



A sustainable planet needs scientists to think ahead

Globalization means that Earth's life-support system can no longer be treated as separate from the socio-economic system, says Sybil Seitzinger.

In Frank Herbert's 1965 science-fiction classic *Dune*, the number-one position on the planet is held not by a politician, but by a planetary ecologist. His job is to oversee the long-term conversion of the desert planet to a lush biosphere — a role demanding formidable far-sightedness.

On Earth, the human population is set to top 9 billion within two generations. Meanwhile, we are altering, in profound and uncontrolled ways, key biological, physical and chemical processes of ecosystems on which this growing population will depend. Gordon Conway, former head of the Rockefeller Foundation, once suggested that Earth should appoint a planetary ecologist of its own. Given that today's policy-makers have consistently demonstrated an inability to take more than a short-term view of life on Earth, perhaps it is time to take the idea seriously.

The number-one position on Earth at present is arguably that of head of the United Nations (UN). Ban Ki-moon, the current UN secretary-general, seems to understand the scale and nature of the problem much better than his predecessors. This is welcome, but is still not enough. Indeed, it is doubtful whether a UN system shackled by national self-interest can ever set out a vision for a sustainable planet, or a sensible plan to realize it.

Policy-makers must take on board that Earth's ecology acts as a complex and non-linear system, and is in a constant state of change. And they must recognize that to fully understand this system, they need to take a long-term view. Is this so different from acknowledging the complexity and timescales of the world economy?

Politicians do accept that the global economic meltdown was caused by relatively small changes in parts of the financial system. The response of global markets to US toxic debt and sub-prime mortgages was nonlinear and far-reaching. The effects tumbled through other social systems and rippled through the global carbon cycle by way of reduced emissions. The crash exposed the way in which a jumbled mass of connections can cause a colossal and abrupt decline that the full might of human ingenuity struggles to stem. We should note, given the frequent warnings from scientists about our fragile natural systems, that many economists saw the financial crash coming.

For a decade or more, scientists have built up a picture of Earth as a similarly complex, interconnected system — resilient in places but vulnerable in others. Progress has been slower than many hoped, but planetary models now go beyond simple atmospheric chemistry and the carbon cycle to include cryosphere, ocean and land processes. The basics of the nitrogen cycle are being included, as are elementary descriptions of social and economic systems such as energy and agriculture. As a result, there

has been an explosion in our knowledge of Earth as a complex system. One conclusion is clear: our behaviour will shape our future.

Despite these advances, the UN still doesn't seem to see that Earth's restless and powerful social system operates within a complex and intricately linked ecological system — let alone manage it. The UN system currently includes more than 500 international treaties and agreements related to the environment. Although the current climate talks in Cancún, Mexico, are being held under the UN's Framework Convention on Climate Change, its related Millennium Development Goals, Convention on Biological Diversity and Millennium Ecosystem Assessment are all managed separately. And the UN's iconic Human Development Index takes no account of sustainable development.

Some reasons for this are apparent. The UN's 192 member states are primarily governed by narrow perspectives, self-interest and short time horizons. Nations prefer to deal with environmental issues separately because such an approach gives them more leverage in negotiations.

Given what we now know about the long-term planetary impact of human activities, this piecemeal and short-term management of individual environmental issues leaves us exposed should one part of the system fail and send shockwaves through the rest.

In August, Ban Ki-moon called for fresh ideas as he announced the creation of an independent high-level panel to direct the world towards sustainability. The panel, due to report ahead of the UN's 2012 Conference on Sustainable Development in Rio de Janeiro, is made up largely of senior politicians and business people. Although the business community can inject dynamic thinking to counter what they view as immediate threats,

there must also be strong input to this debate from scientists with a long view and an understanding of how Earth operates as a complex social-ecological system.

Just six weeks before the UN's 2012 Rio conference, scientists from around the world will gather to set out such a long-term vision of planetary stewardship. The London-based Planet Under Pressure conference aims to attract 2,500 natural and social scientists along with policy-makers, industry and others. It will offer a timely update on what we know about the Earth system, including the impact of its economic, political and social sub-systems. The results will be offered to the Rio meeting and the wider world as sorely needed long-term thinking and leadership from the scientific community. For, as Herbert wrote, "The highest function of ecology is the understanding of consequences." ■

Sybil Seitzinger is Executive Director of the International Geosphere-Biosphere Programme, based in Stockholm. Sybil.seitzinger@igbp.kva.se

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