

# How sustainable are we?

Facing the environmental impact of modern society

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Part of being human is our capacity to transform the natural world around us. Although we rightly rejoice in our scientific knowledge, we are increasingly aware of the damage that we are causing as our technological powers have gone beyond harnessing forces and resources locally, to controlling and redirecting on a massive scale. If all the peoples of the world consumed resources at the rate of the current richest nations, key systems of the planet could not sustain the burden—for example, the climate, fresh water and soil. No longer can we rely simply on our ability to rescue ourselves technologically from problems of our own creation. Our past greenhouse gas emissions have set in train climatic consequences that we cannot stop; the best we can do is to put in place countermeasures to reduce emissions by 60–80% by the year 2050, to keep the increase in global temperature within tolerable bounds. The UK Royal Commission on Environmental Pollution Report and the Stern Review indicate the large scale of the measures needed to achieve this (Royal Commission on Environmental Pollution, 2000; Stern, 2006).

**No longer can we rely simply on our ability to rescue ourselves technologically from problems of our own creation**

One of the most urgent needs facing global civilization is to find models by which to use our powers sustainably and, in turn, the values that should underlie them. I would argue that, among the many religious and cultural understandings of the human condition, the ancient texts

of the biblical book of *Genesis* offer an important clue. Its two parallel accounts of creation describe humans, contrastingly, both as apart from the rest of nature, endowed with a task to “subdue the earth and fill it” (*Genesis* 1: 27–28), and yet also as a part of nature, set in a garden “to work it and take care of it” (*Genesis* 2: 15). These metaphors describe an inherent tension in our role as humans, as both the interveners and conservers of nature. The role of the intervener was emphasized in the ideas of the Enlightenment and embodied in the Industrial Revolution. The role of conservator was idealized in eighteenth century Romanticism and is expressed in the current environmental movement. The stakes are now much higher. The choices that we make to handle this tension in the twenty-first century will be crucial, not only for European civilization, but also globally.

There is an important relationship between technology and society and its values. Technologies are not neutral: they are a product of the society that created them and embody some of its values, aspirations and concerns. As a new technology becomes embedded in a society, it alters the practices, expectations, aspirations and values of that society to a greater or lesser extent, and often unconsciously. This synergic relationship has been referred to as a tacit social contract and creates the conditions for the acceptance of a new technology (Bruce, 2002).

If the values and goals of the invention are close to those of society, and if the invention anticipates the wishes of society, it is likely to be welcomed, as in the example of the mobile phone. By contrast, if the aims and values of the inventor do not correlate with the values and concerns of the

society—as with genetically modified (GM) crops—the technology can create conflicts. In some cases, there might also be tensions between conflicting values within a society—as with stem-cell research or nuclear power—or at a more local level—opposition and support for a proposed wind farm, for example.

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Historically, there have been periods when technological revolutions have cohered with changes in thought or culture. In 1517, the German monk Martin Luther (1483–1546) nailed 95 bullet points to a church door in the small town of Wittenberg, Germany. This was a standard way of publishing ideas for discussion and debate at the time—a sixteenth century ‘blog’ of sorts. However, the printing press, which had been invented over 50 years earlier, allowed his ideas to spread over Germany within one month and across Europe in three months. The combination of moveable type and the recovery of the belief that human beings were reconciled to God through God’s grace and not through religious rituals, created one of the most important revolutions in history. Similarly, the Industrial Revolution coincided with the Enlightenment idea of human autonomy and mastery over nature. The somewhat anarchic user-driven style of the Internet resonates with the condition of post/late-modernity in which it emerged.

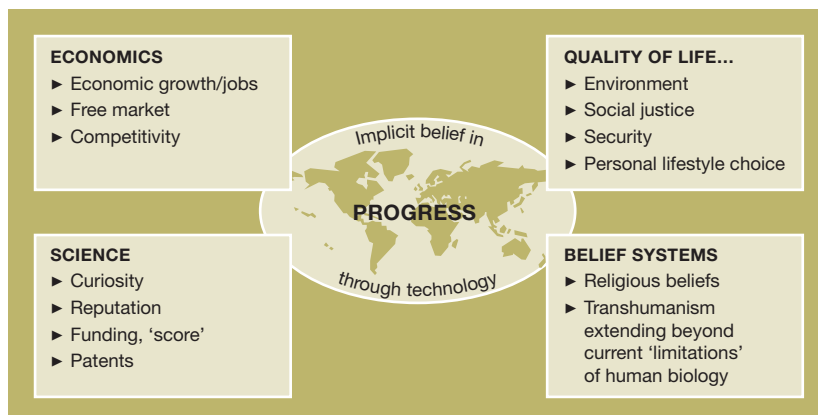


Fig 1 | The different 'lenses' through which societies view progress.

As technologies have increasingly manipulated the most basic components of life, they have impacted on fundamental human values. If the values expressed in some 'disruptive' technologies are not shared by society at large, but reflect only powerful elites, this might lead to protests. The opening meeting of the European Network of Excellence in Nanobiotechnology (Nano2Life) in Barcelona, Spain, 2004, was greeted with graffiti that equated nanotechnology with fascism. This might be a minority view, but it illustrates the different understandings of what is deemed to be 'progress' within European society.

The Enlightenment fostered an implicit belief in progress through science and technology in order to improve the human condition in its widest sense. This idea of progress is frequently cited as self-evident. Yet progress can be interpreted differently through the lenses of various world views and 'views of the world' (Fig 1).

The scientist ideally emphasizes progress in knowledge, to be harnessed in ever more ingenious ways. In reality, reputation, funding and publication pressures are also important drivers. Governments typically frame technologies economically, based on their capacity to generate wealth and jobs, and emphasize the supreme value of competitiveness in a global market place, over quality of life (European Commission, 2002; Scottish Executive, 2001). The dominant economic model equates progress with sustainable economic growth in a free market, although some commentators consider such aspirations to be a contradiction in terms (Porritt, 2008).

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For many people, however, progress is about much broader human aspirations. It might be addressing global problems such as the environment, social justice and human suffering, through sustainable food supplies, water, medicine or renewable energy. Here, technology is a tool at the service of humanity rather than the engine of macroeconomic ambitions. Its advances must redress stark global inequities, and be balanced by the care for our fellow humans and a fragile environment. Others understand progress personally, choosing whatever technologies they wish to use to improve their own quality of life. Religious belief systems interpret progress *vis-à-vis* God-given limits, and the effects of technology on the spiritual and social health of people and communities or the non-human environment. By contrast, transhumanism believes in a future vision, which some consider to be quasi-religious, where technology extends individual human capacities without limit.

These illustrations show the diversity of viewpoints found in contemporary societies. Yet, in a global context, there is concern that certain views of the world gradually become all pervasive, alongside the spread of technology or theories of economics. When technologies are introduced to relatively isolated cultures with different value systems, they are often accompanied

by a package of implicit foreign values about modernity and the dominant Western economic system. Such cultures might respond in four different ways.

The first response, capitulation, is to depart from traditional culture and to accept what is offered. However, this might lock the culture into new dependences on the incomers, their supplies and agendas. The opposite response, retrenchment, is to hope to keep the invasion of alien practices and values at bay by re-affirming one's own. However, this carries the risk of intolerant fundamentalism or the inability to withstand the force of Western technology, economics and practices. Between these two poles lies the third response, accommodation, which is to accept some things while resisting others. Again, this is hard to sustain because poorer countries are unequal players in a global market, the rules of which are written primarily for others. According to international trade rules, the removal of trade 'barriers' asserts a monopoly over all other values, whether religious, ethical or cultural. For example, these rules effectively impose Western intellectual property rights over subtle concepts of community ownership in traditional cultures. The fourth response, for a few more-powerful developing countries, is to become a strong enough global player to adapt the system of modernity to their own values.

This globalized modernity is disturbing because the accompanying values are manifestly flawed, especially when it comes to environmental sustainability. In this regard, we can identify four basic attitudes to nature and human intervention (Bruce & Bruce, 1999). At one extreme is an attitude towards nature best described as 'ownership'. Nature is an object for humans to use, exploit and dispose of exactly as we wish. We 'found' it, staked our claim and now we feel that we can do whatever we want to do with it. Whatever is good for humans is good. This is a model of complete anthropocentricity, with humans as subject and nature as object. If our experience of nature leads us to see it as a threat, it is to be conquered; its unruly forces are to be tamed and harnessed for humanity. The *Genesis* text, "to subdue the earth", has been separated from its counterbalancing idea of "caring for the garden". This instrumental, reductionist and unrestrained view is a primary philosophical root-cause of the current environmental

crises. It has origins both in medieval scholastic theology and Enlightenment humanism, and is compounded by economic reductionism and old-fashioned human greed and carelessness.

At the other end of the spectrum is the second extreme attitude, an eco-centric view in which nature is to be revered as sacred or even divine. This view emphasizes the relatedness of all things, among which humans are merely one part and not the centre or the summit. We should, therefore, hardly intervene in nature, lest we interfere with and upset the order and relationships throughout the natural world, which are part of a divine wisdom in a pantheistic, rather than a monotheistic, sense. Eco-centrism often embraces the idea of Gaia, seeing the Earth as a self-sustaining interdependent organism; 'Mother Nature' is assumed to know best. This 'deep ecology' tradition reacts against the exploitation expressed by the ownership model, and seeks to recover a sense of the sacredness of the Earth and its creatures, seasons and varied phenomena, which western Christianity, modern science and the European Enlightenment have 'desacralized'. It has a tendency to equate natural with good, and to equate human intervention through technology with spoiling, except where it is done in deep harmony with nature, without disturbing her balance and concord.

These two models illustrate the two poles of a spectrum of attitudes. In practice, most people hold a less extreme position, but are usually inclined one way or the other. Therefore, the third and fourth basic attitudes, which are modulated versions of the first and second, can be described as follows: partnership, which represents a more moderate view of the eco-centric model; and maintenance engineer, which is a more pragmatic version of ownership.

Partnership with nature acknowledges reluctant use. Nature has intrinsic value for its own sake, but it is not untouchable. A deep sense of respect means that any changes that we make must not upset the overall balance. It is a relationship of equals, not of higher to lower. This is the typical perspective of the environmental movements of industrialized countries, the roots of which include the European Romantic tradition, reactions against the mastery over nature of the Enlightenment and the American wilderness movement, which is associated with the naturalist John Muir (1838–1914) and the Sierra Club.

Nature is a source of inspiration rather than of worship, but its fragile beauty and balance must not to be diminished by either callousness or carelessness.

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Although the partnership model does not oppose technology, its effects should be small and reversible. It might be summarized as a "No, unless..." approach. The burden of proof lies on the innovator to show no harm or adverse effects. As we are part of nature, our human expansions and aspirations should be constrained broadly within the carrying capacity of the bioregion in which we are located, in a co-operative reciprocal relationship. For example, modifying the genetics of fellow species by radical molecular means would be seen as imposing a reductionist paradigm on to a holistic system. The partnership model therefore concludes that humans have gone too far. In taming and confining nature for our purposes, we have seriously mishandled it. We must therefore redress the balance and release some of our hold on nature. There are tendencies, in this model, to over-emphasize nature as a system in balance, to romanticize the past and to idealize traditional cultures, many of which have had a relatively poor record of environmental sustainability.

The title 'maintenance engineer' expresses a pragmatic view. Nature exists for our use but we must look after it, not for altruistic reasons but because it is in our best interests. The former UK Prime Minister Margaret Thatcher famously referred to humans having a "full repairing lease" on the planet (Thatcher, 1990). It is sometimes referred to in terms of the Christian idea of stewardship; however, our responsibility to look after nature is not addressed to God, but to current and future human generations. Technology is a good thing, in general, but needs to take into account adverse effects. If partnership expresses a "No, unless..." view of intervention in nature, the maintenance version of ownership has a "Yes, provided..." view. Innovation is beneficial and the burden of proof lies on the objector to show that there would be serious harm, rather than on the innovator to prove that there would not.

Therefore, the genetic modification of crops might well be done if the risk and benefit equations add up. Questions about the intrinsic value of animals or other species do not apply: bad husbandry of animals or of ecosystems is bad business for humanity. The onus is on intervention, but within some agreed and recognized limits. However, this model is not good at foreseeing the possible problems that come from innovations, and often falls down because it does not value nature for itself beyond its functional usefulness to humans.

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These four models are, to some extent, stereotypes. They map the terrain, to help one locate one's own position, and perhaps seek more appropriate models. None of these models seems satisfactory—for the reasons given—to address how we should use our technological potential in the face of the environmental crises of climate change, pollution, species loss, and water and soil pollution. The diversity of national and global situations also calls for flexibility. In short, we are looking for something between partnership and maintenance engineer.

I therefore suggest a fifth model of stewardship and relationship, which was originally derived from Christian insights, but which has gained a more general relevance. The ancient stories of *Genesis* paint a theocentric picture, in which the Earth is the creation of God and has intrinsic worth because God made it. The refrain "and it was good" expresses the delight of God in an unfolding masterpiece, which continues to evolve and create new possibilities with each new generation of creatures and organisms, and through the creativity of human agency. The creation is not ours, but humans have been given oversight on the behalf of God, to reshape and develop it, and, as stewards, we are answerable to God. There are limits to human ambitions, set by the laws of God, expressing the obligations of the relationships that we have towards each other, especially the disadvantaged, and towards all of nature. In the Christian understanding,

the spoiling of the stewardship and the relationship with nature has happened because we have sought our independence from God, losing the framing and relationships that should have guided our ingenuity. God grieves over what humans have done to what God made, but has acted in Jesus Christ to reconcile the broken relationships, and has given us a vision of hope for sustaining the ultimate renewal of creation.

Although this model derives from Christian insights, I suggest that its underlying sense of responsibility and respect, and its checks and balances, are generally applicable. The idea of stewardship is indeed widely accepted, but the model adds an important relational element. It affirms human creativity and technology, while recognizing that the planet is not ours alone, but is shared with fellow humans, non-human cousins and future generations. This places a responsibility on us to find a balance between intervention and conservation. Moreover, it points to the need to identify ultimate values for humanity and the rest of creation, which our technology should not violate.

The practical application of this model will vary from case to case and draw from the four other models, as appropriate. The loss of biodiversity indicates that crop production requires a better balance with conservation, to recover our partnership with nature. Climate change implies that a revolution is needed in the maintenance of the planet, and in how we obtain, use and depend on energy. These changes will require much technical ingenuity; however, the ethical emphasis of the fifth model highlights a relationship that calls for mutual responsibility. Justice becomes an important factor in our relationship with nature, as illustrated by our response to global warming.

To constrain global temperatures within tolerable bounds, global emissions of greenhouse gases have to decrease rapidly, breaking the trend of the past 200 years. We, in the industrialized parts of the world, bear the main responsibility for the climate change that will happen over the next 50 years. We must therefore bear the 'lion's share' of the reductions. The principle of con-

traction and convergence sets goals of per capita emissions, by which poor nations are allowed to increase their emissions up to a globally agreed norm, and to which we have to reduce ours. This also puts special responsibilities on the emergent economies of China, India and Brazil. They will take over as the main agents of climate change in the second half of this century if, in embracing the industrialization and lifestyles that our Western project of modernity have offered, they also copy our model of nature as a resource to be consumed. The fifth model is presented to seek a balance between intervention and conservation in their own contexts that do not merely repeat our sorry ecological history with analogous mistakes. Climate change provides both the urgency and the opportunity to do better; merely doing as badly as we have in the past is not an option for anyone any more. We face an environmental race to the bottom if the ownership model, as expressed in terms of competitive economic pressures and gross domestic product, remains the prime determinant of how we treat nature and intervene technologically.

**Merely doing as badly as we have in the past is not an option for anyone any more**

A final issue concerns our humanness. If we pursue technological progress without limits, are we losing something vital in our humanity that would be difficult to regain? If, because of the pressures of the dependencies that we have set up, we are unable to say 'no' to any technological development, is our humanity diminished? Many years ago, the Catholic priest and academic Romano Guardini (1885–1968) reflected on the loss of harmonious landscapes beside Lake Como in Italy through the brute insensitivity of the "logic of the formula", rather than respecting human and natural connectedness. His response was not to retrench, but to ask how we might make our technology more human in the future and what limits we must apply to do so (Guardini, 1994). Faced with climate change, human enhancement and much else, some answers are needed sooner rather than later.

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