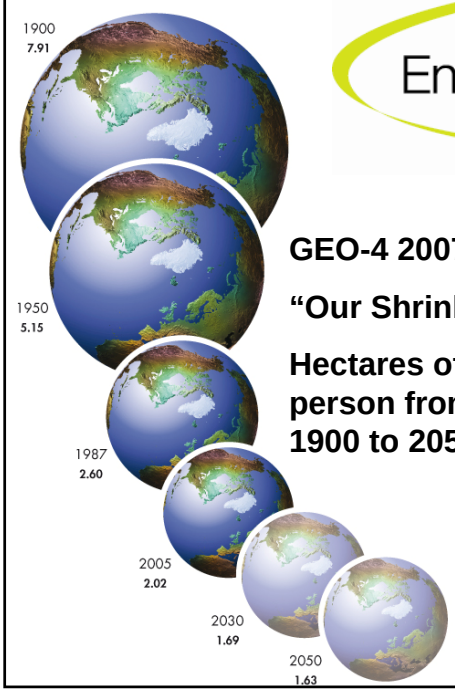


Living With Environmental Change
LWEC

GEO-4 2007

"Our Shrinking Earth"

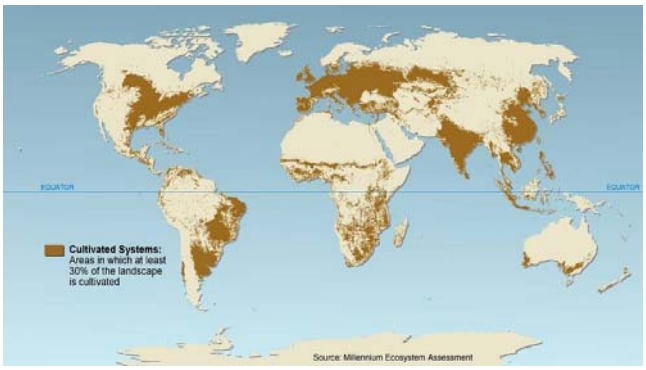
Hectares of land per person from 1900 to 2050: 7.9 to 1.6

Professor Alan Thorpe
Chief Executive
Natural Environment Research Council

Human Footprint on Planet Earth

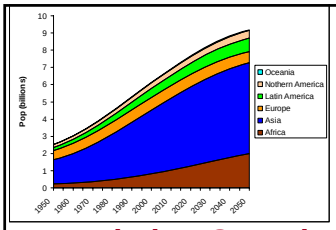
60% of ecosystem services are degraded

Cultivated systems cover 24% of land surface

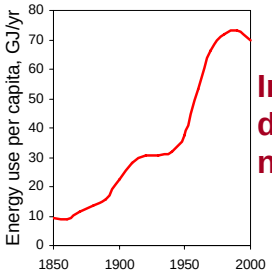


25% to 30% of population of vertebrate wildlife lost since 1970

Living With Environmental Change
LWEC

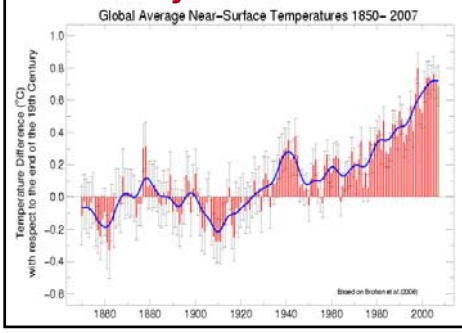


Population Growth

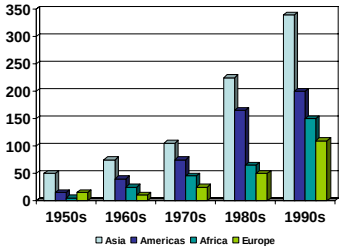


Increased demand for natural resources

Degradation of ecosystem services



Increased vulnerability



Living With Environmental Change LWEC

LWEC aims to bring together natural science, engineering, economics and social research AND policy to address the environmental challenges we face

People, research, policy, societal action …

Recent scientific and research advances mean we are poised to be able to do this

Increasing experience in working across traditional disciplinary boundaries

Living With Environmental Change LWEC

LWEC Goal

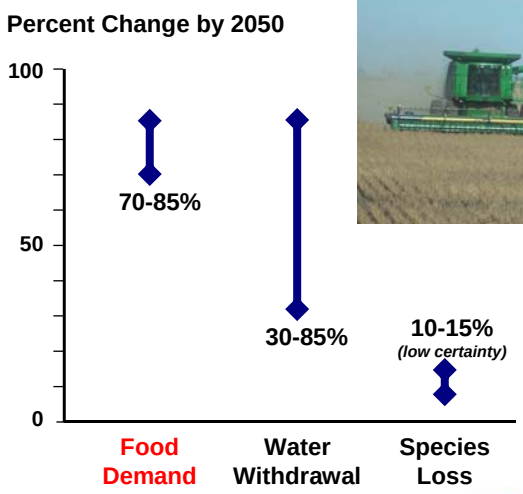
Whole-system assessments and risk-based predictions of environmental change and its effects

Predictions – by making assumptions about underlying factors, e.g. population growth, greenhouse gas emissions.

These are *what if* predictions - *scenarios* or *projections* or *foresight*

Living With Environmental Change LWEC

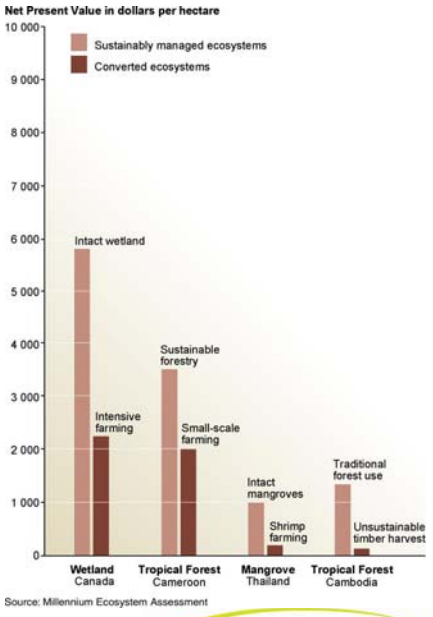
Millennium Ecosystem Assessment Scenarios



Living With Environmental Change LWEC

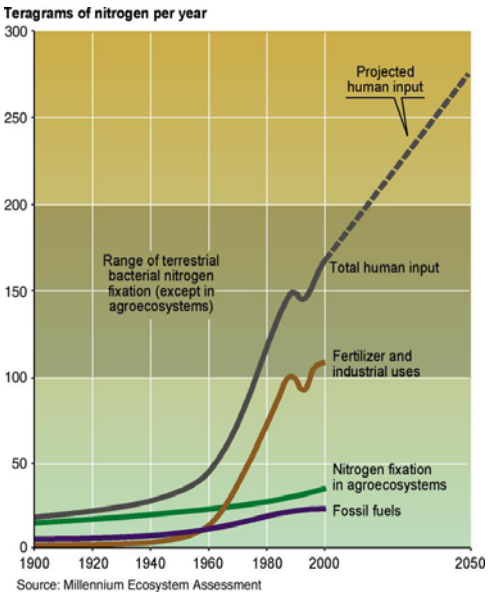
Degradation of ecosystem services can limit overall human well-being

- Economic value of managing ecosystems more sustainably is often higher than the value associated with conversion
- In “Rural Economy and Land Use” we have brought together social, economic and natural science



Living With Environmental Change LWEC

Unprecedented change: Biogeochemical Cycles



More than 50% of all the synthetic nitrogen fertilizer ever used has been used since 1985

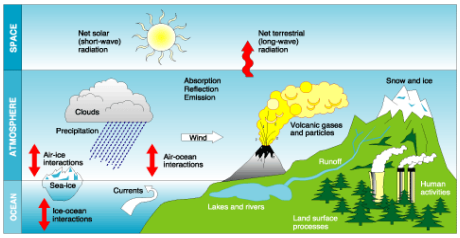
Humans produce as much biologically available N as all natural pathways and this may grow a further 65% by 2050

Living With Environmental Change LWEC

Climate Change

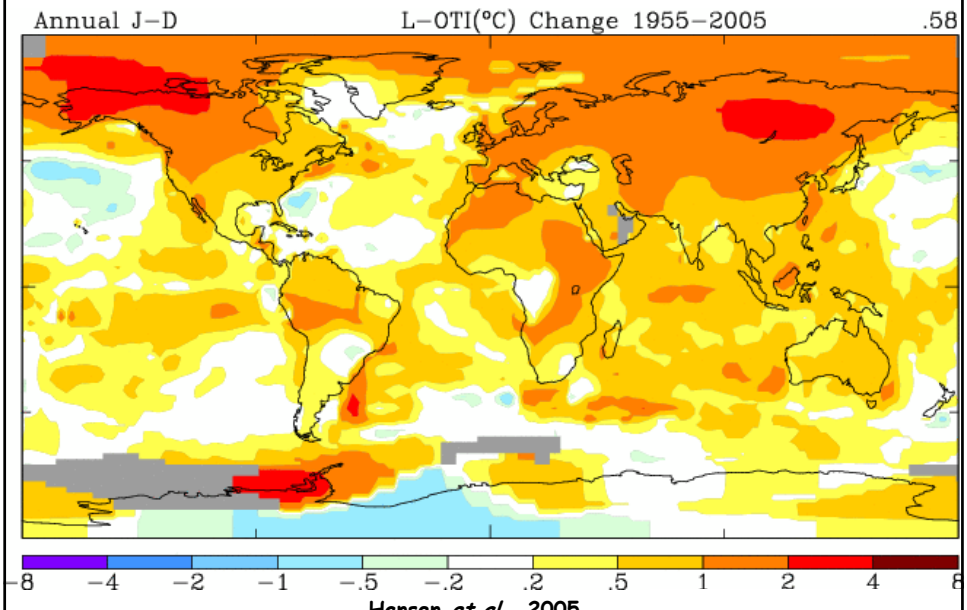
Scientific knowledge advancing rapidly because of increased observations, improved understanding and computational & modelling power

Poised to take next step to local-to-regional scales and seasonal to decadal predictions of climate impacts



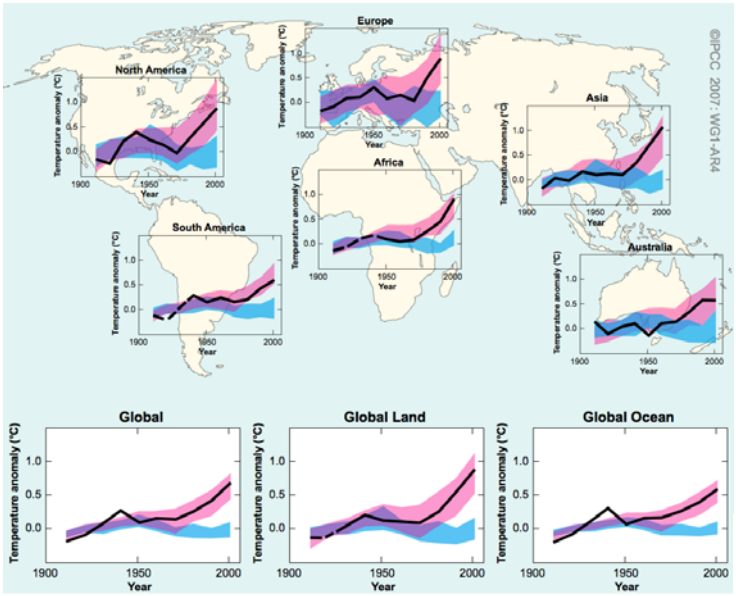
Living With Environmental Change
LWEC

Regional pattern of warming over last 50 years

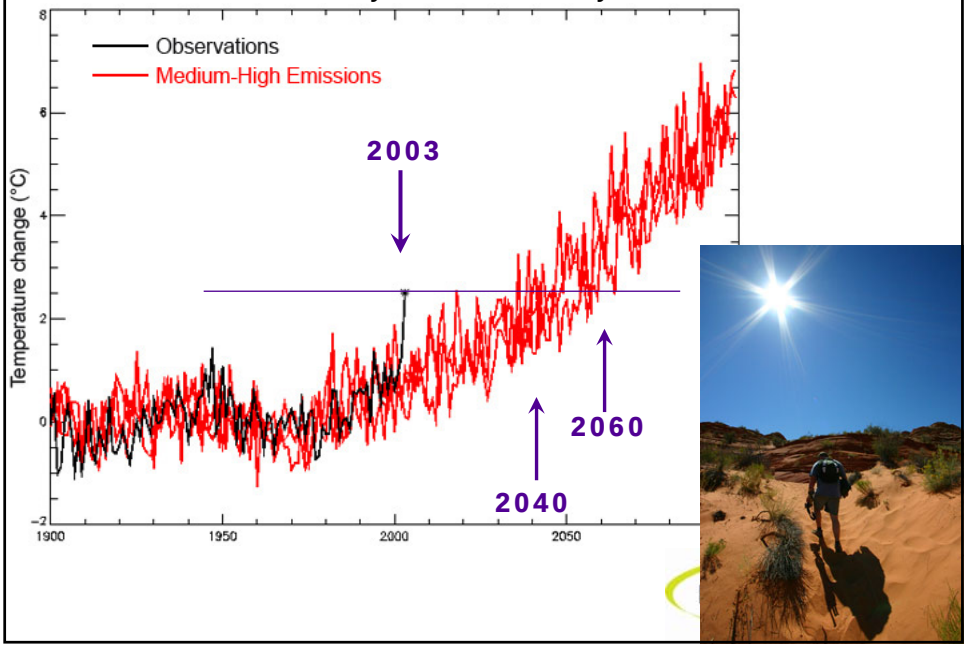


Hansen *et al.*, 2005

Understanding and Attributing Climate Change using regional patterns: observations and models



A future scenario: European 2003 heatwave could be normal by 2040s, cool by 2060s



320 km

20 km

Need foresight of environmental changes with regional detail on timescales from seasons to decades

Living With Environmental Change LWEC

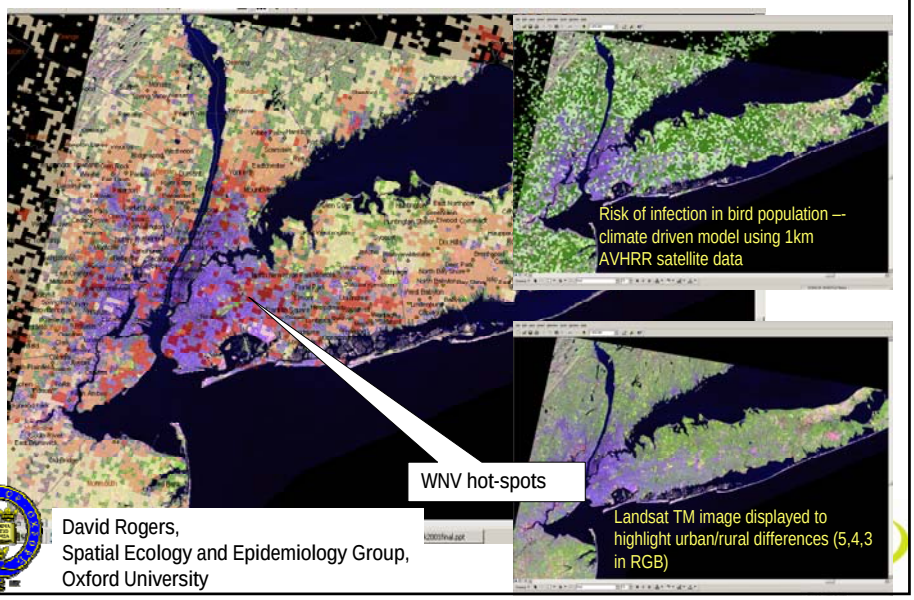
Environment and Health

Disease / disease organism	Environmental / Medical / Social factors
Bluetongue (Virus)	• Temperature scenarios • Vector distribution and ecology • Impacts of loss on farmers and farming (mental health; economic) • Policy and practice on vaccination
Lyme disease (Bacterial)	• Ecology of ticks • Behaviour of mammal hosts, e.g. deer • Distribution of susceptible people and amenity land • Educating vulnerable people • Detection and early treatment

Living With Environmental Change LWEC

Combining high and low resolution imagery:
Human risk maps for West Nile Virus in the US

Human population density*Infected bird risk = population-weighted WNV Risk Map



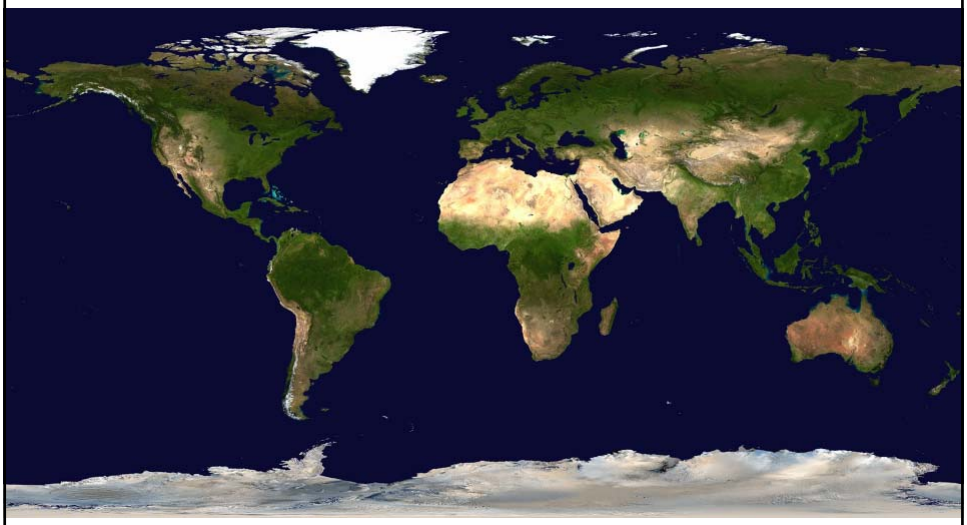
David Rogers,
Spatial Ecology and Epidemiology Group,
Oxford University

LWEC deliverables

- Better **flood risk management** through improved predictive capability, knowledge of the water cycle and targeting of investment in infrastructure
- Increased capacity to plan for storm impacts and **manage heat waves** based on predictive climate science
- More **knowledge of new and emerging diseases**, when they might arrive, who is susceptible to them and how to manage them
- More **sustainable agricultural systems** producing more nutritious food with less environmental impact
- Environmental change scenarios for **use in decision making** weighing up costs and benefits

Living With Environmental Change
LWEC

The End!



Living With Environmental Change
LWEC

Living With Environmental Change
LWEC

- Whole system approach – natural, social, economic and engineering plus policy-making and business
- £1 billion investment

Arts & Humanities Research Council
Communities and Local Government
NATURAL ENVIRONMENT RESEARCH COUNCIL
EPSRC Engineering and Physical Sciences Research Council
Met Office
Local Government Association
bbsrc
Environment Agency
Llywodraeth Cymru Welsh Assembly Government
NATURAL ENGLAND
Department for Transport
defra Department for Environment Food and Rural Affairs
E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL
SEPA
MRC Medical Research Council
natural scotland SCOTTISH GOVERNMENT
DFID Department for International Development

LWEC Objectives

Objective A **NERC / Defra led**

*To predict the impacts of **climate change**, mitigate or adapt to these and manage extreme events*

Objective B **NERC / Defra led**

*To manage **ecosystems** for human well-being and protect the natural environment as it changes*

Objective C **BBSRC led**

*To promote human well-being, alleviate poverty and minimise waste by ensuring a sustainable supply of **food and water***

Living With Environmental Change LWEC

LWEC Objectives

Objective D **Scottish Government led**

*To protect human, plant and animal **health** from diseases, pests and environmental hazards*

Objective E **EPSRC led**

*To make infrastructure, the **built environment and transport** systems resilient to environmental change*

Objective F **ESRC led**

*To help **people** from different cultural and social backgrounds respond to a changing environment*

Living With Environmental Change LWEC