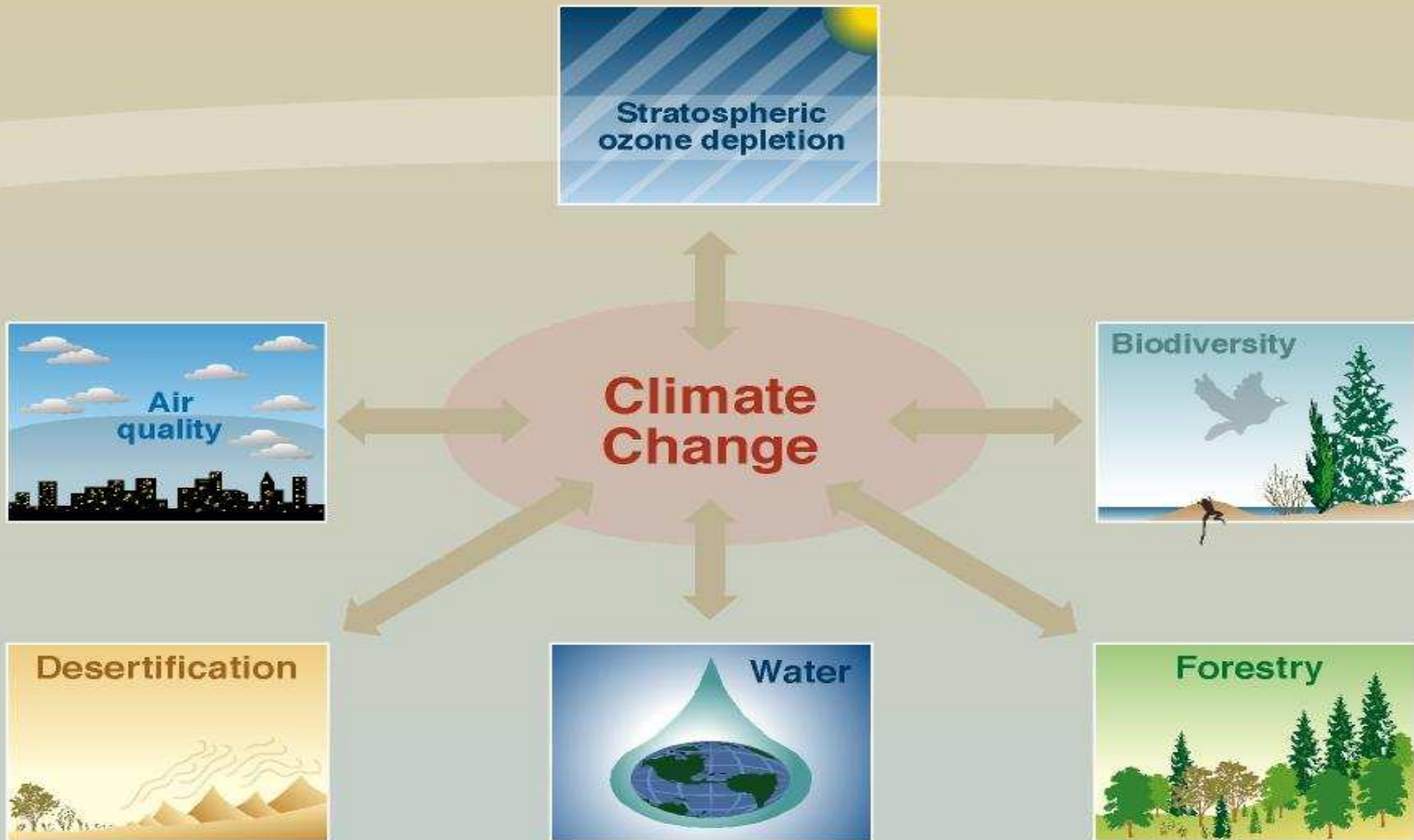
WHAT HAPPENS TODAY

Driver's actual trends



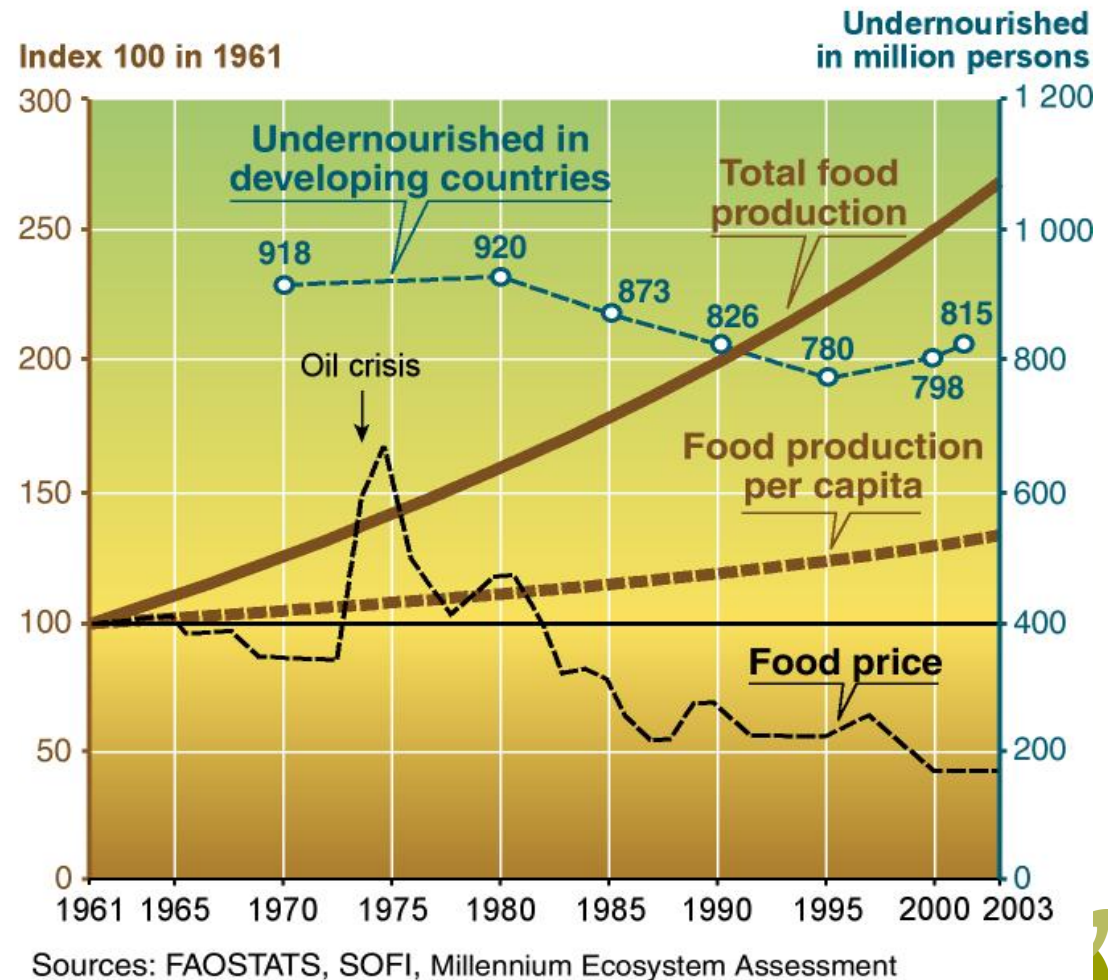
Source: Millennium Ecosystem Assessment

Linkages between climate change and other environmental issues



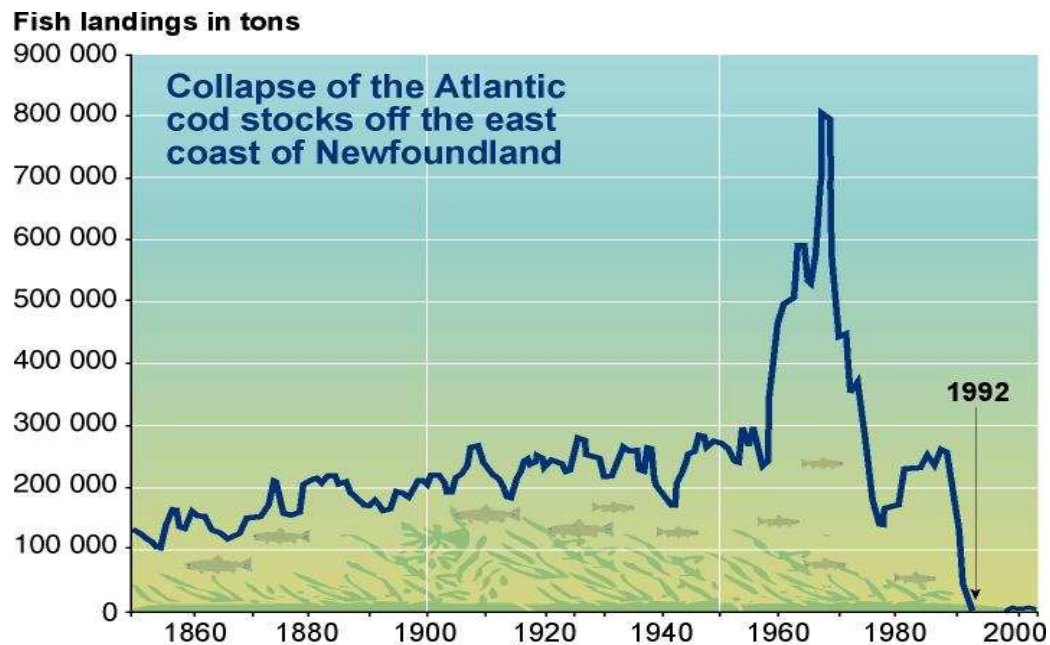
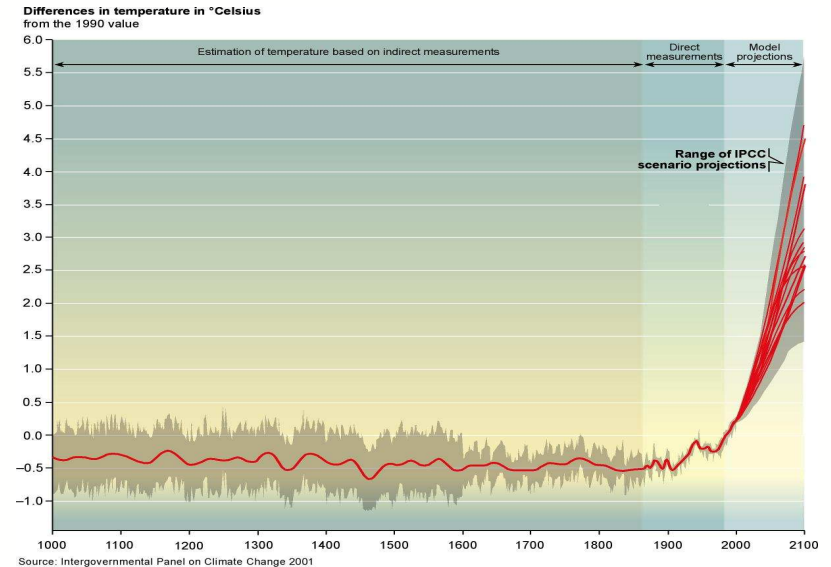
Changes to ecosystems have provided substantial benefits

- Food production has more than doubled since 1960
- Food production per capita has grown
- Food price has fallen

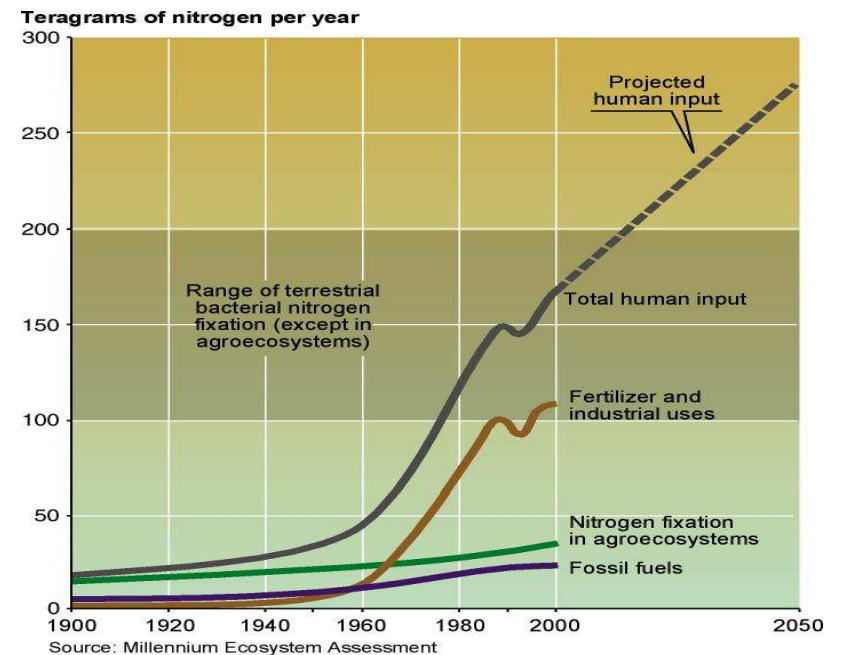


Key Problems

- Among the outstanding problems identified by this assessment are the dire state of many of the world's fish stocks; the intense vulnerability of the 2 billion people living in dry regions to the loss of ecosystem services, including water supply; and the growing threat to ecosystems from climate change and nutrient pollution.

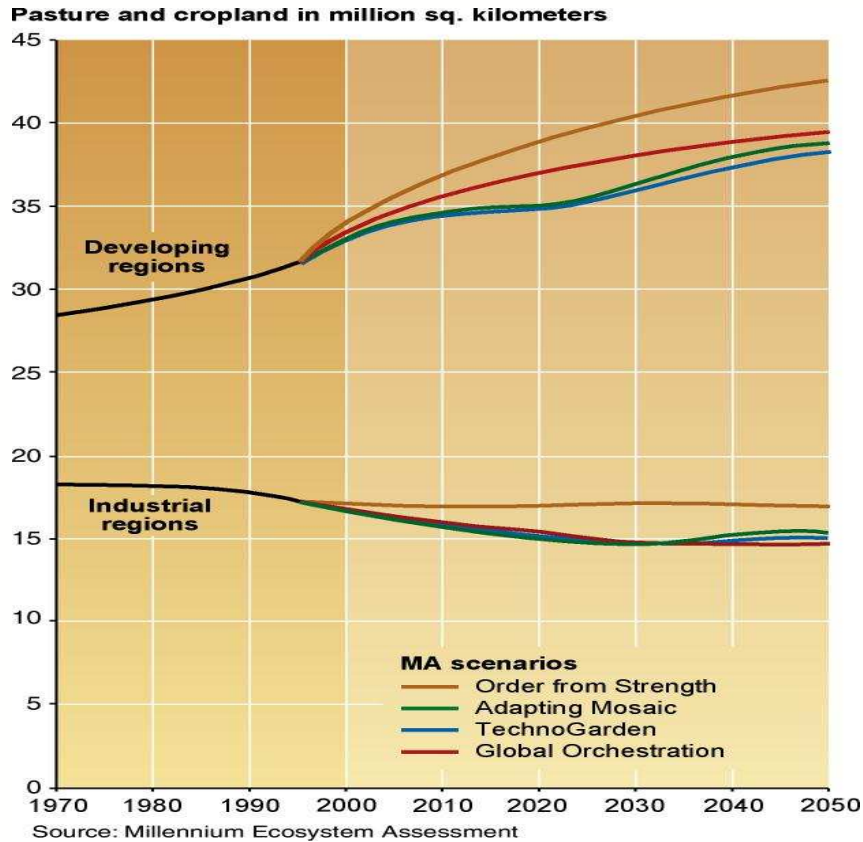


Source: Millennium Ecosystem Assessment

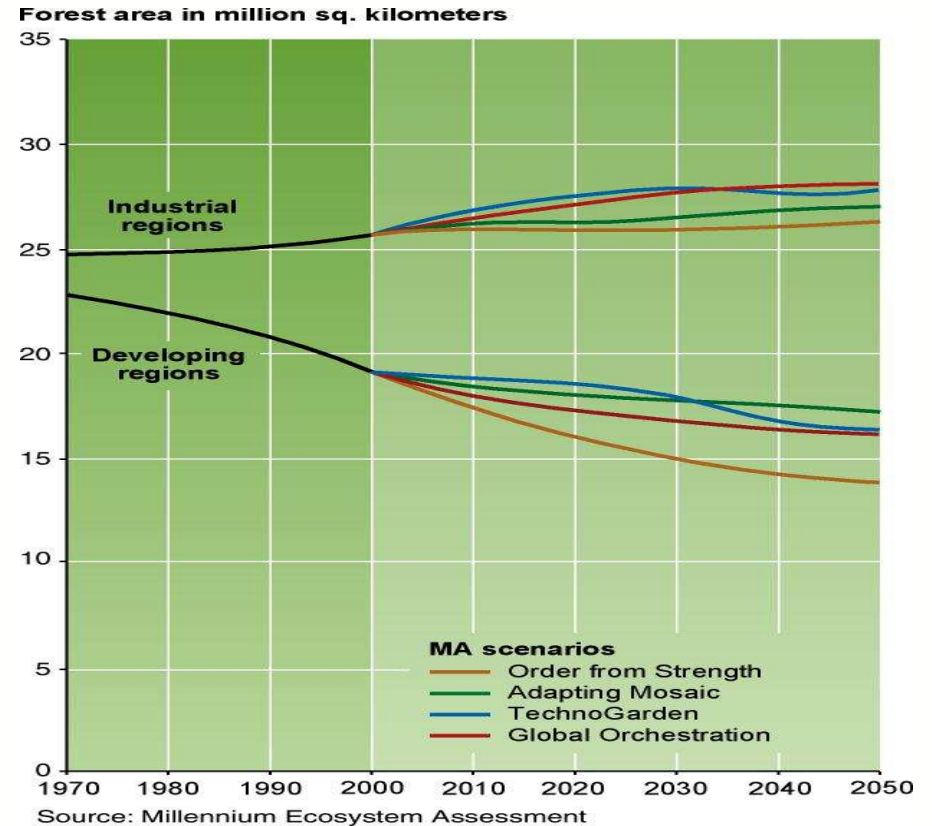


Changes in direct drivers

Changes in crop land and forest area under MA Scenarios



Crop Land



Forest Area

What can we do about it?

- **Change the economic background to decision-making**
 - Make sure the value of all ecosystem services, not just those bought and sold in the market, are taken into account when making decisions
 - Remove subsidies to agriculture, fisheries, and energy that cause harm to people and the environment
 - Introduce payments to landowners in return for managing their lands in ways that protect ecosystem services, such as water quality and carbon storage, that are of value to society
 - Establish market mechanisms to reduce nutrient releases and carbon emissions in the most cost-effective way

What can we do about it?

- **Improve policy, planning, and management**

- Integrate decision-making between different departments and sectors, as well as international institutions, to ensure that policies are focused on protection of ecosystems
- Include sound management of ecosystem services in all regional planning decisions and in the poverty reduction strategies being prepared by many developing countries
- Empower marginalized groups to influence decisions affecting ecosystem services, and recognize in law local communities' ownership of natural resources
- Establish additional protected areas, particularly in marine systems, and provide greater financial and management support to those that already exist
- Use all relevant forms of knowledge and information about ecosystems in decision-making, including the knowledge of local and indigenous groups

What can we do about it?

- **Influence individual behavior**
 - Provide public education on why and how to reduce consumption of threatened ecosystem services
 - Establish reliable certification systems to give people the choice to buy sustainably harvested products
 - Give people access to information about ecosystems and decisions affecting their services
- **Develop and use environment-friendly technology**
 - Invest in agricultural science and technology aimed at increasing food production with minimal harmful trade-offs
 - Restore degraded ecosystems
 - Promote technologies to increase energy efficiency and reduce greenhouse gas emissions

Strengths and Weaknesses of the MA

- Useful conceptual framework - but limited data and information to quantitatively assess the inter-linkages
- Limited economic analysis
- Sub-global assessments did not follow the suggested methodologies – inadequate buy-in of local decision-makers

UK Sustainable Development Strategy

- Natural Resource Protection and Environmental Enhancement a shared UK priority
- Commitment to develop clear vision and coherent approach
- More integrated policy framework focused on whole ecosystems
- Better understanding of environmental limits



Where we are now

- **Natural environment PSA**

Secure a healthy natural environment for everyone's health, well-being and prosperity, now and in the future; and reflect in decision-making the value of the services that it provides.

- **Ecosystems Approach project**

Deliver an action plan for embedding an ecosystems approach to policy-making and delivery by the end of 2007.

Natural Environment PSA

Secure a healthy natural environment for everyone's well-being, health and prosperity, now and in the future

Indicators and targets

Air

Water

Land
& Soil

Biodiversity

Marine

Ecosystems Approach

Ecosystems Approach Project - Aim

“To embed an ecosystems approach to conserving, managing and enhancing the natural environment across policy-making and delivery”

- Policies designed to deliver healthy, functioning ecosystems
- Reflect the true value of ecosystem services in decision-making

Ecosystems Approach Action Plan

- Defra aiming to publish action plan by end 2007
- Key themes:
 - Mainstreaming an ecosystems approach
 - Valuing ecosystem services in decision-making
 - Environmental limits, targets and indicators
 - Ecosystems and climate change
 - Developing the evidence base

An ecosystems approach – key principles

- Manage on a **whole** ecosystems basis to maintain ecosystem services
- True **value** of ecosystem services reflected in decision making – including long-term costs & benefits
- Respect environmental **limits** taking into account ecosystem functioning
- Manage at an appropriate **spatial** scale
- **Adaptive** management

Benefits

- Better informed decisions in context of sustainable development
- More effective prioritisation and allocation of resources
- Greater awareness and recognition of value of natural environment
- Improved environmental outcomes – living within environmental limits

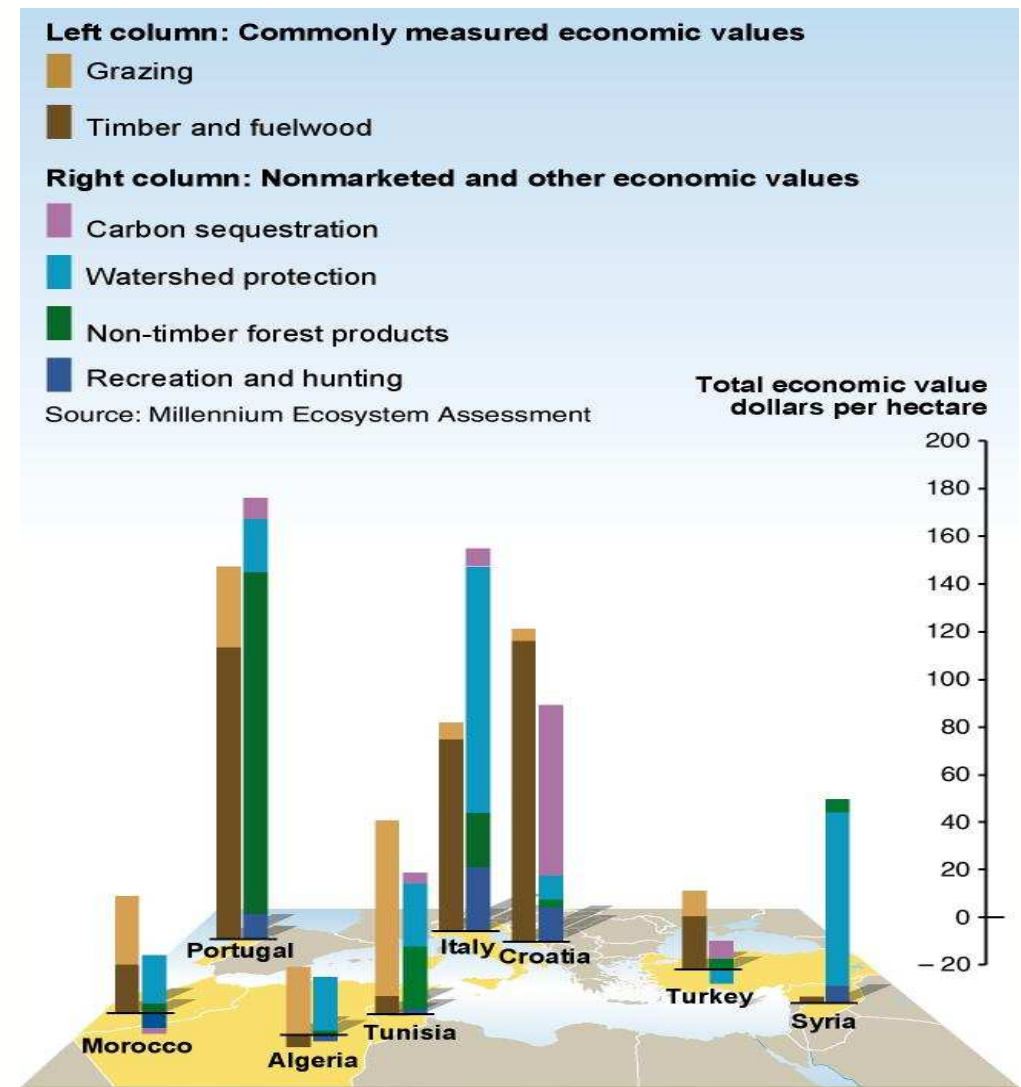
Valuing ecosystem services

- Defra developing an introductory guide for policy-makers and economists – for CSR07?
- Planning to road-test within Defra and Defra network
- Keen to work with OGDs on case studies or pilots
- Longer term aim to integrate into policy appraisal/impact assessments

Degradation of ecosystem services often causes significant harm to human well-being

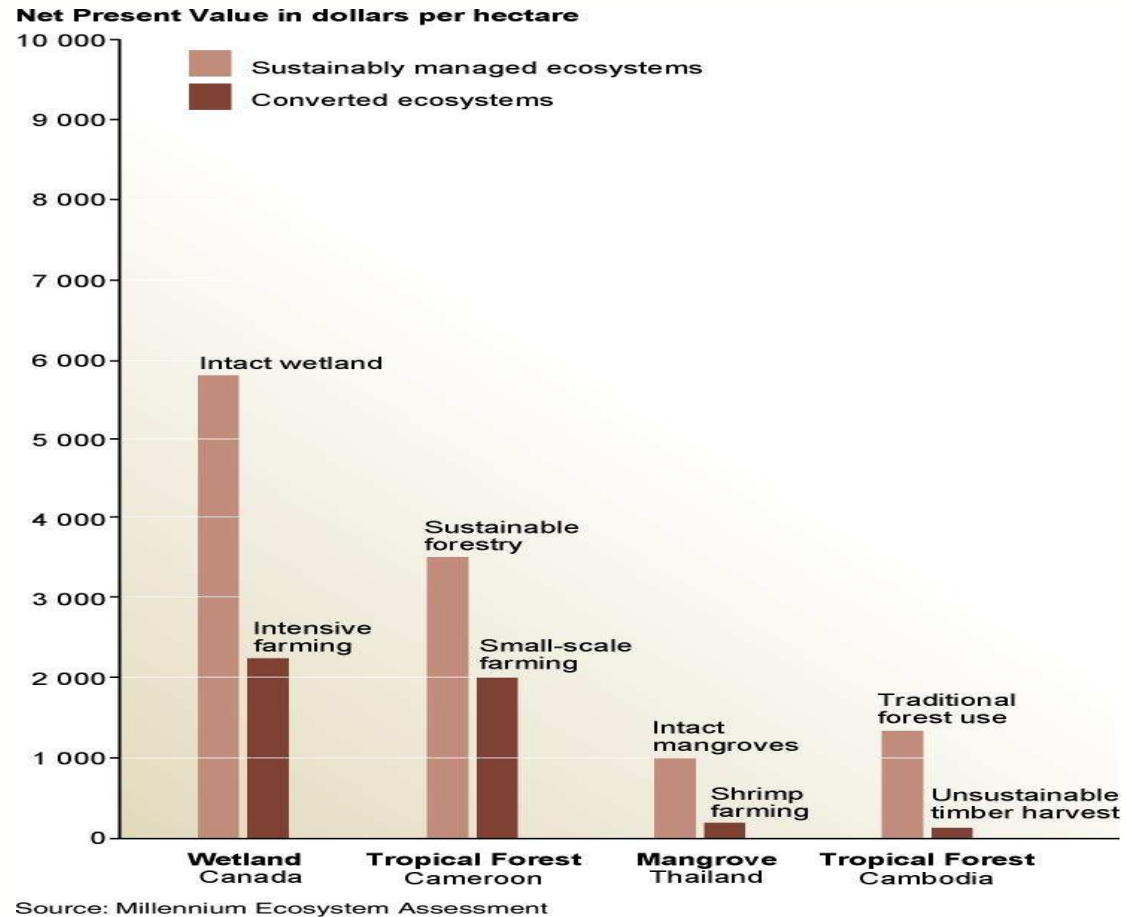
- Degradation tends to lead to the loss of non-marketed benefits from ecosystems
- The economic value of these benefits is often high and sometimes higher than the marketed benefits

Timber and fuelwood generally accounted for less than a third of total economic value of forests in eight Mediterranean countries.



Degradation of ecosystem services often causes significant harm to human well-being

- The total economic value associated with managing ecosystems more sustainably is often higher than the value associated with conversion
- Conversion may still occur because private economic benefits are often greater for the converted system



Living With Environmental Change

ISSUE: We live in the midst of human-induced climate and environmental changes that increasingly pressurise our natural resources and ecosystem services, and so challenge our social and economic well-being (*emphasised by Stern Review, Millennium Ecosystem Assessment, HMT Challenge 5, IPCC 4th Assessment*)

Living With Environmental Change will meet this challenge by providing the required predictive science, solutions and business opportunities to increase resilience to, and reduce the economic costs of, environmental changes.

Through an unprecedented partnership connecting natural, engineering, economic, social, medical, cultural, arts & humanities researchers with policy makers, business, the public, and other key stakeholders.

Living With Environmental Change

10-year interdisciplinary research & policy partnership programme to increase resilience to — and reduce costs of — environmental change:

- considering natural resources, ecosystem services, economic growth & social progress;
- on the time & space scales on which the economy is managed;
- learning how, when & where to take action (smart intervention);
- £1Bn effort

NERC, ESRC, EPSRC, BBSRC, MRC, AHRC, Defra, DFID, SE, DfT, EA, DCLG, NE, WAG, SEPA.

First meeting of LWEC Partners' Board **(July 2007)**

Formally agreed partnership, including:

- governance & management
- recruitment of Director & Chair
- how to identify strategic objectives
- communications strategy

Cited in Secretary of State's press release on science budget allocation – 10 Oct 2007

Set to agree strategic objectives
Nov/Dec 2007



Living With Environmental Change

Aims to deliver (1):

- Whole-system assessments and risk-based predictions of environmental change and the effects on ecosystem services, economies and communities on local-regional and seasonal-decadal scales
- Integrated analyses of the potential economic, social & environmental costs, benefits and impacts of different mitigation and adaptation responses

(cont)

Living With Environmental Change

Aims to deliver (2):

- Guidance for more effective sustainable management of ecosystem services, as a foundation for resilient economic development and social progress,
- New technology and infrastructure solutions in the management of environmental change
- A more research-informed dialogue and debate about the environmental challenges and choices that we face and their economic and social consequences

defra

Department for Environment
Food and Rural Affairs

Ecosystem Services for Poverty Alleviation (ESPA)

**A joint initiative from the
Department for International Development
Natural Environment Research Council
Economic and Social Research Council**



UK context

- **DFID Science Strategy** – “Managing global challenges will require investment in science, technological advances and innovation. Developing country governments need access to the best international expertise. With the right networks, scientists in developing countries can encourage governments to use their skills to help the poor.”
- “People in the poorest countries are most reliant on environmental resources for their livelihoods. These resources are already under pressure and likely to be degraded further by climate change.”

Meeting the Challenge

- **Environmental science** to understand why ecosystems are becoming degraded and how to stabilise and reverse this trend
- **Ecological economics** to place a better value on ecosystem services;
- **Political economics** to identify what institutional changes are needed so that that the costs and benefits of improved ecosystem management is fairly distributed to the poor

Scientific Challenges

- Improved information/understanding/methodologies:
 - ecosystem functioning and its relationship with the supply of ecosystem services
 - state of and trends in ecosystems and their services
 - the impacts of ecosystem change on human well-being
 - environmental limits and how to define them
 - valuing ecosystem services for decision-making
 - forecasting of changes in ecosystems and their services, including trends and scenarios
 - policy options for responding to future change

Ecosystems evidence needs

- **How are ecosystem services provided?**

Improved information on ecosystem functioning and delivery of ecosystem goods and services

- **What is the state of service provision?**

Information on state and trends in ecosystems and ecosystem services; and ways to monitor this over time

- **Does this matter?**

Information on impacts of ecosystem change on human wellbeing and ways to establish public preferences and values

Building the evidence base on environmental limits and how to define them

Ecosystems evidence needs - cont

- **What will happen in the future?**

Improved forecasting of changes in ecosystems and ecosystem services, including trends and scenarios

- **What can we do about it?**

Improved methodologies for valuing ecosystem services in decision making

Improved understanding of policy options for responding to future change

Further information available at

<http://www.defra.gov.uk/wildlife-countryside/natres/>