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Losing Hope? The Environmental Crisis Today

Martin J. Hodson*

Abstract

Environmentalists and scientists who study the environment often give a pretty bleak picture of the future. Surveys of secular views on the environment suggest that the general public in the developed West are concerned about the state of the environment. After considering all of the environmental problems that are causing scientists to worry, this paper then concentrates on four: climate change; biodiversity loss; global water supply; and the increase in our human population. Finally we will see what scientists have to say about hope in a time of environmental crisis.

Introduction

The climate, the economic situation, rising birth rates; none of these things give me a lot of hope or reason to be optimistic. Sir David Attenborough¹

We live at a time when many people consider that we are sliding into an environmental crisis, and some would say that we were already there. There are, of course, a wide range of views on this topic, including apathy, denial, depression, fatalism, activism, and optimism. The above quote from Sir David Attenborough, the famous British naturalist and television presenter, is not atypical of the way environmentalists see our present situation. In fact the majority of scientists are also concerned about the future of our environment, and we will come back to look at some of their thinking at the end of this paper.

Environmentalists and scientists tend to take a gloomy view of the future, but what is the view of the general public? In 2008 the European Commission published a major report, *Attitudes of European citizens towards the environment*.² European citizens listed five environmental issues as those that they were most worried about: climate change; water

* Department of Biological and Medical Sciences, Oxford Brookes University, Headington, Oxford, OX3 0BP, UK. Email: mjhodson@brookes.ac.uk

pollution; air pollution; manmade disasters; and natural disasters. They were concerned about the environment and 96% considered that its protection was important.

In December 2012 the web site ukdebate.co.uk asked the following question of the UK public: ‘The environment is a political hot potato and parties are increasingly ramping up their “concerns” and solutions to protect us from pollution, climate change and global warming. But do you care?’ The response (on 5 Dec. 2012) was that 70% were concerned (very and a little) and 30% were not.³ It is difficult to gauge the opinions of the British Christian public concerning the environment, and it appears that little work has been carried out in this area. Recently, however, Rushton and Hodson⁴ carried out an analysis of the environmental opinions of Church of England ordinands (those training for ministry) using a standard set of questions known as the New Environmental Paradigm. The ordinands agreed with the statement that, ‘humans are severely abusing the environment’, and disagreed that, ‘the so-called “ecological crisis” facing humankind has been greatly exaggerated.’ It would therefore appear that at least those in training for leadership in the Church of England had some level of concern for our environmental problems.

It is generally accepted that the citizens of the United States are on average less keen on environmental protection than their European counterparts. Even so, in a 2010 survey, 81% of Americans favoured greater environmental protection laws and regulations, with just 14% in opposition.⁵ In 2010 the environment was seen as very important by 57% of American voters, well behind the economy (90%) or jobs (88%), but higher than abortion (43%) or same-sex marriage (32%). Interestingly, religion was found to have very little influence on environmental thinking.

So environmentalists and scientists often tend to very apprehensive about the state of the environment and the majority of the general public in the European Union and the United States show some level of concern. It is difficult to determine how many of the general public are as worried about the future of the planet as those who spend much of their lives working on these issues. But what are our environmental problems? The aim of this paper is to survey the main environmental problems that we face today, concentrating on the most recent data and findings. We will then briefly investigate whether scientists are hopeful that our problems can be overcome. This will then provide the context for theological reflection in the remaining papers in this volume.

Our Environmental Problems

There are a dozen things, any one of which could do us in, and we have got to get them all right. Jared Diamond⁶

There are many different environmental problems. Some of these will be relatively minor, and only have an impact on a local area. Others are global in scope, and some are very serious. Jared Diamond, the American scientist, listed twelve key issues:⁷ destruction of natural habitats; overfishing; loss of genetic diversity; soil erosion; decreased supplies of fossil fuels; freshwater availability; sunlight availability and a ceiling on photosynthetic capacity; toxic chemicals; alien (non-native) species; release of gases that escape into the atmosphere, causing effects such as the breakdown of the ozone hole and climate change; human population growth; and overconsumption. Some would disagree with this list, and maybe add other issues, divide some of the categories up, or downgrade an issue as less important. More recently, Johan Rockström and colleagues⁸ framed their list of problems in terms of ‘planetary boundaries’. These are biophysical thresholds that if crossed could have disastrous consequences for humanity. The planetary boundaries are: climate change; biodiversity loss; human interference with the nitrogen cycle; interference with the phosphorus cycle; stratospheric ozone depletion; ocean acidification; global freshwater use; change in land use; atmospheric aerosol loading; and chemical pollution. The authors considered that we are already over the safe boundaries for climate change, biodiversity loss and human interference with the nitrogen cycle. The planetary boundary approach was popularised by Mark Lynas in his book *The God Species*.⁹ It is interesting to compare the two lists. There are some similarities and some differences, most of which can be attributed to the different approaches taken. For instance, Diamond includes human population and overconsumption (by humans) in his list, but these would not qualify as biophysical thresholds.

Which issues should we focus on, given the short nature of this article? Many regard the ‘big four’ issues as climate change, biodiversity loss, water and human population increase. The first three feature, in different ways, in the lists produced by both Diamond and Rockström *et al.* Although human population increase does not feature in the list of Rockström *et al.*, it is in many ways the key factor behind all of our environmental problems. Having selected four issues we should be aware that although these may be the ‘big four’, any of the other issues listed could cause huge problems. To add to the complexity, all of the

issues interact with each other in a myriad of ways, and some of the interactions will become apparent below.

Climate Change

Doing something, anything, about climate change is a step in the direction of caring for people. We're all free in Christ to decide if we care. It's not a guilt thing. But our hope is that knowledge plus caring will lead to action. Katharine Hayhoe and Andrew Farley.¹⁰

Climate change looms large in both scientific and public discourse. It is a complex and, for some, a controversial issue. The reason that the vast majority of scientists are concerned about it is that they fear an abrupt, very rapid, change that may spin totally out of control this century. At the end of 2012, reports suggested a 2.6% rise in global carbon dioxide (CO₂) emissions from the burning of fossil fuels compared to 2011. Therefore CO₂ emissions are about 58% higher than the 1990 levels (the reference year for the Kyoto protocol).¹¹ Since CO₂ is a greenhouse gas and its concentration in our atmosphere has risen from about 280 ppm before the Industrial Revolution to 399.89 ppm¹² in May 2013¹³, we would expect that the atmospheric temperature would begin to rise. That this temperature rise (about 0.7 to 0.8°C) has happened in the last 100 years is now well established.¹⁴ Predictions for future temperature rises this century vary, mainly because we are unsure how much humanity will cut global carbon emissions if we decide to do so. However, it now seems clear that it is very unlikely that we will manage to keep below the 2°C target rise that many scientists would like to see as an absolute maximum, and a 3-5°C rise seems a much more likely outcome.¹⁵ A series of, frankly depressing, United Nations climate change meetings culminating with COP18 in December 2012 in Doha have given little indication that the necessary emissions cuts will be implemented in time. So there is a fairly high probability that we will see an abrupt climate change within the next few decades. Those sceptical of climate change will often say, 'the weather/ climate has always changed', which is true, but it is the speed of the change we are seeing that is most worrying. In the past most climatic changes (e.g. into and out of Ice Ages) were relatively slow, but there have also been abrupt climate changes. This type of abrupt climate change was dramatised in the 2004 film *The Day after Tomorrow*.¹⁶ Some aspects of the science in the film were huge exaggerations or completely wrong. It was, however, based on a real scientific theory where the melting of the Arctic and Greenland ice caps produced cold water which switched off the Gulf Stream. This in turn brought about the rapid onset of an Ice Age in the Northern Hemisphere. In the film

this happened in just a few days, which is extremely unlikely, but such events have happened before over periods of a few years or decades. I was involved in some work which was carried out in the United Arab Emirates, a very arid area now, but which had large human communities in the Neolithic and Bronze Age.¹⁷ We worked on samples from a dried up lake at Awafi, and conducted a number of analyses at different depths into the lake sediments. From this we were able to determine past climates going back at least 8000 years before present. Abrupt arid phases had a major impact on the population. The largest change followed the onset of climatic aridity around 5900 years before present, when the region's semi-nomadic populations abandoned much of the area and retreated to environmental refugia, mainly on the coast. There have been a number of abrupt climate change events in the past with a variety of causes, and these were well before humans had a significant effect on the climate through carbon emissions. Where they impacted on humans, however, the effect was extremely negative.¹⁸ In March 2013, Marcott and his colleagues published a highly significant paper looking at temperature changes over the last 11,300 years since the last Ice Age.¹⁹ They found that temperature rose gradually after the Ice Age and peaked between five and ten thousand years ago, before steadily declining until about 200 years ago. If this had continued we would probably have entered another Ice Age. However, in the last 200 years an abrupt temperature increase has already taken us back to near the levels seen between five and ten thousand years ago, and this can almost entirely be attributed to increases in greenhouse gas concentrations.

The human population in the past was much lower than at present (see below), and so we are much more vulnerable to abrupt climate change events than we were. The kinds of things that happen with an abrupt climate change of the order we have been discussing were well documented in *Six Degrees* by Mark Lynas, and would be disastrous for both humanity and the other organisms living on this planet.²⁰ Many people at the time of Hurricane Sandy,²¹ which devastated first the Caribbean and then New York in October 2012, drew comparisons with some of the scenes from *The Day After Tomorrow*. In fact some of the hoax 'Sandy' photos that went viral on the internet were taken from the film.²² Fiction had merged with reality. It is interesting that the American public, after an extremely hot summer and Hurricane Sandy in 2012, were (in December 2012) more certain about global warming. A poll revealed that the vast majority (78%) are now convinced warming has happened in the last 100 years, and 80% thought it could be a serious problem for the United States if nothing was done about it.²³ The same poll suggests that scientists are not entirely trusted on the topic

of the environment, with only 31% in the 'completely' or 'a lot' trusted categories. It seems that recent weather has a greater effect on public opinion about climate change than statements by scientists.

Biodiversity Loss

Almost all current biodiversity analysts agree that the extinction of species is proceeding at one hundred to 10,000 times the pre-human rate, while the rate of origin of new species is decreasing. Edward O Wilson²⁴

Until climate change rose up the agenda the most obvious worry was a decrease in biodiversity; that is the plants, animals and other organisms that share our world with us. We are not sure, even now, how many species there are in the world. Most of the large plants and animals have been discovered and named, but there are still some being found every year. In September 2012 eight new mammal species were reported from northern Peru, including a species of night monkey.²⁵ There are still many species remaining to be discovered and named, but it is highly uncertain how many. Recent estimates of the number of non-microbial species on Earth vary from 2 million to over 50 million.²⁶ Scientists have identified and named about 97% of mammals, 80-90% of flowering plants, 79% of fish, 67% of amphibians, 30% of arthropods and less than 4% of nematodes. Many of the unknown species will be found in a number of biodiversity hotspots such as Central America, the northern Andes and South Africa, the Philippines and New Guinea. Unfortunately many of these areas are under serious threat from human development, and we are certainly losing some species before they are even catalogued.

As the quote from world famous ecologist, Edward O Wilson, at the head of this section illustrates, we are losing biodiversity at a rate far higher than before the advent of humans. Many scientists say that we are currently seeing a 6th mass extinction event, an idea promoted by Richard Leakey and Roger Lewin.²⁷ The previous five extinction events in geological history have been caused by natural events, but this one is due to humanity. What are the main factors causing biodiversity loss? Wilson puts it like this: 'Try HIPPO: habitat loss, invasive species, pollution, over-population, and over-harvesting of wild species.'²⁸ Although there are other lists of causes of biodiversity loss this still encapsulates the main problems at the moment. Undoubtedly the biggest problem of all has been, and still is, habitat loss. Since the beginnings of agriculture humans have been changing habitats where plants and animals live, and usually the change is for the worse. Before the advent of agriculture

much of Europe was covered with forests, which generally allowed for a greater number of species to thrive. Urbanisation often leads to a further decline in biodiversity, although even here some species are able to adapt to live in urban environments. Invasive species are often non-native animals and plants that have been introduced by humans. A classic example was the introduction of the North American grey squirrel into the United Kingdom. This has had a serious effect on the native red squirrel. A plant example is the tumbleweed *Salsola tragus* which was introduced into North America from Russia in the 19th century. It has become an important weed species, and is very evident in many Western films! Archbishop Thabo Makgoba, in the first paragraphs of his article in this edition of *Anvil*, tells the story of morning glory, a plant with beautiful flowers that had become an important invasive species in South Africa.²⁹ Pollution is perhaps a more obvious cause of biodiversity decline, whether it is pollution of the air, water or soil. ‘Over-population’ by humans leaves less room and resources for other organisms, and is covered in more detail below. Over-harvesting of wild species can refer to hunting, and a number of species have become extinct in this way (e.g. the dodo). We are also having a major effect on fish stocks in the oceans.³⁰

Thus far climate change has had a major impact on phenomena such as the timing of egg laying by birds in the spring, and has caused some changes in plant and animal distributions.³¹ It is difficult to be certain whether it has directly caused any extinctions. However, the fear is that in the future the speed of climate change may not allow time for organisms to adapt to changing environments leading to further biodiversity loss.

Why is biodiversity loss a problem and what differences will it make if we lose some species? Many anthropocentric arguments have been advanced in the past for the preservation of biodiversity, such as the idea that there are valuable genetic resources for agriculture or medicine being lost. More recently these, and other, benefits for humanity have often been couched in terms of ‘ecosystem services’. There have also been attempts to put a monetary value on nature, and this idea was well reviewed by Juniper.³² As a Christian I can see some advantages in this approach, but I prefer the idea of intrinsic value, and that all organisms are of value to a creator God.³³

Water

Only if we act to improve water use in agriculture will we meet the acute freshwater challenges facing humankind over the coming 50 years. Comprehensive Assessment of Water Management in Agriculture³⁴

There are two problems with the world's water, quantity and quality. Although there is a vast amount of water on the planet, about 97% is saline (in seas, salt lakes etc.), and much of the freshwater is locked up in frozen ice caps and glaciers. Only about 0.01% of the Earth's water is in lakes, rivers and surface water. So although there is a lot of water on Earth, only a relatively small percentage is available for use in agriculture unless expensive desalination processes are used. The water cycle involves rain and snow falling on the ground, and water then sinking into the soil to augment the groundwater, running off into streams and rivers, or evaporating back to the atmosphere from the land surface or through plants. Too much rainfall often causes floods and too little causes a drought. As we enter a time of climate change both floods and droughts are likely to increase in intensity as the hydrological cycle is speeded up. Floods are hugely damaging and can cause great loss of life. However, it is lack of freshwater that is proving the greater long term worry and global freshwater use is considered one of the planetary boundaries that we must not cross (see above).

There are two types of water shortage, physical and economic.³⁵ In physical water scarcity more than 75% of the river flow is used in agriculture, industry or domestic purposes. Under this definition scarcity relates water availability to water demand. Areas affected include North Africa, the Middle East, South East Australia and the South West USA. When an area has economic water scarcity the water resource is abundant relative to water use, and less than 25% of water from rivers is used by humans. The largest area affected is Sub-Saharan Africa, and here human and economic capacity are the limiting factors. Water use in agriculture is subdivided into three categories: green water which is mostly from rainfall; blue water which is mostly from rivers other water bodies and groundwater through irrigation; and grey water which has already been used by humans. Palaniappan and Gleick have used the concept of 'Peak Water' to describe the situation that many parts of the world are now in or are rapidly approaching.³⁶ Citing work by the United Nations, they say that, 'by 2025, 1.8 billion people will be living in regions with absolute water scarcity, and two out of three people in the world could be living under conditions of water stress.' Problems with water availability have the potential to fuel political disputes,

and the prospects of ‘water wars’ under such circumstances are all too real. The poor of the world are those most likely to suffer from water shortages. The John Ray Initiative and Redcliffe College held a major conference on water issues in 2012, and many useful resources are available.³⁷

The second water issue concerns quality and here I will give a small personal case study. In September 2011 I visited China for a conference in Beijing, and on the associated field trip all the participants were taken out to see some experimental rice paddies. The Chinese scientists explained some research suggesting that using silicon fertilizers could radically cut the use of nitrogen fertilizer, while improving yield. Their problem was convincing the Chinese farmers that applying less nitrogen fertilizer would not lead to less growth. The scientists were well aware that much of the nitrogen fertilizer applied washes out of the soil and enters China’s rivers. A few days after returning home to the UK I spotted an article which suggested that this nitrogen was partly responsible for causing major pollution in the seas bordering China's east coast.³⁸ We noted above that Rockström et al.³⁹ considered that human interference with the nitrogen cycle was a planetary boundary that we had already crossed. Before the industrial era nitrogen was mostly removed from the atmosphere either during lightning storms or due to fixation by bacteria, but we have probably at least doubled this removal. There are essentially two ways that humans have increased nitrogen cycling: the Haber-Bosch reaction which was discovered early in the 20th century soon enabled us to produce nitrogen fertilizers using energy from fossil fuels; and the internal combustion engine not only produces carbon dioxide, but nitrogen oxides as a by-product.⁴⁰ In fact the reason that China’s seas are so polluted with excess nitrogen is not only due to excessive use of fertilizer, but also to the recent increase in car usage in the region which was all too evident in Beijing during my visit. The nitrogen oxides are dispersed in the atmosphere, but are then washed out into the seas in rainfall. This nitrogen pollution can severely affect marine ecology, leading to algal blooms and ‘dead’ areas of the oceans.

Population Growth

Rapid and widespread changes in the world’s human population, coupled with unprecedented levels of consumption present profound challenges to human health and wellbeing, and the natural environment. Sir Paul Nurse⁴¹

Human population has shown a remarkable rise in the last century. In 1900 it stood at about 1.6 billion, by 1950 it was 2.5 billion, and by 2000 the figure stood at over 6 billion. In

2011 we almost certainly passed 7 billion. Over 2.5 billion people currently live in just two countries, China and India. The impacts of this increase in population on our global environment have been enormous. Almost all of the issues mentioned by Diamond and Rockström *et al.* above have been exacerbated by human population increase. We have turned forests into agricultural land to feed our growing populations, which has decreased the amount of natural habitat available for plants and animals. More people mean more demand for heating, lighting and electricity, and more burning of the fossil fuels that contribute to climate change. Our increased population has put more pressure on freshwater supplies. The list goes on.

Human population increase has been an important factor in environmental degradation, but it is not the only factor. A recent report from the Royal Society, *People and Planet*,⁴² emphasises that overconsumption in the developed world is as important a problem as population growth in the developing world. They say, ‘in the most developed and the emerging economies unsustainable consumption must be urgently reduced. This will entail scaling back or radical transformation of damaging material consumption and emissions and the adoption of sustainable technologies, and is critical to ensuring a sustainable future for all.’

Future predictions concerning population increase are fraught with many difficulties. Most authorities seem to suggest that human population will continue to rise until around the middle of this century when it will reach 9 billion, and will then begin to level off, or maybe even slightly decline. One difficulty with predicting human population size into the future is that we do not know how bad climate change will be and what effect it will have. If nothing else a larger population leaves us more vulnerable to extreme weather events.

The recent 2011 Census of England and Wales highlighted another important population issue, that of migration. The population of England and Wales had risen by 7% between 2001 and 2011 to 56.1 million, with more than half the rise due to migration.⁴³ Movement of people has always happened, but we live in an increasingly mobile world. There is a serious concern that many migrants in the future will be moving because climate change has made it impossible for them to stay in their home countries. Such migration has the potential to increase tension and possibly lead to conflict.

The whole area of human population has been a controversial one, and most particularly in the church and other faith groups. This remains the case for some people, but I feel there is now more openness to at least discuss the issue both in the United Kingdom and

the United States. For instance Richard Cizik has recently advocated family planning as a means of combating climate change.⁴⁴

Hope and Hopelessness- what do scientists think?

*We contend that there is a continuing culture of hopelessness among conservation biologists.... Swaisgood and Sheppard*⁴⁵

At this point it might be worth stopping to consider what those who have provided most of the findings outlined above think about hope; the scientists. There has been an ongoing debate amongst conservation biologists on this topic, most recently reviewed by Swaisgood and Sheppard who are quoted above. These authors fear that the continual stream of bad news coming from their discipline may put off young scientists thinking of joining them, or at least skew recruitment towards those of a pessimistic nature. Moreover, depressing news about conservation topics can also have a bad effect on the general public, leading them to think that nothing can be done. Swaisgood and Sheppard challenge conservation scientists to balance realism with hope. They suggest that conference presentations and publications should all have hopeful suggestions to counter the often gloomy data presented. Andrew Balmford takes this thinking a stage further in his book *Wild Hope: On the Front Lines of Conservation Success*.⁴⁶ He states, 'This is intended to be a conservation book with a difference. While most others concentrate on the gloom and doom, my aim is to explore the glimmers of good news.' Balmford takes a number of case studies from around the world to illustrate the point that not everything in the conservation world is desperately hopeless.

It would be true to say that most of the hope expressed by scientists is proximate ('we can fix it') in the sense of Bauckham's definition.⁴⁷ Although there is a fair amount of apocalyptic thinking there is little sense of ultimate hope. For example ecologist, E.O. Wilson, says of his book *The Social Conquest of the Earth*⁴⁸ that, 'I had to finish it as a full-blown American optimist saying I think we are going to find our way out of this and we are going to do it with education and science.'⁴⁹ Lord Rees, the Astronomer Royal, is also ultimately optimistic despite fully acknowledging the serious problems humanity faces this century and answered the question, 'Are we all doomed?' with 'I certainly hope not. I don't expect we are. This is the best time for young people to be alive.'⁵⁰

In 2009, Lord May, a former Chief Scientific Adviser to the UK Government, caused some controversy when he suggested that faith leaders should do more to encourage members

of their communities to tackle climate change.⁵¹ May is an atheist, but felt that one of the best hopes for tackling the world's environmental problems lay in what he saw as the cooperative nature of faith communities. In a similar vein, the Environment Agency asked a panel of 25 leading environmental experts, including scientists, policy makers and activists for a list of 'things that will save the planet'.⁵² The highest priority out of 50 ideas was to reduce energy consumption, but the second was that, 'religious leaders need to make the planet their priority.' It is quite remarkable that even secular scientists and environmentalists look to the faith communities as a source of hope for the future. Somehow I believe we need to find a way of living up to their expectations.

What of scientists who are Christians? Sir John Houghton often gives three reasons for optimism about climate change: 'First, I have experienced the commitment of the world scientific community (including scientists from many different nations, backgrounds and cultures) in painstakingly and honestly working together to understand the problems and assessing what needs to be done. Secondly, I believe the necessary technology is available for achieving satisfactory solutions. My third reason is that I believe we have a God-given task of being good stewards of creation.'⁵³ Houghton's first two points again focus on proximate hope, but his Christian faith tells him that God has a job for us to do, and that there is something beyond addressing the immediate issues.

Conclusion

What gives you hope? This is a question I'm often asked these days. And what I've come to realize is that being hopeful, in the face of so much bad news about climate change, is not something that just happens -- at least not to me. It's not a passive process, but an active one. Hope isn't something I have, it's something I have to go out and find. Kelly Rigg⁵⁴

Our final quote is from Kelly Rigg, Executive Director of the Global Campaign for Climate Action (GCCA), speaking in December 2012 at the COP18 United Nations climate change meeting in Doha, Qatar. There is little doubt that our present environmental situation is pretty dire. Although almost any of the issues outlined by Jared Diamond or Rockström *et al.* could turn out to be the one that is most serious for our civilisation, climate change seems to be our most immediate danger. We have a pretty good idea of the sorts of things that could happen, the time scales involved, and the kinds of actions that might help prevent its worst effects. Unfortunately, the global community does not seem to have the will to take the necessary decisions, as was well demonstrated at COP18 in Doha. So hope runs thin, and that

is where the philosophers and theologians begin. As Christians we should have something to say about hope. Rigg (above) contends that finding hope is an active process. The other papers in this volume provide resources for this quest.

Biography



Martin Hodson is a plant scientist and environmental biologist, and a former Principal Lecturer, and now Visiting Researcher at Oxford Brookes University. He is also Operations Manager for the John Ray Initiative. Martin was the tour scientist for the Hope for Planet Earth tours, and writes and speaks widely on environmental issues. He has over 90 publications, mostly in international science journals. His recent books are *Cherishing the Earth* (with Margot Hodson, 2008) and *Functional Biology of Plants* (with John Bryant, 2012). Find out more about Martin at www.hodsons.org/MartinHodson/

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