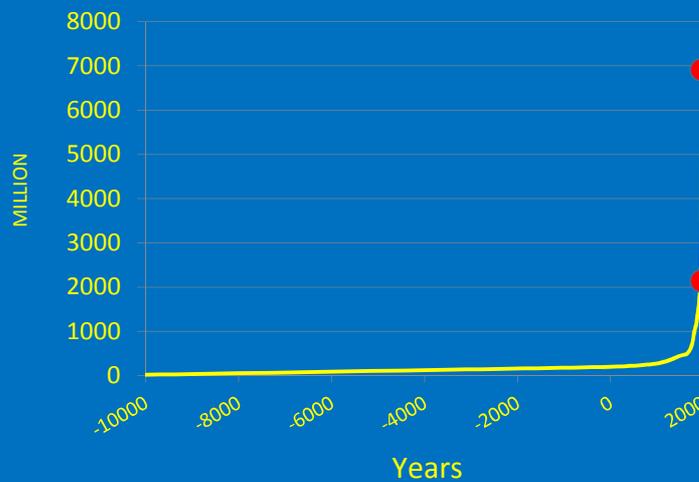


Business, Environment and NERC – Tensions & Responsibilities

Ron Oxburgh

The Foundation for Science and Technology, 24 June 2015

World Population – last 12,000 years



The Challenge

- Extracting resources and dealing with wastes without destroying the wider environment on which all depend i.e. sustainability
- Natural Capital
- Understanding properly how environmental systems work and their response to any particular human intervention
- Consequences of human activity at different scales:
 - Local – most obvious e.g. road building, mining, air pollution
 - Regional – less obvious e.g. acid rain, over-extraction of water, over-fishing
 - Global – clear only through science e.g. G-H gases, ocean acidification
- Only locally is a link between cause and effect conspicuous

Some Examples of Tensions

- Acid rain
- Oil sands of Alberta
- High Arctic hydrocarbons
- UK shale gas/oil

Acid Rain - engineering solution informed by science



- Serious die-back of Scandinavian forests
- Unexpected link to UK power stns. demonstrated .
- Regulation of power station SO_x & NO_x emissions
- Problem much reduced



Athabaska
Oil Sands,
Northern
Alberta

Athabaska Oil Sands

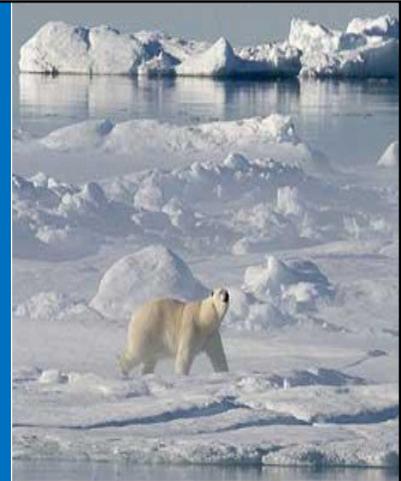
- Arouses extreme emotions
- Essentially an opencast/strip mining operation followed by hydrogenation of separated bitumen to produce oil
- Roughly twice as energy intensive as conventional oil production
- A strict, effective and tightening regulatory regime
- Post-production restoration legally enforceable and seems effective
- Also:
 - << 1% of Canadian muskeg affected - scale
 - Priorities of local population – balance?



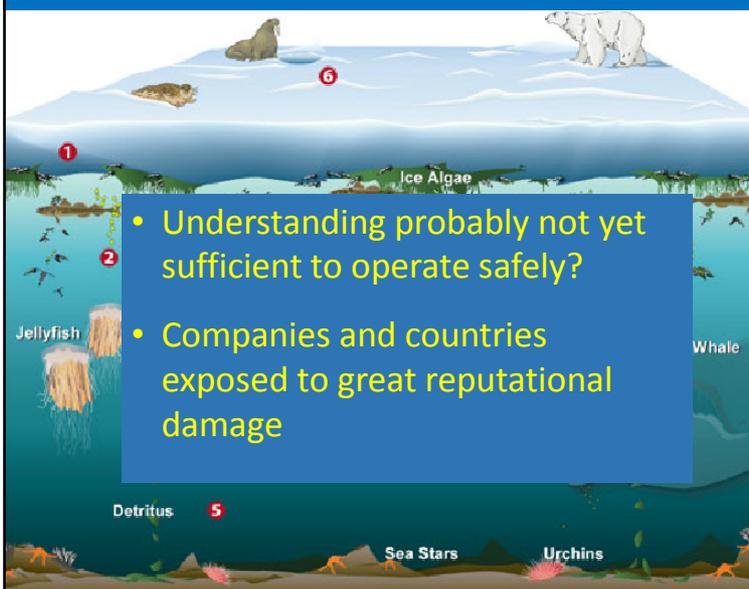
Oil Sands
Restoration

High-Arctic Hydrocarbons

- Decline in summer Arctic ice means a range of commercial activities now feasible
- Strong indication of substantial hydrocarbon resource within and round Arctic Ocean
- Commercial exploration driven by competitive pressures & governments seeking revenue
- Most of resource within sovereign territory of surrounding countries and subject to their jurisdiction
- Arctic so recently accessible that understanding of environmental systems weak – poor basis for regulation



Arctic Food Web



- Understanding probably not yet sufficient to operate safely?
- Companies and countries exposed to great reputational damage

1. Phytoplankton & ice algae are the basis of food chain
2. Microzooplankton feed on phytoplankton, in turn feeding
3. Mesozooplankton - Krill & larger planktonic animals
4. Jellyfish, whales etc eat mesozooplankton
5. Detritus eaten by bottom feeders
6. Seals & walrus eat the fish
7. Bears are top predator – fish, seals, walrus

Jayne Coucette, WHOI OceaNUS

UK Shale gas

- Public opinion strongly influenced by poor practice in early days of US industry – regulation & enforcement failure
- A substantial UK resource
- An ideal opportunity to establish science-informed effective regulation
- The regulation must be ‘honest’ both in intent and application



Role of NERC

- Systematic understanding of the natural infrastructure of the country – geology, hydrology, ecosystems etc.
- Results available to all
- The level of detail sufficient:
 - to indicate specific commercial potential
 - to inform the development of appropriate regulation
- Research to support these functions

Conclusions

- Appropriate regulation is essential to limit the impact of more than seven billion people on other species and the wider environment
- Appropriate regulation depends on understanding environmental processes - one size does not fit all - scale and proportionality
- Past problems have arisen through both ignorance and wilful neglect
- Governments and commerce have a responsibility to understand fully the environmental impact of new developments
- Clear and fairly enforced regulation welcomed by industry
- Government research Institutes and Centres have a key role as independent government advisers