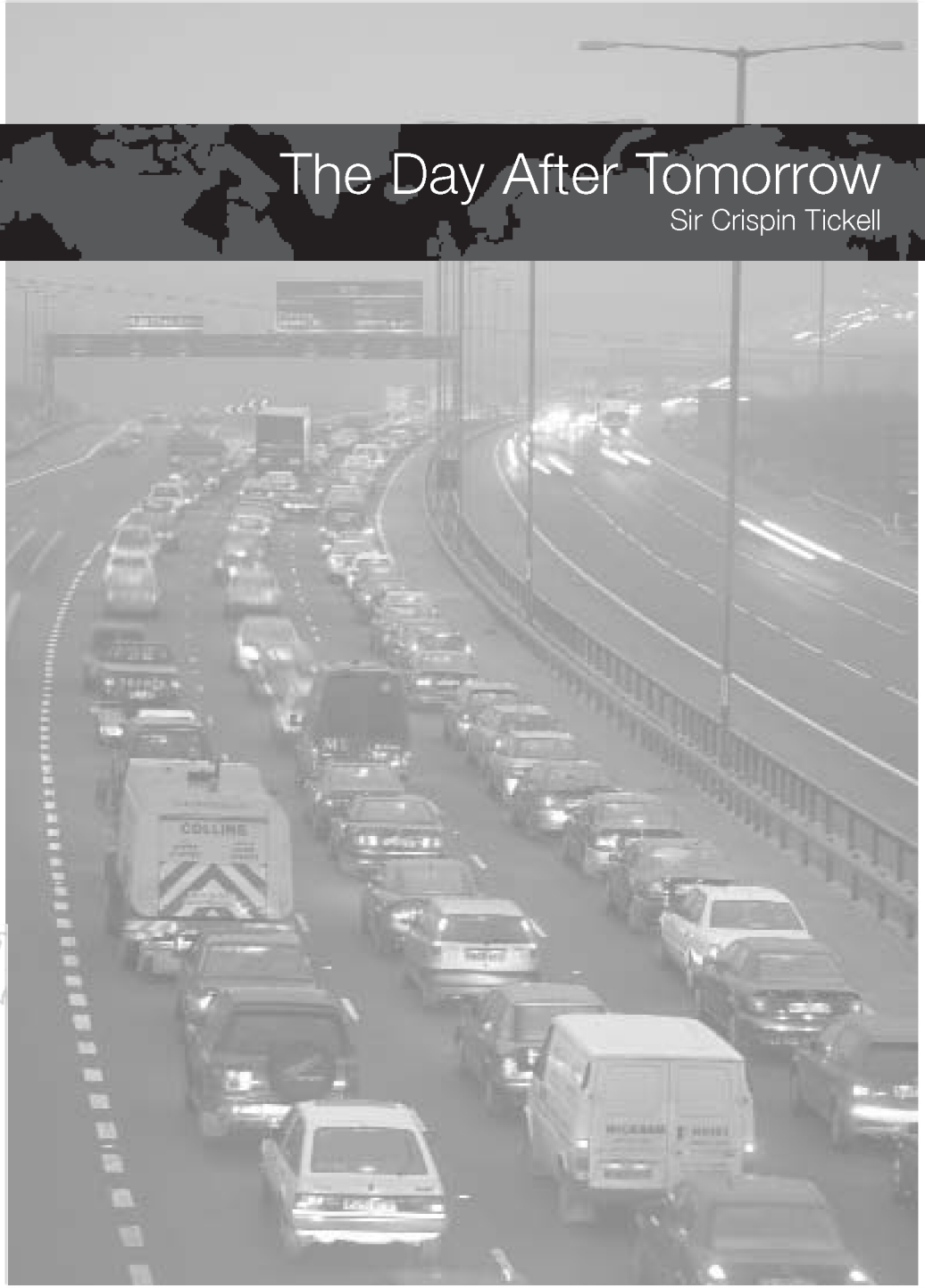
The Day After Tomorrow

Sir Crispin Tickell



Environment on the Edge

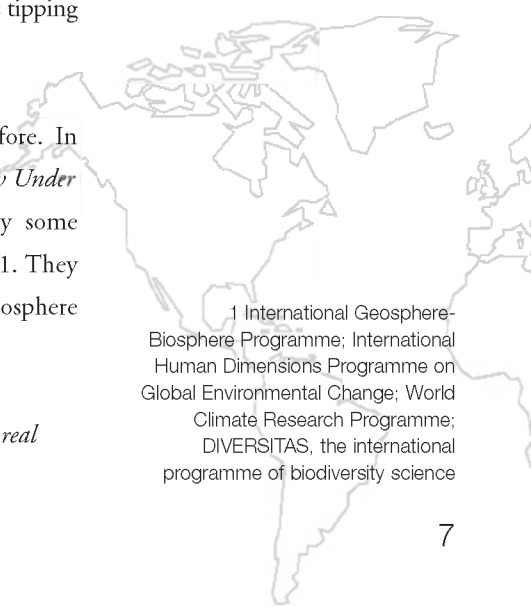
It is a relatively new idea that among the hazards that attend the life of every human being is a global danger arising from the pressure that human activities are exerting on the environment. In one sense environment has always been on the edge, and always will be. It is just that the shortness of our lives and the narrowness of our perspective on Earth's history mean that we are mostly unaware of change, and until now have scarcely noticed the pressures on the environment.

The last couple of centuries have seen an extraordinary stretching of our understanding of space and time. We can now look beyond the solar system, beyond our galaxy, beyond billions of other galaxies – back to the big bang that initiated the universe we know. As for time, we can look beyond the last thousand years, beyond the beginnings of civilization, beyond the patch of warmth in the last 12,000 years, beyond the many spasms of the ice ages, beyond the multicellular, eukaryotic organisms, and further back still over more than 3 billion years to the origins of life itself.

During these almost unimaginable stretches of time, the environment has been on many edges. There have been big hits from space, the changing relationship between the Earth and the sun, the slow movement of tectonic plates on the Earth's surface, major volcanic eruptions, and not least the influence of life itself. The tightly linked living organisms on the Earth's surface work as a single self-regulating system, tending to create and maintain the environment most favourable to them. Over time the environment has tipped many ways, sometimes violently, to the detriment of this or that ecosystem. There have always been correctives; life itself is robust. Yet today one small animal species – our own – is tipping the system in ways whose consequences cannot be foreseen.

The idea may be hard to accept, but the Earth has never been in this situation before. In the words of the title of a recent book on environmental history, we confront *Something New Under the Sun*. These points were well brought out in a remarkable *Declaration* published by some 1,500 scientists from the four great global research programmes[1] in Amsterdam in July 2001. They stated squarely that human-driven changes to the Earth's land surface, oceans, coasts, atmosphere and biodiversity:

> *… are equal to some of the great forces of nature in their extent and impact.… Global change is real and happening now.*



1 International Geosphere-Biosphere Programme; International Human Dimensions Programme on Global Environmental Change; World Climate Research Programme; DIVERSITAS, the international programme of biodiversity science

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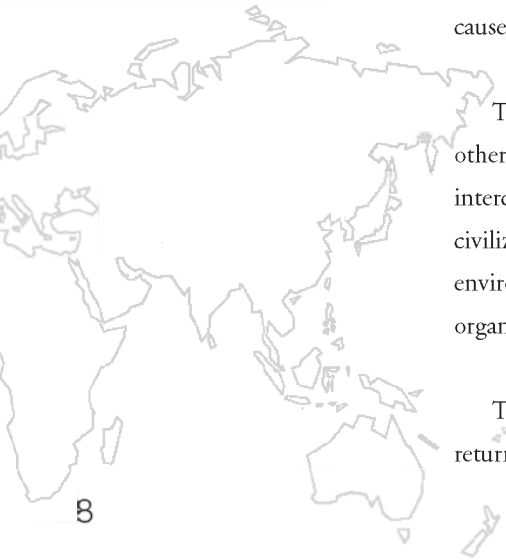
… Human activities have the potential to switch the Earth System to alternative modes of operation that may prove irreversible and less hospitable to humans and other life.… The nature of changes now occurring simultaneously in the Earth System, their magnitudes and rates of change are unprecedented. The Earth is currently operating in a no-analogue state.

… The accelerating human transformation of the Earth's environment is not sustainable. Therefore the business-as-usual way of dealing with the Earth System is not an option. It has to be replaced, as soon as possible, by deliberate strategies of good management that sustain the Earth's environment while meeting social and economic development objectives.

The problem is almost on a geological scale. No wonder the Nobel Prize winner Paul Crutzen, with his colleague Eugene Stoermer, should have named the current epoch the "Anthropocene" in succession to the Holocene.

How did we get into this situation? Let us look at recent human history. At each stage in the development of current society, the impact has increased. Hunter-gatherers fitted easily enough into the ecosystems of cold and warm periods in the Pleistocene epoch. But farming with land clearance changed everything. With a vast increase in human population came towns and eventually cities. Tribal communities evolved into complex hierarchical societies. Before the industrial revolution, some 250 years ago, the effects of human activity were local, or at worst regional, rather than global. All the civilizations of the past cleared land for cultivation, introduced plants and animals from elsewhere, and caused a variety of changes.



This ability to influence other species has given us a profound conceit of ourselves. Yet our use of other species is coupled with an amazing ignorance of how natural systems work, their awe-inspiring interconnectedness, and our total reliance on natural services. There have been some 30 urban civilizations before our own. All eventually crashed. Why? The reasons range from damage to the environmental base on which they rested to the mounting costs in human, economic and organizational terms of maintaining them.

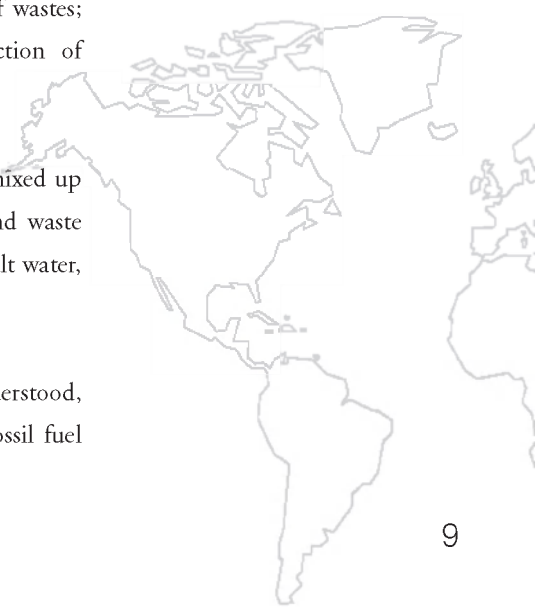
There has been a worsening conflict between humans and the rest of living nature. I have just returned from China, where this conflict is painfully visible. As one of my Chinese hosts remarked, we

are exploiting natural resources on an epic scale. According to him: "During the 20th century humans consumed 142 billion tonnes of petroleum, 265 billion tonnes of mineral coal, 38 billion tonnes of iron, 760 million tonnes of aluminium and 480 million tonnes of copper." This depredation cannot continue indefinitely.

As for the future, some may have heard some remarkably gloomy predictions from the Astronomer Royal Sir Martin Rees. In his new book *Our Final Century* (the publishers removed the question mark after the title), he explores the dangers arising from human inventiveness, folly, wickedness and sheer inadvertence. The ramifications of information technology, nanotechnology, nuclear experimentation and the rest have still to be understood and explored. His conclusion is to give our civilization only a 50 per cent chance of survival beyond the end of this century. James Lovelock recently gave a comparable warning. He wrote:

> *We have grown in number to the point where our presence is perceptibly disabling the planet like a disease. As in human diseases, there are four possible outcomes: destruction of the invading disease organisms; chronic infection; destruction of the host; or symbiosis – a lasting relationship of mutual benefit to the host and the invader.*

It seems to me that there are six main problems that have pushed the environment to the edge. They arise from human population increase; degradation of land and accumulation of wastes; water pollution and supply; climate change; energy production and use; and destruction of biodiversity.



Of these factors, population issues are often ignored as somehow too embarrassing or mixed up with religion and the ideology of development. Most people are broadly aware of land and waste problems, although far from accepting the remedies necessary. Water issues, both fresh and salt water, have received a lot of publicity, and already affect most people on this planet.

Climate change, with all its implications for atmospheric chemistry, is also broadly understood, apart from by those who do not want to understand it. How we generate energy while fossil fuel resources diminish and demand increases is still a conundrum.

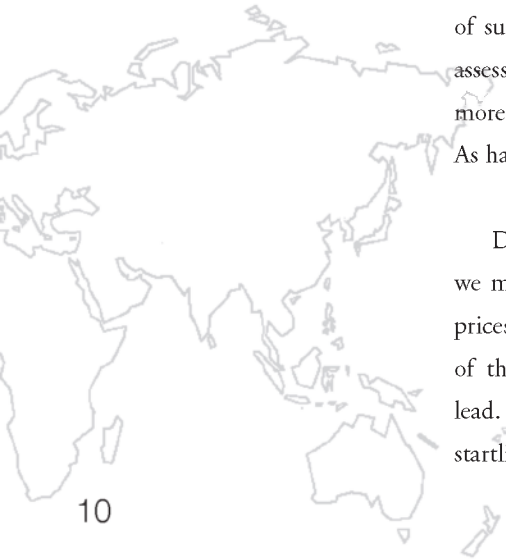
But damage to the diversity of life of which our species is a small but immodest part has somehow escaped most public attention. Yet according to IUCN–The World Conservation Union, current extinction rates are between 1,000 and 10,000 times greater than they would naturally be.

All these issues are interlinked, and all represent pressure on the environment. Coping with all or any of these issues requires two fundamental changes: first, recognition that they exist, and second – and eventually – readiness to do something about them. This process may take some time. The story of how ozone depletion was recognized, and international action followed, is a classic example of success. The story of climate change is only halfway there. Many in the Bush administration are still in a state of denial, but elsewhere in the United States attitudes are changing fast, and I believe that, in the end, concerted international action to limit the emission of greenhouse gases will be taken.

Nothing is more difficult than learning to think differently. The problem is wider than ozone depletion or even climate change, and goes to the roots of how we run our society. It relates to our value system. Any change in a system that gives primacy to market forces, exploitation of resources and ever-rising consumption will be uncommonly difficult.

At present we seem to want to attach monetary value to almost everything. But how do we give a monetary value to pollution of the atmosphere, acidification of the oceans, loss of a species or supply of such natural services as microbial disposal of wastes? Of course some rule-of-thumb method of assessing and comparing values would indeed be useful, not least in giving comfort to economists and more plausibility to their models. But somehow we have to bring in the factor of environmental costs. As has been well said, markets are superb at setting prices but incapable of recognizing costs.

Definition of costs requires a new approach towards economics and above all towards how we measure things. In addition to the traditional costs of research, process, production and so on, prices should reflect the costs involved in replacing a resource or substituting for it, and the costs of the associated environmental problems. Here the Chinese government has recently taken the lead. It has actually applied the principles of "clean green growth" in the province of Shanxi, with startling results.



Neither state-directed economics nor market economics can alone supply the right framework. Again, as has been well said, the economy is a wholly owned subsidiary of the environment. Governments have a particular responsibility to determine what is in the public interest, and to use fiscal instruments to promote it. But they can scarcely do so without public understanding and support.

It is also extremely difficult for governments to take action outside a broad international consensus. Such action can look needlessly damaging to the national interest unless others do the same. It is, for example, obvious that the current exemption of aviation and bunker fuel from taxation is absurd and profoundly damaging to the environment. It is one of many distortions of energy policy that still sees subsidies going to fossil fuel extraction (some $73 billion a year in the 1990s). Rhetoric about competitiveness as an excuse for environmental abuse fills the air in the United Kingdom as elsewhere.

The sad truth is that global institutions are still feeble. We seem to have an exaggerated expectation of what they, and international conferences, can achieve. Look at what happened – or did not happen – at the World Summit on Sustainable Development in Johannesburg in 2002. Perhaps the most damning comment came from Hugo Chavez, the president of Venezuela. He said: "Sometimes our heads of state go from summit to summit, while our people go from abyss to abyss."

Most of the solutions to the problems we have caused are well known. Take human population increase. The overall rate is still rising, but in several parts of the world it is levelling off. The main factors are improvement in the status of women, better provision for old age, wider availability of contraceptive devices, lower child mortality and better education, especially for girls and young women.

Even so, according to the first UN Millennium Ecosystem Assessment report, if current trends are anything to judge by, in 2050 we may well have a population of 3 billion more people, bringing the total to around 9 billion. Yet when I was born, the population was around 2 billion. If this rate of increase was in swallows, spiders or elephants, we should be scared silly. But because it is ourselves, we accept it as almost normal.

Take degradation of land and water. We know how to look after them both if we try. We do not have to exhaust topsoils, watch them erode into the sea, rely upon artificial aids to nature, eliminate

the forests with their natural wealth of species or poison the waters, fresh and salt. Take the atmosphere. We do not have to rely on systems of energy generation that will affect climate and weather in a fashion that puts an overcrowded world at risk.

But in order to concert action we need institutions for the purpose. The United Nations is basically an association of sovereign states, even if real sovereignty is leaking away from them all the time. Beyond and above the international debating society that is the UN General Assembly is the Security Council for the regulation of peace and war. Much of its role is reactive, and its scope for taking action to head off conflict is limited.

Then there are the International Court of Justice, to which few states now risk submitting their disputes; the various specialized agencies and associated bodies; then the multilateral corporations, the banks, the media controllers, the drug empires, the criminal syndicates and others essentially outside the current system; the non-governmental organizations which, though not accountable except to their members, try to represent citizens' interests; and now increasingly the information systems of the Internet and the world wide web, also outside the system.

There is a particular imbalance. On the one hand we have the World Trade Organization, the International Monetary Fund and the World Bank, which are all institutions with real mechanisms for influencing government policy. They are much stronger on trade and finance than on the environment, and tend to be driven by vested interests looking for short-term profitability. By contrast, the 200 or more environmental agreements are dispersed and poorly coordinated, have different hierarchies of reference and accountability, and look principally to the long term.

I have long argued for the creation of a World Environment Organization to balance – and be a partner of – the World Trade Organization. The last director of the World Trade Organization took the same view. If ever we are to cope with the consequences of the environment going over the edge, we shall need something of this kind.

So at the moment, neither public understanding of how and why environment is on the edge nor the mechanisms for coping with the results yet exist. Nor have we reckoned with the indirect effects.

High among them is the understandable desire of most poor countries to follow the industrial countries in exploiting natural resources to the full, raising living standards and participating in the consumer culture characteristic of the mindset of most modern societies.

Yet in many ways this is an impossibility. Over the last few years stock market indices may have risen, but the world's natural wealth, measured by the health of its terrestrial, freshwater and marine species, fell by no less than 40 per cent between 1970 and 2000. The World Wide Fund For Nature's *Living Planet Report* shows that the development on which so many countries are bent ignores ever-increasing human pressure on the biosphere. In 2001, humanity's ecological footprint exceeded the Earth's biological capacity by about 20 per cent. This underlines the need to avoid the misleading characterization, based on a false biological analogy, of "underdeveloped", "developing" and "developed" countries.

The division between the world's rich and the world's poor is a prime and growing source of insecurity for all. At present about 20 per cent of the world's people consume between 70 and 80 per cent of its resources. That 20 per cent enjoy about 45 per cent of the world's meat and fish, and use 68 per cent of electricity (most of it generated from fossil fuels), 84 per cent of paper and 87 per cent of cars. The division between rich and poor is not only between countries but also within them.

New elites in such countries as China and India are now acquiring similar purchasing power to the middle classes in industrial countries. For example, increased meat consumption by middle-class Chinese already threatens to perturb world grain markets as more cereal is needed for cattle feed. The contrast is increasingly between small numbers of globalized rich and large numbers of localized poor.

Some economists suggest that market forces will eventually bring their version of development to all. The trends in subsequent issues of the UNDP (United Nations Development Programme) *Human Development Report*, especially that of 1999, suggest the opposite. Living conditions have certainly improved for many people over the last 250 years, and most people are living longer. But with ever-rising population and increased pressure on resources, it is hard to see how this can continue.

Our ability to respond to change is constantly being diminished. More people than ever are fleeing poverty, water and food shortages, health problems, storms, floods and droughts, and by most

reckonings the number of environmental refugees will greatly increase. In a world where the Internet lets knowledge travel ever wider, ever faster, inequalities in living conditions are becoming more generally known and felt.

Accepting all the difficulties, we still need to work out what should be done. Looking over all the problems of the environment, I have my own list of priorities, for what it is worth:

- We need urgent action on climate change. Like Sir David King, the UK government's chief scientific adviser, I think that it represents "the most severe problem we are facing today, more serious even than terrorism". Global dimming from pollution has become an unexpected, even if temporary, counterpart of global warming. Urgent action on energy policy in all its aspects is now essential. So much has been said on this that I will not repeat it. But sucking up to car drivers or calling for new airports does not suggest that all politicians have yet understood what is at stake. I doubt whether technical wheezes – mirrors in space, windmill extractors, iron sprays in the oceans, cloud whitening and the rest – could ever do much to help. They would probably create more problems than they solved. But I am, of course, in favour of carbon capture and sequestration. I am also in favour of a government review of the true costs of all sources of energy, including nuclear.
- We need to do far more to educate public opinion, not least in the financial and investment communities. Here many initiatives are pending, with the support of the industries and businesses likely to be affected. The insurance industry is very much aware of the problems. I welcome the recent statement by the chief executive of BP that "paradigm shifts must occur across the economy".
- As I have already said, we need to look again at economics and the way we measure wealth, welfare and the human condition in terms of the Earth's good health.
- We need to apply the principles of common but differentiated responsibility, accepting that industrial countries have much bigger responsibilities for what has gone wrong as well as what has gone right, and should set the example in their domestic policies.
- For other countries, we need to help them make best use of their resources and particular circumstances, avoiding any universally applicable blueprint for improvement in their condition.
- We need to do far more to understand natural ecosystems and promote conservation. The Millennium Ecosystem Assessment should help.
- We need to make better use of technology and its myriad applications. We also need to understand

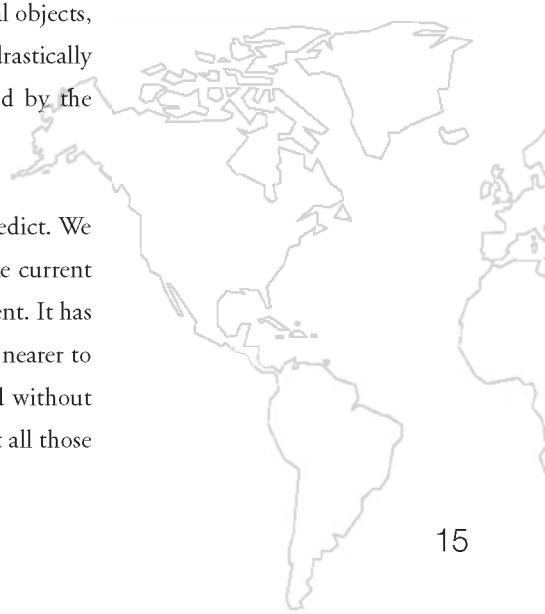
the hazards, particularly regarding pollution. Risks are hard to assess. The short term must not be allowed to defeat the long term.

- We need to focus on the needs and attitudes of coming generations – in short, give new direction to the educational process. The process in industrial countries, as in any other country, is rightly called capacity building.

All involve the ability to accept accelerating change, to learn to think differently and ultimately to behave correspondingly. We all suffer from the disease of what has been called conceptual sclerosis. Change is rarely linear. There are sudden breaks, unforeseen thresholds, uncomfortable shocks. In bringing about change we need three things: leadership from above; public pressure from below; and, usually, some instructive disasters to jerk us out of our inertia. There are many examples of all these: leadership on ozone depletion or climate change; pressure on disposal of industrial wastes, including oil rigs; and catastrophes over destruction of topsoils and their fertility.

This brings me to prospects for our future. If present trends continue, we may well push the environment over the edge with consequences that include potentially unfavourable conditions for ourselves. But let us assume that we survive this century. In peering further ahead, it may be useful to jump a few hundred years, accepting that our ability to look even 20 years ahead is extremely limited. If statistical projections from the past have value, there will certainly have been some sudden disruptions before 2500, whether volcanic explosions, earthquakes, impacts of extraterrestrial objects, or even destructive wars using unimaginably horrible weapons. Ecosystems will be drastically changed, as after extinction episodes in geological history. Human health will be affected by the development and spread of new pathogens.

How our successors, if there be such, will react to these new circumstances we cannot predict. We must always expect the unexpected. But it is hard to believe that there will be anything like current human numbers in cities or elsewhere. Their distribution will almost certainly be very different. It has been suggested that an optimum population for the Earth in terms of its resources would be nearer to 2.5 billion rather than – as now – 6.2 billion. Communities are likely to be more dispersed without the daily tides of people flowing in and out of cities for work. People may even wonder what all those roads were for.



There is also the possibility, however sinister, of differentiation of the human species. H.G. Wells invented Eloi and Morlocks (those up above and those down below), and at the time, more than a century ago, it seemed an amusing fantasy. No longer. Redesigning humans has become a real possibility. Through genetic manipulation, humans could split into distinct varieties and, over time, into subspecies. It is worth remembering how vulnerable even the Eloi were. Lee Silver explored some of these ideas in his 1998 book *Remaking Eden*.

Then there is the development of information technology. On the one hand humans may take enormous advantage from such technology and thereby be liberated from many current drudgeries. Soon cars will book themselves in for servicing, hospitals will consult online diaries before scheduling an appointment, and trawlers will sell their catch at market before reaching port. All this seems unimaginable while elsewhere others still trudge miles to collect fuelwood and water.

On the other hand, humans may become dangerously vulnerable to technological breakdown, and thereby lose an essential measure of self-sufficiency. Already dependence on computers to run our complex systems, and reliance on electronic information transfer, are having alarming effects. Here industrial countries are far more vulnerable than others. Just look at the effects of single and temporary power cuts. More than ever, individuals feel out of control of even the most elementary aspects of their lives.

The implications for governance reach equally wide. Already there is a movement of power away from the nation state: upwards to global institutions and corporations to deal with global issues; downwards to communities of human dimension; and sideways by electronic means between citizens everywhere. There is a wide range of possibilities, including forms of dictatorship and disaggregation of society.

The problems of politics will be as difficult as they are today: how to ensure greater citizen participation without creating chaos; how to establish forms of accountability to ensure that governance is by broad consent; and how to establish checks and balances to protect the public interest and ensure enforcement without abuse.

Let us hope that by then, humans will have worked out and will practise an ethical system in which the natural world has value not only for human welfare but also for and in itself. Humans may also be

involved in spreading life beyond Earth and colonizing Mars or other planets. The opportunities for our species seem as boundless as the hazards.

Working together, we may merit our survival. But our long-term prospects cannot be assured. We may have to regard our present civilization as a failure, an experiment which did not work, or which sank under the weight of its own rapacity. There is a touching Chinese poem from the time of the Tang dynasty with a message of hope: "Thousands of boats pass by the side of the sunken ship. Ten thousand saplings shoot up beyond the withered tree."

But supposing the boats do not pass and the saplings do not shoot up. How long would it take for Earth to recover from the human impact? How soon would our cities fall apart, soils regenerate, the animals and plants we have favoured find a more normal place in the natural environment, the waters and seas become clearer, the chemistry of the air return to what it was before we polluted it? Life itself, from the top of the atmosphere to the bottom of the seas, and even below that, is so robust that the human experience could become no more than an episode.

Above all, let us remember how small and vulnerable we are as creatures of a particular environment. We are like microbes on the surface of an apple, on an insignificant tree, in an insignificant orchard, among billions of other insignificant orchards stretching over horizons beyond our sight or even our imagining.

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