

DINNER/DISCUSSION SUMMARY

Living with Environmental Change – the new multi-Research Council, multi-Departmental environmental research programme

Held at The Royal Society on 18th June, 2008

We are grateful to the Natural Environment Research Council for supporting this event.

Chair: **The Lord Broers FRS FREng**
Council Member, The Foundation for Science and Technology

Speakers: **Professor Bob Watson**
Chief Scientific Adviser, Department for Environment, Food and Rural Affairs
Professor Alan Thorpe
Chief Executive, Natural Environment Research Council
Dr Richard Pike
Chief Executive, Royal Society of Chemistry

PROFESSOR WATSON outlined the key policy issues and research needs that the Living with Environmental Change (LWEC) programme was addressing. These were to predict the impacts of climate change and how to mitigate or adapt to these; to manage eco-systems for human well-being; to alleviate poverty and minimize waste by ensuring a sustainable supply of food and water; to protect human, plant and animal health from environmental hazards; to make infrastructure more resilient to environmental change; and to aid response to changing environmental conditions. All these programmes were interconnected and the aim was that research programmes would cross all areas by examining the implication of various GHG (Greenhouse gases) stabilization levels; understand the scope of regional and sectorial strategies; examine the scope and scale of technological options; consider governance structures which promoted action; and understand how individual and collective action can be mobilized. In many areas the general picture was understood, but the sectorial and geographical implications for e.g. food, water and eco-systems were not. What were the limits – technological, physical, behavioural of our ability to adapt? What were the effects of e.g. price rises or demographic change on security, demand and productivity? We did not have the scientific evidence to enable clear decisions to be taken on e.g. biofuels, or social reaction to measures on sustainability. But we knew that stress of climate change and eco-system change could lead to conflict and other negative effects. LWECs mission was to involve world science so that decisions which would increase resilience to change could be taken.

PROFESSOR THORPE set out some of the factors in recent demographic and environmental change; in 1900 for each human there were 7.9 hectares of land; in 2050 it would be only 1.6.- 60% of ecosystems had been degraded and 30% of vertebrate species lost since 1970. Understanding what is happening now through measurement of many isolated factors - which may take many years to come to conclusions - was the basis for understanding and predicting the consequences of change. The drivers of environmental change went well beyond climate change - they were population growth, increased demand for natural resources, degradation of eco-systems and increased vulnerability to natural events, such as floods. LWEC ought to bring together the research relevant to making decisions about dealing with the consequences of change in all areas - science, engineering, economics, and social research. The 17 different organizations and departments working to

gether should enable a more strategic approach to these issues to be taken. He stressed the need for public understanding and for a programme of public engagement with these issues. Fortunately the timing of the LWEC initiative was propitious as scientific advances had increased understanding. Of great importance was understanding the economic value of eco-systems and the costs of conversion; the impacts of environmental change in different localities; and using predictions only with knowledge of the assumptions behind them and with an understanding of inherent uncertainty.

DR PIKE outlined the role of chemical sciences in responding to the government's "Energy Challenge". Some key facts were that 30% of energy was wasted before it got to the end user; 42% of non-transport energy was used to heat buildings (and 30% of that went out of windows); transport used 75% of oil and 80% of energy use came from fossil fuels. If the EU target on biofuels was to be reached, 19% of the UK agricultural land would be needed. His concern was that time was wasted on trivial issues while there was no sign of a global strategy, and little understanding in the public of the underlying factors, or statistics. Many projects were still going ahead that had a high carbon footprint – for example re-injecting gas in the Middle East to increase oil recovery and burning coal instead of gas for power. Global Strategies should not be based on fossil fuels running out - they would not - but on energy use and understanding consequences and opportunities. Development of carbon capture and storage (CCS) would enable fossil fuels to be used while limiting the rise in CO₂, but he warned that so called "clean fuels" could, in fact, be highly energy intensive to use. Nuclear must play a large role in a new energy policy, and solar was the most effective way of capturing energy in relation to the land surface used. Biofuels were highly problematic. His priorities would be reducing waste, and resource optimisation. We needed also to "think out of the box" and explore ideas such as artificial photosynthesis and massive reforestation. The use of chemical science was fundamental to successful policy choice and implementation.

Many participants in the following discussion welcomed the LWEC initiative which could lead to a more systematic and strategic approach to the problems of environmental change. But there were some underlying concerns - what were the funding resources available; what were the pressures that would encourage researchers (and government departments)

to leave their silos and cooperate effectively; were there any particular priorities which should be followed urgently - as one speaker said the whole programme sounded long term, but actions must be taken now, if they were to be effective within the next decade; how would the success of the programme be measured; was the search for determining values in different eco-systems too narrowly based on outworn market theories; was the right balance struck between the problems of the developing and the rich world.

On funding, the headline figure of £1bn over 5 years looked impressive, but where did the money come from, and was it new money, or double counting money already earmarked? It was explained that the Research Councils had committed £361m from their budgets, which was money, already found in the Comprehensive Spending Review included settlement. But although the total was not new, it had not yet been committed to individual programmes and the eventual commitment would take into account LWEC's own priorities and views. But, perhaps more important than the spending figure was the expectation that because scientists and policy makers would be working together in LWEC they would understand the benefits of interdisciplinary working, with an understanding of how one programme could benefit another. So, overall, the impact and efficiency of various programmes would be enhanced. Crucial to this was LWEC's aim of looking at all aspects of environmental change which might effect delivery - hence the importance of engaging the economists and behavioural scientists - and engineers, who would be the people who would actually make things happen. The pressures on departments and researchers to engage in the LWEC process would come from their understanding of the increased ability to work across sectors, and to work more effectively. But, inevitably, this would take time to develop. If successful "LWEC endorsed" should be a form of accreditation which would signal that a programme was part of a total strategy and be likely to be more effective in influencing decision makers.

Priorities were difficult to establish at this early stage, but it was recognized from the start that understanding behaviour, when individuals were confronted by policies designed to mitigate or alleviate environmental change, was crucial. While one speaker doubted whether the representation of social scientists on LWEC was sufficient, it was recognized as important and was vital if public engagement was to be forthcoming. There were many examples where the public did not accept that behaviour must change if unpleasant consequences were to be avoided, from GM foods to resistance to increased fuel prices - it had to be remembered that the public did not trust scientists or "experts". Short term advantages from changes in ecosystems - e.g. wetlands to shrimp farming, forestry to agriculture - nearly always seemed to trump long term concerns. Understanding the economic consequences of such changes and enabling the public and politicians affected to see where benefits and costs lay was crucial. This did not mean that market forces should prevail, or that social consequences could only be understood in financial terms, but it did mean that a common language had to be found in which concerns and consequences could be understood by all affected (perhaps, as one speaker cynically observed, Finance Ministers).

LWECs success could only be measured from the outputs of the various research programmes which it covered. Such programmes would be peer reviewed and their output, particularly in terms of influence on policy makers, carefully observed. Real success would come - as mentioned above - in getting LWEC endorsement of a programme would be seen as being a sign of quality and utility.

Perhaps the most difficult issue was determining the balance of programmes between global and national priorities, and between the developing and rich worlds. So much depended on what were the aspirations any group had for a "good life" and what were the immediate problems they faced. Would a UK or US citizen regard a life in which travel was heavily re-

stricted, a "good life"? A Maldivian islander, however, might regard the removal of a threat to tidal or storm surge as being sufficient for his "good" life. The balance of programmes within LWEC would need to adjust continuously to cope with urgent issues in the developing world as well as climate change issues affecting not only rich but also near rich - Brazil, China, Russia, India, Korea - and the poor. But before successful policies can be formulated comes the need to understand in detail the effects of environmental change in diverse localities. We did not know enough. Again a priority must be to establish the knowledge base and to take Professor Thorpe's point, to measure trends consistently over long periods.

Sir Geoffrey Chipperfield KCB

Presentations from the meeting are on the Foundation web site at www.foundation.org.uk.

Institute of Physics:

www.iop.org

Natural Environment Research Council - Living with Environmental Change:

www.nerc.ac.uk/research/programmes/lwec/resources.asp

Research Councils UK:

www.rcuk.ac.uk

Royal Society of Chemistry:

www.rsc.org

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