Living with our changing Earth

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Drivers of change:
- Population growth
- Globalisation
- Rise of China and India
- Technological change

Global challenges:
- Climate change
- Poverty alleviation
- Food, water and energy security
- Disease reduction

Graphic source: www.mondolithic.com | Slide A. Thorpe, NERC
Increase in Demand by 2030

- Water: +30%
- Food: +50%
- Energy: +50%
- Climate: +1°C by 2030
- Specific diseases: +50%

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Population

Today
6.8 billion

By 2050
9.2 billion

Food prices rose by 50% in the past 2 years

Increased demand for natural resources
Increasing degradation of ecosystem services
GEO-4 2007
“Our Shrinking Earth”
Hectares of land per person from 1900 to 2050:
7.9 to 1.6*

* = 128m x 128m = 4 acres

|Slide A. Thorpe, NERC|
Projections of global warming
Global fossil carbon emissions

(US Department of Energy)

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Climate trends and CO2 concentrations

Global Average Near-Surface Temperatures 1850–2007

Temperature Difference (°C) with respect to the end of the 19th Century

Carbon Dioxide

CO₂ (ppm)
Energy

~60% of CO2 comes from energy production

• World energy demand >50% increase by 2030

• China and India will account for half the increase

• The Mix will remain coal and gas, nuclear and renewables

  • One quarter of humanity has no access to electricity

• One third rely on traditional biomass for cooking and heating
Energy, Wealth, Economic Growth

EIA Data 2002
Carbon Capture and sequestration

Powerful solution: climate, coal use, security of supply, use of infrastructure, maintenance of economic activity/jobs
By imaging nitrogen oxides you can see Europe’s fossil fuel emissions from space
Geoscience for...

..... spatial planning and development

Geoscience for...

..... subsurface geological infrastructure

Building for the future

..... Megacities
Geoscience for...

...... monitoring & mitigating hazards

Geoscience for...

...... monitoring environmental change impacts
Can we define a global science initiative in which we play a central role?

Food, water, energy security

landscape vulnerability

Subsurface infrastructure

Erosion

Communication

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