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## **Ethics of large-scale change**

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*Published in:*  
Geografisk Tidsskrift

*Publication date:*  
2006

*Document Version*  
Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

*Citation for published version (APA):*  
Arler, F. (2006). Ethics of large-scale change. *Geografisk Tidsskrift*, 106(2), 131-144.  
[http://www.geogr.ku.dk/dkgs/image/pub\\_pdf/2006\\_2.html](http://www.geogr.ku.dk/dkgs/image/pub_pdf/2006_2.html)

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# Ethics of large-scale change

Finn Arler

## Abstract

*The subject of this paper is long-term large-scale changes in human society. Some very significant examples of large-scale change are presented: human population growth, human appropriation of land and primary production, the human use of fossil fuels, and climate change. The question is posed, which kind of attitude is appropriate when dealing with large-scale changes like these from an ethical point of view. Three kinds of approaches are discussed: Aldo Leopold's mountain thinking, the neoclassical economists' approach, and finally the so-called Concentric Circle Theories approach. It is argued that the last of these three approaches must be preferred, even though further interpretation will be needed in relation to specific decision-making.*

## Keywords

*Ethics, large-scale changes, population growth, ecological footprint, energy, climate change, fossil fuels, thinking like a mountain, cost-benefit analysis, future generations, equity, justice, Concentric Circle Theory, complex equality.*

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*Geografisk Tidsskrift*

*Danish Journal of Geography 106(2): 131-144, 2006*

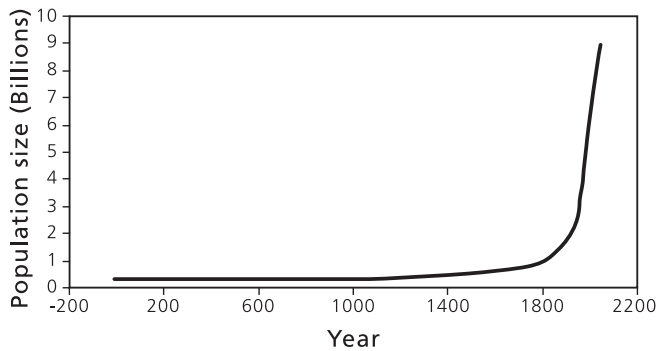
In Godfrey Reggio and Ron Fricke's film *Koyaanisqatsi* from 1983, the pace of life in the city is speeded up gradually. Eventually, people move around too fast to be recognized as individuals and, as a result, patterns emerge which are ordinarily invisible to the human eye. Individual human actions combine into an almost pathological common scheme. When, at the end of the film, the camera angle is elevated to a position high above the city, all the activities going on below appear as hectic and incomprehensible as life on an anthill or, to use the film's own image, as circuits in a microchip. This is deeply fascinating, indeed, but at the same time somewhat scary due to the dehumanisation of the actors moving around almost like mindless ants, robots or electrons in a circuit.

Monitoring large-scale change can be fascinating for similar reasons. We discover patterns and trends with life cycles much longer than those of individual human beings, driven by forces which are not necessarily apparent to the actors themselves. All the small-scale incidents of everyday life achieve new meanings when interpreted on the background of long-term developments. This is extremely enlightening, to be sure, but, again, sometimes rather daunting when the revealed patterns appear to be overwhelming and inescapable. After all, we are part of it.

The subject of this paper is long-term large-scale changes in human society. I will do two things. Firstly, I shall give a few examples of large-scale changes of utmost importance: population growth, appropriation of land and primary production, use of fossil fuels, and climate change. This leads to a discussion of different ways of dealing with large-scale issues: Aldo Leopold's idea of mountain thinking and neoclassical economy. In the end, I shall defend a kind of attitude which has been named the Concentric Circle Theory and give a few suggestions about where this may lead us.

## Human population growth

The human population has been growing almost continuously ever since the first members of the species *Homo sapiens* occurred some 150,000 years ago. Our species has been extremely successful and has spread to almost every corner of the world. This is an important point in itself. What is truly significant, however, is the fact that the human population has grown extremely fast the latest couple of centuries, i.e., during a period of time which, measured by long-term standards, is very, very short (Figure 1).



**Figure 1:** Human population size 0-2050 AD. Based on estimates from U.S. Census Bureau (reproduced from <http://www.census.gov/ipc/www/worldhis.html>).

Two centuries ago, there were less than 1 billion human beings in the world. One hundred years ago, there were some 1.6 billion. Recently the 6 billion mark was passed, and estimates predict that there will be at least 9 billion people on the globe within half a century. Stability may not occur until there are 10 billion world inhabitants, unless, of course, some catastrophic events have altered the present pattern of growth.

This, again, is a key fact in itself. Another point, which is worth noticing, however, is the fact that consumption per capita in the developed countries has grown just as extensively as the global population. Between 1960 and 2000, while the world population doubled from 3 to 6 billion people, the global economy increased more than six-fold, mainly due to economic growth in the industrialised countries (MEA 2005). There is certainly no one-to-one relationship between economic growth and growth in material consumption. In general, goods are obtained in still more efficient ways, and goods with less impact may be preferred. However, so far, economic growth has been closely associated with growth in material flow and consumption. Even in the most developed countries, where previous inputs have been accumulated into buildings, roads, etc., the growing efficiency per unit produced has been eaten up by a growing number of units (Azar et al., 2002). If every world citizen in 2100 reaches the consumption level of the upper sixth of world population living in the developed world today, total consumption could easily happen to be about ten times as large as today.

The sheer number of people does not in itself tell us very much, though. Nor do figures of material and energy flow, if these are looked upon out of context. If there is “enough and as good” left, as John Locke (1966) – still living in a world inhabited by less than one tenth of the

current population – recommended us to make provision for in his famous proviso, population and consumption growth can hardly be categorized as problems. If we only inhabit a limited part of the globe, if there are plenty of resources of all kinds left, or if science and technology can be expected to continue to enhance the resource base through permanent innovation, there is no reason to worry about population growth.

However, various kinds of indicators suggest that there may not be enough and as good left, if the human population continues to grow, and if the consumption patterns of the developed countries spread to the rest of the world. Within the latest couple of years, a number of reports have compiled information from a variety of sources in order to get an overall picture of the present situation for humankind, e.g., (EOLSS 2001; Steffen et al., 2005; UNEP, 2002 and 2005; MEA, 2005). In this paper, I shall confine myself to a few of the most significant indicators, beginning with the amount of net primary production (NPP, i.e., the total plant material generated through photosynthesis minus respiration) consumed or otherwise appropriated by humans, and the amount of land area occupied for human purposes.

### Use of land and primary production

The most cited estimate of the human uses of NPP is Peter Vitousek, Paul & Anne Ehrlich and Pamela Matson’s “Human Appropriation of the Products of Photosynthesis” from 1986 (Vitousek et al., 1986). The authors distinguish between three calculations leading to a low, an intermediate and a high estimate, respectively. In the low estimate, only the directly used organic material (food, fuel, clothing, timber, etc.) is included. This amounts to 3% of total NPP. The intermediate estimate includes the productivity of land that is now devoted entirely to human activity, but which could be used otherwise. This estimate lies somewhere between 30 and 40% of the terrestrial NPP. The highest estimate moreover includes productive capacity lost as a result of converting open land to cities and forests to pastures and losses due to desertification and overuse. The result lies above 40% of terrestrial NPP, and the authors furthermore underline that humans influence the rest significantly. These results have later been updated several times with fairly similar results (Vitousek et al., 1997; Rojstaczer et al., 2001).

A recent assessment, based on both satellite and statistical data, concluded that in 1995, humans were appropri-

ating about one fifth of the Earth's total NPP on land (Imhoff et al., 2004). The reason why the new estimate differs from previous calculations is mainly a matter of semantics: some of the land uses included in earlier studies are kept out of the new one. However, in densely populated areas like Western Europe and South Central Asia, appropriation is still estimated to amount to 70-80% of the regional NPP supply. Today, cultivated systems cover one fourth of the terrestrial surface (MEA 2005). These are also the areas which are most suited for agriculture as well as for human living in general. The least used areas – tundra areas, deserts, boreal forests, montane or dry grass- and shrubland, tropical rainforests, etc. – are the least accessible areas, or areas that for various reasons are difficult to cultivate. However, due to population growth, along with a number of other factors, the pressure on these areas is increasing. This is particularly the case with the tropical and subtropical rainforests, savannahs, grass and shrublands (MEA 2005).

Although the human impact on the channels, through which the material and energy of the biosphere are floating, is truly significant, it is not altogether obvious how one should react to it. The American philosopher Mark Sagoff (2004) has brought attention to studies which estimate termites' direct consumption of NPP to be as high as 30-40% or ten times more than that of human beings. Sagoff argues that if the human consumption is a problem due to its size, the consumption by termites (or beetles, earthworms, ants) must be a much greater problem. Alternatively, one must take a theological stand and consider human beings as unnatural creatures, tainted by original sin, who somehow denaturalises the flow of organic material by consuming or maybe even just affecting it.

Even though I find that Sagoff takes the problems of human pressure on ecosystems too lightly, he certainly has pointed out a tricky problem. After all, a human being is as natural as the next living creature, and the fact that human beings occupy and consume an increasing part of the globe does not make it less natural. If the significant influence of humans on the biosphere should worry us as a true problem, at least one out of two further assertions needs to be confirmed.

Either one has to argue convincingly that human appropriation of NPP leads to less valuable processes and products than if it were left for other species. Indications of inevitable losses of valuable biological diversity due to further human expansion are strong arguments in favour of this, but these losses always have to be weighted against the expected advantages of a further expansion in

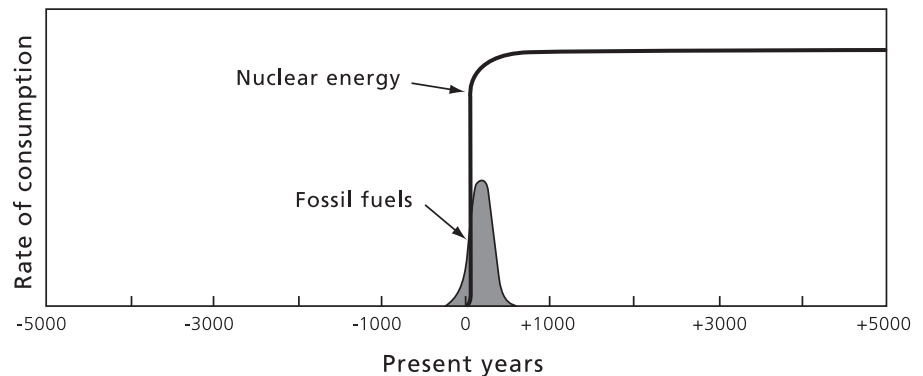
terms of cultural surplus. Alternatively, it needs to be shown that the current and anticipated human appropriation is impossible to sustain, for instance, due to unavoidable degradation of land fertility. This is a very difficult question to answer in general, because the answer very much depends on local conditions – soil, water, climate, ecological resilience and various social factors – as well as on future technological possibilities for more efficient production, particularly of food.

So let us leave the question for now, and ask instead whether there is land enough at all for the increasing number of humans to make a living. The interesting indicator here is the ratio of productive and arable land areas to the numbers of humans. Mathis Wackernagel (2001) has calculated – on the basis of various UN statistics – how much space each world citizen would have at his or her disposal, if the total of biologically productive space on the planet were distributed evenly. The biologically productive space is the area that produces more than 95 per cent of the biosphere's biomass, including actually and potentially cultivated land (forests, pastures, and arable land) as well as ecologically productive ocean areas located on continental shelves. The land areas amount to some 1.6 hectares per world citizen, to which may be added 0.5 hectares of productive ocean areas. If some space should be left for other species to live without heavy human influence, there will be even less land areas to distribute.

A few hectares per world citizen; this is definitely not very much. Wackernagel's own estimates indicate that the average world citizen already uses 2.8 hectares, whereas citizens of the richest countries use at least twice as much on average. Consequently, according to Wackernagel, we have already exceeded the biological capacity of the globe. The expected future fifty per cent increase in world population makes this even more obvious, particularly if everybody is expected to reach living standards similar to the average of today's richest fifth.

Wackernagel's calculations are to some extent based on rather shaky data and controversial assumptions. The most controversial assumption, and the one which influences the result most significantly, being responsible for almost half of the calculated land use, is the assumption that the use of fossil fuels should be converted to land areas used as sinks for the extra released carbon dioxide. The argument is that we can exceed the amount of area available by leaving a growing amount of carbon dioxide in the atmosphere instead of recycling it through sinks. Although this argument does make sense, it can also be somewhat misleading, particularly when estimates of fu-

**Figure 2:** The famous “Hubbert Peak” in the short-termed Age of Fossil Fuels (reproduced from M. King Hubbert, 1956).



ture land use are made. One may all too easily overlook the fact that energy consumption needs can be satisfied in less area-demanding ways, for example by using wind mills or solar collectors.

Another issue of controversy is the estimates of average biological productivity in humanly managed systems. These estimates are difficult to make even in relation to current land use; depending on crops and agricultural methods, estimates of productivity can vary as much as a factor 5 from field to field, (Rojstaczer et al., 2001), and estimates of future sustainable productivity further depend on difficult assessments concerning the possibility of technological improvements and estimates of the costs related to a growing productivity.

Still, despite the controversies, the indicators show us quite clearly that the human population has already reached a size which may be difficult to sustain, especially when the survival and well-being of other species and populations is a concern as well (as I certainly believe it ought to be). And, remember, there will be 50% more people within this century. Some of the uncultivated areas, which are now getting under pressure, are among the richest areas on the globe in terms of biodiversity, the so-called hot spots (Pitman & Jørgensen, 2002). It is by no means unfounded when biologists are warning against an emerging threat of a humanly induced sixth extinction, comparable in size to the previous five big ones, which all occurred long time before the emergence of human beings (e.g. Ehrlich & Ehrlich, 1981; Wilson, 1992 and 2001; Leakey & Lewin, 1996; Ceballos & Ehrlich, 2002). In this respect, too, human activity has reached a geological scale.

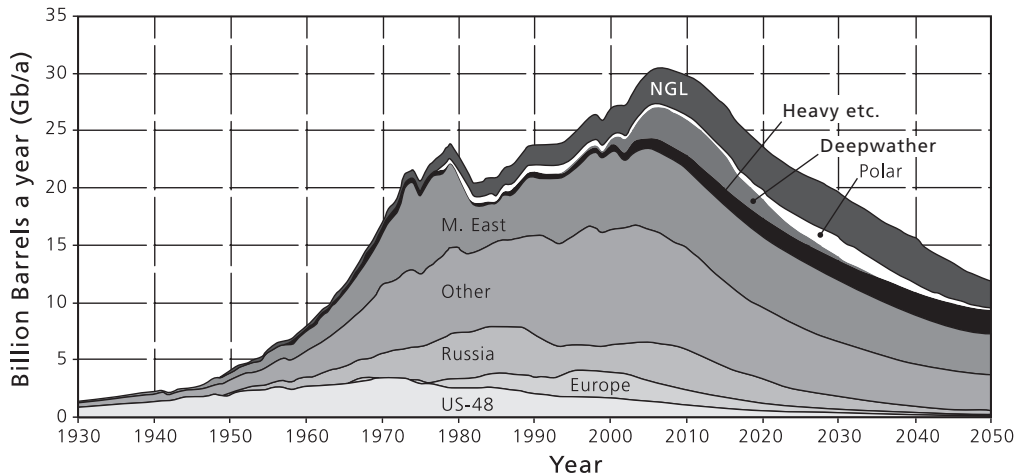
### The age of fossil fuels

Let us now turn to another significant large-scale change issue: the use of fossil fuels. It is well known that the ex-

ceptional material growth, we have witnessed the latest century and a half, to a large extent is fuelled by fossil vestiges, oil in particular. This has been an extremely cheap and extensive energy source, which has worked as a power boost apparently emancipating the human species from the ordinary global cycles of energy and material.

It has been discussed for more than a century, how far into the future the source can continue to be extracted. Some of the most serious estimates has been made by the geologist M. King Hubbert, who was employed by the oil industry for a number of decades. The first of his estimates was published in *Science* as early as 1949, predicting that the age of fossil fuels will only be a very short episode in the history of mankind. 80 per cent of the oil reserves could be expected to be consumed within half a century (King Hubbert, 1949). In 1956 he predicted that the peak in oil consumption would take place around the year 2000, after which the use of oil would decline almost as quickly as it was established (King Hubbert, 1956). The only alternative, which at that time appeared to be able to generate comparable amounts of energy, was nuclear power (Figure 2). New estimates were made in the book *Energy and Power* from 1971 (King Hubbert, 1971). In Hubbert's assessments of coal consumption, it was estimated that coal consumption would not peak much later than half a century after the oil peak, if it became the main energy source in a world of continuous material growth – and this is a necessity if all world citizens are expected to approach the current consumption standards of the industrialised part of the world.

Some recent estimates – based on King Hubbert's own methods – confirm the older projections to a large extent. One of the most prominent participants in the debate, the Irish geologist Colin J. Campbell, founder of the independent Association for the Study of Peak Oil, has argued that King Hubbert's estimates were just about right and that oil consumption is peaking right now during the first



**Figure 3:** Colin J. Campbell's 2004 estimates of oil and gas consumption 1930-2050 (reproduced from <http://www.hubbertpeak.com/us/eia/oilsupply2004.htm>).

couple of decades of this century, and can be expected to decline afterwards (Figure 3).

Others expect the peak in oil production to lie at least half a century ahead, unless consumption growth surpasses an average of 2 per cent p.a. (Figure 4). In 2004, though, primary energy consumption actually increased by 4.3%. Coal was the fastest growing fuel, rising 6.3% globally, whereas oil consumption grew by 3.4% (BP, 2005).

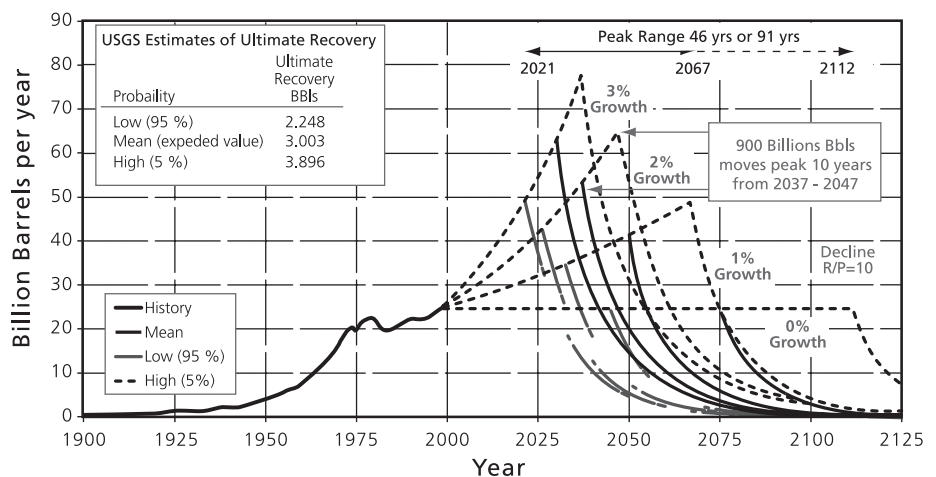
The differences between these estimates are important, of course, from the point of view of current energy planning (not to mention the perspective of our own lives), because the amount of time for adjustment will be crucial. The reasons why such differences occur are interesting, too, as they influence the critical assumptions behind projections of future (as yet unknown) possibilities (cf., for instance, Illum, 2005 and Maugeri, 2004). I shall not deal with them here, though. If we look at the projections from within a very large-scale change perspective, the similarities overshadow the differences. All estimates confirm the

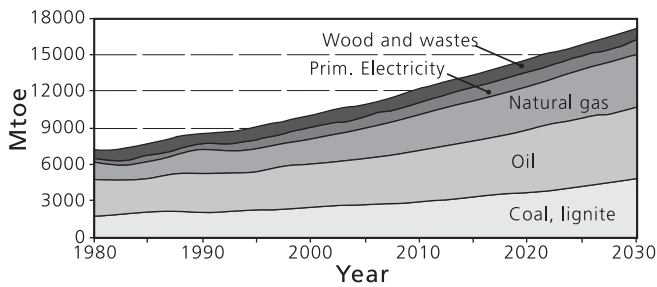
fact that the age of cheap and easily accessible fossil fuels (the most important of which is oil), must be considered a very short incident in the history of mankind, more or less coincident with the age of extreme population growth.

As fossil fuels – oil, gas and coal – account for almost 90 per cent of the total (traded) primary energy consumption today (BP, 2005), the continuous growth (Figure 5) and eventual decline in consumption is alarming, indeed, particularly when continuous growth in population and overall consumption put still more pressure on the land which can be used for alternative biotic energy production.

The good news is that even without the fossil fuels there is still a sufficient amount of possibilities to collect energy for human use. The amount of solar energy arriving on Earth is huge, compared to the energy generated from fossil fuels and just a tiny fraction channelled through human societies would be enough to satisfy the needs and wants currently relying on (often: inefficient use of) fossil fuels. It has been estimated that the theoret-

**Figure 4:** U.S. Energy Information Administration's scenarios based on various estimates from the U.S. Geological Survey (reproduced from EIA, 2004). It is worth noticing that the assumptions lead to a sudden and very quick decline once the peak has been reached. If no alternatives are in place at that time, the consequences will inevitably be dramatic.





**Figure 5:** The EU-Commission's "business as usual" reference scenario of world energy consumption 2000-2030 (reproduced from EU Commission 2003). The scenario is based on the assumption that the gross consumption increases at 1.8 per cent per year between 2000 and 2030. This again rely on the assumptions that world population grows at a rate of 1 per cent per year and the per capita GDP at 2.1 per cent per year (the developing countries' economies are not expected to grow significantly), while the energy intensity of GDP decreases by -1.2 per cent per year. The energy prices are not expected to rise significantly, nor is it expected that the resulting doubling of annual CO<sub>2</sub> emissions (or other related environmental problems) will have any influence neither physically nor politically.

ical potential for renewable energy is 2850 times the current global use of energy (Greenpeace, 2005), and that the part, which can be accessed by known technology, is at least five times bigger than total energy consumption today. Wind energy alone could probably provide for half of the current energy consumption. The technological potential is already developed enough to make a shift from fossil fuels possible, as presented in several sustainable energy plans (e.g., WBGU, 2004; Greenpeace, 2005; INFORSE, 2005), and even though the use of the solar energy flow necessitates more careful planning, due to the use of a broad complementary variety of sources with different qualities (Lund, 2006), lack of energy does not have to be the main problem – unless, of course, the global demand continues to grow at the current rate.

The bad news is that the shift is taking place so slowly that the burning of fossil fuels may continue long enough to cause serious climate change with unfortunate consequences. Thus, the true problem in the short run may not

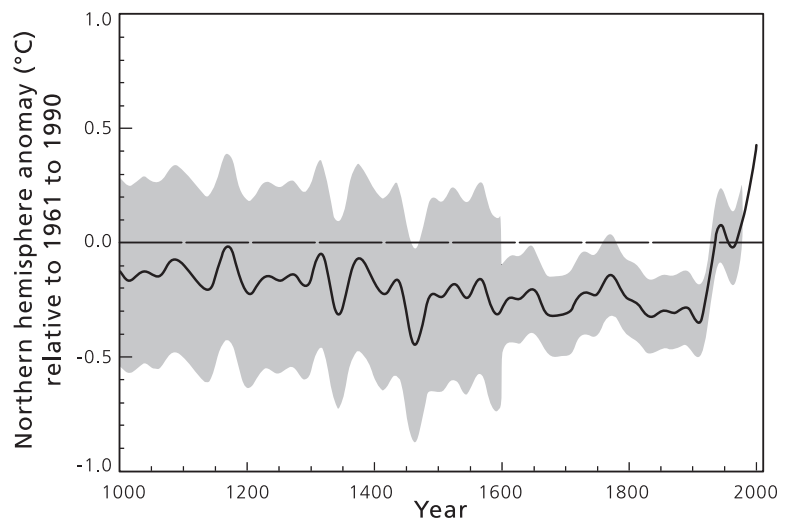
be scarcity, but rather abundance of fossil fuels. In the long run, however, it will be very difficult to sustain a global consumption ten times as big as today. A radical, but probably also quite difficult decoupling of wealth and energy flow is badly needed.

### Climate Change

The use of fossil fuels is closely related to my last example of large-scale transformation: climate change. Current climate changes are linked to population growth and the growing consumption of fossil fuels, both directly, through the carbon dioxide emissions from the burning of fuels (together with the clear cutting of forests), and indirectly, by way of other changes to which a growing population and an increasing use of energy have given rise.

The graph in Figure 6 is often referred to as the "hockey stick" curve, and it resembles almost too obvi-

**Figure 6:** Climate change, Northern Hemisphere 1000-2000 AD. Based on estimates from Mann et al. (1999) and IPCC (2001) (reproduced from [http://www.grida.no/climate/ipcc\\_tar/](http://www.grida.no/climate/ipcc_tar/)).



ously the similar hockey stick curves of population growth and fossil fuel consumption. The precise form of the curve has been a matter of controversy – other interpretations try to make the changes appear less clear-cut – and the figure itself shows clearly the uncertainties of historical records. Still, there is no longer reason to doubt that human actions have actually led to greenhouse gas emissions of major climatic significance.

Research on ice cores has shown a remarkable accordance between global temperature and CO<sub>2</sub> concentrations (and also CH<sub>4</sub> concentrations) in the atmosphere, and there seems to be a clear mutual influence (Petit et al., 1999; IPCC, 2001). Ultimately, the heavy fluctuations of both are determined by the strongest factor of all: the periodic changes of the precession, obliquity and eccentricity of the Earth's orbit. Another external factor, the changing solar irradiation plays an apparently minor roll. Still, it is well documented that both CO<sub>2</sub> and CH<sub>4</sub> are greenhouse gases, and if the amounts of these grow as extensively in the atmosphere, as they do today, this will almost inevitably lead to changes of temperature. Petit et al. (1999) have estimated that greenhouse gases' contributions to previous climate changes have been as high as 50 per cent.

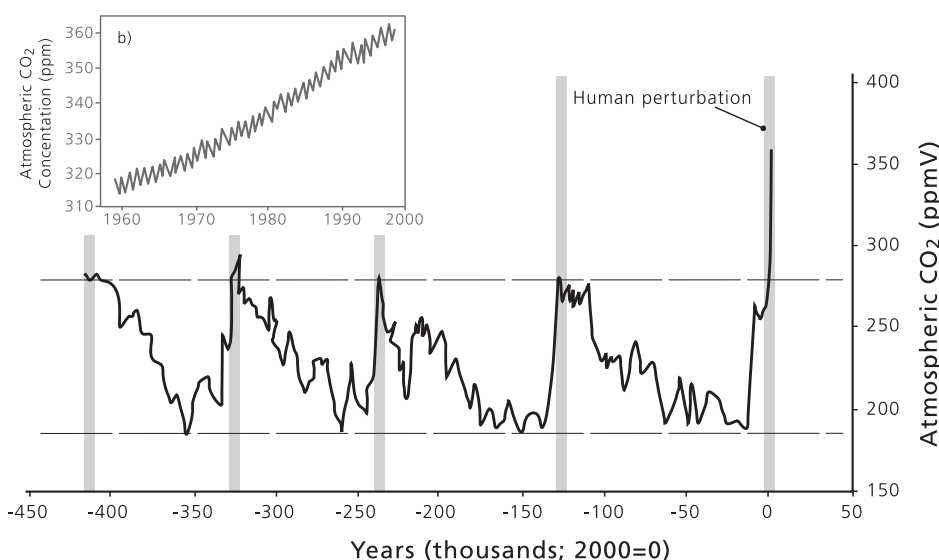
Figure 7 below shows how extraordinary the current increase in atmospheric CO<sub>2</sub> concentration is, even when measured on a geological scale. The concentration has increased from around 250 to 350 ppmv within a few decades, due to human influence. If the annual CO<sub>2</sub> emissions double before 2030, as it is assumed both in the EIA and the EU Commission's reference scenarios (Figures 4 and 5), it is hard to believe that the consequences will be

no more than trivial, particularly for the most exposed and vulnerable populations, not only of human beings but of other species as well.

Long-term estimates of past climate changes, based on various kinds of indicators like ice cores and tree rings, are not as reliable as direct measurements of current changes, of course, and they should be handled with an appropriate amount of caution. The data often leave room for more than one interpretation. The hockey stick image in Figure 6 may be based on sets of data that are still too uncertain, given the broad band of uncertainty lying on both sides of the straightforward average interpretation. Still, there does no longer seem to be any serious disagreement about the reality of a significant raise in human influence on climate during the latest century due to emissions of greenhouse gases, particularly carbon dioxide. Human beings have become a factor that is measurable on a geological scale in relation to climate as well as to land use.

### Thinking like a mountain

From a long-term large-scale perspective, two major points stand out clearly. Firstly, the latest couple of centuries have been unique, extreme in fact, in terms of growth of population, energy consumption, and material flow. Secondly, the consequences of human activities can no longer be considered marginal even on the largest scales relevant on Earth. Human beings have become a key factor for all kinds of life on Earth. Which kind of attitude is appropriate, then, when dealing with these changes?



**Figure 7:** Atmospheric CO<sub>2</sub> concentration from the Vostok ice core record with the recent human perturbation superimposed. The inserted figure shows the observed increase in atmospheric CO<sub>2</sub> concentration 1960–2000 from the Mauna Loa Observatory on Hawaii. The figure is based on data from Petit et al. (1999), and the U.S. National Oceanic and Atmospheric Administration (NOAA) (reproduced from IGBP, 2001).



One possibility is to take the scale seriously and try to “think like a mountain,” as the American wildlife manager Aldo Leopold recommended in his famous book *A Sand County Almanac* (published posthumously in 1949). Leopold’s catchword emerged at the end of a story of a wolf hunt: Game managers believed they could manage local ecosystems more efficiently without unpredictable wolves, saving more deer for the hunters. Later on, it turned out that the loss of the wolves just led to more problems. Even before the last wolves were shot, Leopold himself had doubts whether they were truly on the right track. When finally he looked into the eyes of the last dying wolf he realised that a manager will not be able to do the right thing until he learns to think like a mountain (Leopold, 1949/1989).

To think like a mountain – this is undeniably an intriguing idea. No wonder it has caught the attention of many people. (An internet search brought almost 15 million references for “thinking like a mountain”!). Leopold’s main points seem to have been the following ones. Firstly, we need to look at current human aspirations from a broader perspective than that of short-sighted selfishness and avoid decision-making based on too short time scales. Secondly, we should be aware of large-scale mechanisms that we do not know in detail and over which we cannot have full control. This is true of non-linear ecological systems, but may also quite often be the case in human affairs that involve a large number of actors. Thirdly, we ought to give due respect to the lives of non-human organisms.

To Leopold, the metaphor of ‘mountain thinking’ signified stability and large-scale perspective as against the short-sighted fuzziness characteristic of modern life. It also appeared to lead to the kind of disinterested impartiality appropriate in matters of ethical concern: “Only the mountain has lived long enough to listen objectively to the howl of a wolf” (Leopold, 1949/1989). Although Leopold used the vast scale metaphor of thinking like a mountain, his concerns were still fairly limited. He was employed as game manager, when the culling of wolves took place, and even though he became patron of wildlife in general, or of “land the collective organism,” and advocated a change of attitudes from “man the conqueror” to “man the biotic citizen” (Leopold, 1949/1989), his main concern was the preservation of wilderness areas, where wolves and “the land” in general could thrive without inappropriate interference from humans.

At first glance, the challenges we are facing today seem to appeal even more to mountainous thinking, being truly large-scale and likely to influence life on earth as far

ahead as we are able to envisage. On the face of it, mountain thinking seems particularly suited for such cases. On the other hand, mountain thinking, taken literally, may easily turn out to be way too distanced from the issues that we find truly important in ethics. After all, human interests and concerns may appear to be too insignificant to matter much. From a mountainous point of view, there is no difference between changes due to human conduct and other geological or biological occurrences. The impartial mountain would probably not care much whether it is covered with bacteria or with sensitive creatures like wolves and human beings. Even if we accept Leopold’s claim that the summum bonum from a mountainous point of view is simply to “preserve the integrity, stability and beauty of the biotic community” (Leopold, 1949/1989), it would not matter whether human beings continued to be part of this. From a human point of view, however, it matters quite a lot.

In the tradition of landscape aesthetics, mountains have been associated with the concept of the ‘sublime,’ which occurred as a response to the idea of a decentred infinite universe occurring in the 17th century (Nicolson, 1959/1997). Mountains appeared vast and majestic, almost like the starry sky; at the same time frightening and yet fascinating, even attracting due to their enormous size and the large time scale perspective they represent. They were “incomprehensible for our imagination” as the German philosopher Immanuel Kant (1790/1974) pointed out in his analysis of the sublime, and their scales appeared in all dimensions to be so much out of line with those of the individual human being that they made his or her ambitions and efforts seem hopelessly vain and inadequate. To think like mountains meant thinking in terms of the infinite, *sub specie aeternitatis*; an important corrective to pettiness, like the mountaineer leaving all the tiny affairs of everyday life behind, but also a *memento mori*, a scary reminder of our own finiteness.

### Thinking like a tradesman

“In the long run we are all dead.” This could be the ultimate point of sublime mountain thinking. It is also one of the most quoted sentences among economists, however. John Maynard Keynes is the originator, using it in a critique of Alfred Marshall’s distinction between what counts in the short run, where the neoclassical marginalist concept of value is appropriate, and the long run, where the classical concept of “natural” value may happen to be

correct (Marshall, 1920). Keynes' point was that we know (and care) too little about what will happen in the long run to be able to make use of the distinction in a meaningful way. A fortunate thing, he argued, because at least so far we have seen society continue to prosper exactly due to the fact that everybody pursues short-sighted marginal gains without too many thoughts about the long run and "natural" value.

But how about the disturbing trends summarized in the figures above? From the camp of neoclassical economists, we receive the standard answer that these trends need not worry us. Two arguments are typically employed in unison. Firstly, as long as we desist interfering with the market, its mechanisms will continue to keep us on the right track. If one kind of resource runs out, or rather, becomes too expensive to be exploited with revenue, the short-sighted gain seekers will turn to something else. Secondly, humans are basically creative beings, open-minded and prepared for changes. They will always be capable of finding new possibilities, or more efficient ways of using older ones. The resource basis will not diminish, but can be expected to expand along with the developing capabilities following from progress in scientific and technological knowledge. In fact, the economists argue, the basic resource is knowledge itself, not material resources. Consequently, Neo-Malthusians are wrong.

The second point – that we should not forget technological, scientific and social innovation – is sound and very important not to ignore. Still, there are several reasons why the standard answer in total is not acceptable without further ado. Let me just mention a few of these here (for further discussion and references, see Arler 2006). Firstly, leaving it all to the market may not be such a good idea, as long as the market is infected with systematic failures. Many costs and benefits are not valued on the market at all, environmental costs being the key example, and future costs are not valued on current markets, although, in theory, they should be. In order to make the market work in a way that matches the suppositions in economic theory, the standard answer from neoclassical economists is to let these issues be incorporated into the current market by use of cost-benefit analysis.

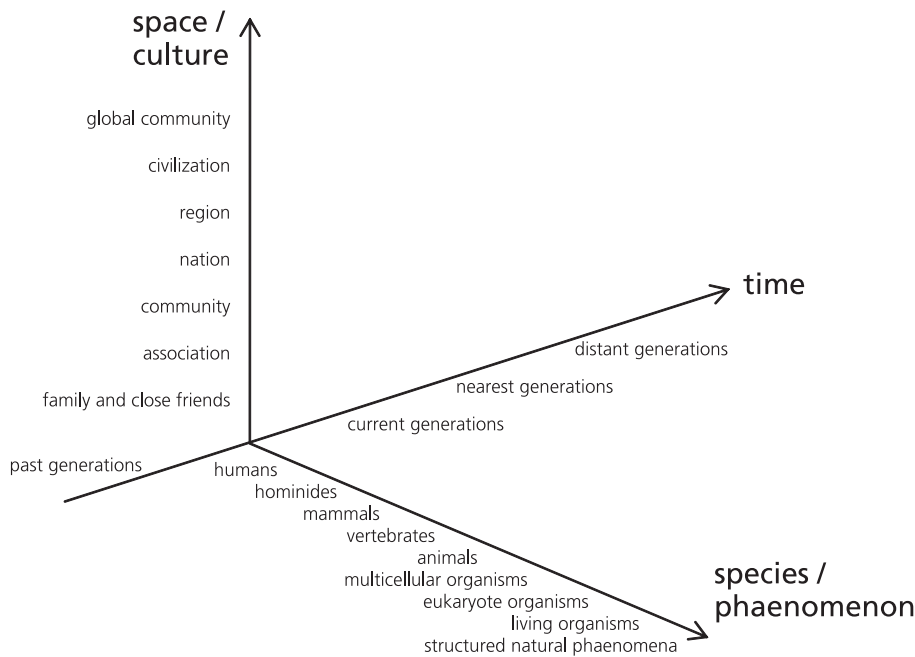
Cost-benefit analyses of large-scale changes like the increasing greenhouse effect tend to confirm the conclusion that there is no need for radical measures in order to cope with them. There is one simple reason for this, however: future impacts are discounted at the current rate of interest for reasonably safe investments, i.e. by some 5-10% p.a. This is based, primarily, on the assumption that

technological improvement and economic growth in general will continue in a business-as-usual sort of way. The use of a high discount rate has the consequence that future impacts become negligible. This is true for future losses of human lives as well, so even if the Neo-Malthusians happen to be right, it needs not matter much, as long as the losses take place far enough into the future.

Another point, which makes the standard answer problematic, is the probability that costs and benefits of wide-ranging changes, like the increasing greenhouse effect or the exploitation of the fossil fuels reserves, are separated both in time and space. The gainers and the losers are likely to be different people living in different places at different times. Calculations of changes that are international by nature involve estimates concerning people that live under highly unequal circumstances. When differentiated prices on so-called "statistical lives" are included, anticipated losses of poor people's lives have little significance compared to rich consumers' requests. The high expectations of economic growth and the corresponding use of a high discount rate strengthen this problem, as anticipated losses of future poor people's lives disappear totally from the account. But why should current rich people's marginal preferences count many times more than the needs or even lives of future poor people?

Or, to put the point in a more general form: why should private preferences count at all, at the expense of political values and priorities (Sagoff, 2004)? Reliance on market mechanisms is typically legitimised by reference to the consumers' autonomy and freedom of choice, the notorious difficulty of centralist planning, their efficiency in terms of coordination of diversified societies, and maybe the innovative force of a competitive setting. Even though some of these arguments do have a certain strength – albeit not without reservations (cf. O'Neill, 1998) – they lose their reliability in relation to cost-benefit analysis, which is used exactly as a centralist planning device in relation to comprehensive long-term changes.

Cost-benefit analyses is certainly helpful in relation to limited projects with a marginal impact, but they are not appropriate for assessments of comprehensive, non-marginal, international, and long-term changes. Not only is it extremely difficult to anticipate long-term changes in detail. This is true for all sciences dealing with the future. Cost-benefit analysis suffers from the additional problem that their basic data, the value relations, change along with other changes, particularly when alterations are as wide-ranging as those depicted in the previous section. Private valuations made under current circumstances are all the



*Figure 8: Three dimensions where obligations may become relevant. The closer to the centre a group is placed, the stronger and more comprehensive will the obligations usually be, according to Concentric Circle Theories (re-produced from Arler, 2001).*

analysts have.

To this can be added that cost-benefit analysis indirectly recommends a transfer of the decision-making agency from the collective of citizens to an aggregation of (current) consumers. Even if the market actually worked as smoothly as it is assumed in cost-benefit analysis, and it certainly does not, this would still not be the right basis for making political decisions. It is a conceptual mistake to confuse consumer preferences with values and assumptions related to the long-term good of society at large.

Finally, standard cost-benefit analysis is completely incapable of dealing with the fundamental questions of equity. The ignorance of questions of equity is usually defended with the argument that if society becomes richer, everybody is likely to gain. This argument loses its credibility, however, when benefits and costs are radically separated in time and space, and, consequently, no compensatory mechanisms are likely to be operational.

The development of the latest couple of centuries must be considered extreme, if looked upon from a large-scale perspective encompassing hundreds of years. More than any other group, economists have brought attention to a truly difficult question. Are the basic features, which have made this extremity possible, just temporary phenomena, like the immediate accessibility of cheap fossil fuels and minerals, uncultivated land and productive

ecosystems? Or are the basic forces irreversible and permanent features like the market system and a scientific and technological culture, which, once reached, can be expected to continue to develop without limits? Neoclassical economic theorists typically opt for the second option and tend to see the current situation as continuously normal. 20th century growth is therefore expected to continue as far into the future as it will ever be necessary to take into account. As attractive as this assumption may seem, it is also extremely risky to rely on in relation to specific decision-making, particularly when it is unrelated to any empirical foundation.

### Thinking as a citizen

Mountain thinking is too sublime, economics too short-sighted. The question is whether it is possible to find some middle course between the two, without losing any of the good points, which can be found in both. I believe there is, and that the perspective we are looking for must be constructed along the lines of a kind of theory, which the American philosopher Peter Wenz has named the Concentric Circle Theory (Wenz, 1988). Let me explain some of the merits of this kind of theory on the basis of Figure 8.

We are all involved in various kinds of relationships.

Some are close, like family and close friendships; others are far more remote, like common membership of the EU, whereas others are still so vague that we seldom think of them, like the common membership of the Earth's 4.5 billion year old biotic community. To be involved in relationships is binding; the closer and more comprehensive a relationship is, the more binding and numerous will our obligations be. If my own child is hungry and incapable of finding food on her own, I am strongly committed to help her. If a child in a foreign country is hungry, I rely on the hope that she has some relatives to take care of her. If she is the victim of some unfortunate circumstances, I will consider contributing money through a helping organisation. If the cub of a fox in a remote country is hungry, I hope the best for it (if I know anything about it at all), but I feel no commitment to get involved, unless, perhaps, the fox is one of the last few survivors of a species threatened by extensive hunting.

I tend to believe that most other people agree. We care more about those of our fellow biotic citizens who are closest to us for some reason. It is not quite as simple as illustrated in Figure 8. I may, for instance, have colleagues on the other side of the globe that I regard as closer to me than my neighbour. Differences in obligation are caused by various factors. Location does matter, of course, because physical nearness makes it easier to become acquainted, and presumably, my neighbour pays taxes to the same authorities as I do and is associated with the same community and nation. Mutual knowledge about needs and wishes, mutual impact, mutual agreement about values and goals, common projects, etc., are all elements that matter.

However, even though our attention is mainly focused on those who are closest to us, and towards whom our obligations are more comprehensive, the obligations emerging from the larger circles are in a certain sense stronger than those that emerge from the smaller circles. Or, to put it in another way, the orders of the larger circles determine the orders of the smaller ones. This can be illustrated by a couple of examples. If international relations are in a state of war and chaos, this will inevitably do a lot of damage to the national order. A reasonable international order needs to be established, in order for the national society to be well-functioning. So even though I am more concerned about people within my own country, re-establishing the international order will have first priority.

Or take another example: let us assume that my cousin is employed in the local tax department, and that she is very considerate about people within her family circle.

Does this commit her, or at least allow her, to let them off paying taxes? Certainly not; in a well-ordered society there is no room for nepotism, corruption, or fraud. In this case the societal obligations are stronger than family duties.

This is not simply a weighing of family benefits against the possible costs: she may get into trouble if her fraud is discovered, and the family may suffer if nepotism becomes a social canon. The argument goes deeper. Basically, I assume that we must be able to justify our conduct on the basis of impartial reasons that we expect everybody, who is capable of reasoning, to be willing to accept (cf. also Kant, 1980; Wellmer, 1986; Scanlon, 1998). When I take special care of my family, for instance, I expect everybody else to do the same. My first-order partiality towards my own family ought to be acceptable on the basis of second-order impartiality rules, leaving everybody else with a similar allowance (Barry, 1995). However, if my care is so extensive that I neglect common rules, I can no longer expect everybody else to accept my actions (apart from certain cases of emergency). The argument is not even that I, or my family, will be better off in a well-ordered society without fraud and nepotism; in that case we may try to transport all costs of current activities to be dealt with by future generations. If I find it important to be able to justify my conduct with reasons, I believe everybody, including future people, ought to accept that, this is no longer an option.

Which kinds of obligations are relevant, then? In relation to future generations, the arguments must be similar to those we use in current large circle relations. Even though commitments are more comprehensive towards our closest co-existing relatives, we are only allowed to fulfil these commitments in ways that are acceptable within the larger circle of intergenerational obligations. I have proposed elsewhere (e.g., Arler, 2001a) that the obligations towards future generations be comprised into three basic principles. Firstly, each generation should leave succeeding generations resources and environmental circumstances which can be expected to be as good as those they themselves inherited. This principle is similar to the Lockean proviso. Secondly, deterioration of environmental goods, depletion of resources, and increasing risks should, if possible, be compensated by improved opportunities like, for instance, added wealth, knowledge, technology, etc. This is not always possible, because some resources are critical or unique, and cannot be substituted for (Arler, 2005 & 2006; Leist, 2005). These resources should be preserved, if possible, in any case. Thirdly, no single group (or generation) should be sacrificed for the

good of the wealth and welfare of others. These three principles are open for various interpretations, of course, but this is unavoidable in any case.

How about obligations across national borders? Since the end of the Second World War, the organising of international relations has pursued the neighbourhood ideal codified in the UN Charter. This ideal includes a sharp line between national and international affairs. The country is sovereign in relation to internal regulations, wealth and welfare of its citizens, cultural priorities, etc. Cornerstone principles are freedom and independence for every people, duty of compliance with international agreements, mutual respect and equality as contract partners, duty of non-intervention, right of self-defence, and duty to aid burdened societies (Commission on Global Governance, 1995; Rawls, 1999). In general, this is a reasonable ideal in the present situation, and it fits in well with Concentric Circle Theories.

At the Earth Summit in Rio 1992, a new important concept in international regulations was introduced, which takes us a bit beyond the neighbourhood ideal. Some issues, global challenges like the increasing greenhouse effect and the increasing losses of biodiversity, were depicted as 'common concerns of humankind' that should be dealt with in accordance with basic principles of equity and social justice. In the Framework Convention on Climate Change, for instance, it is emphasized that obligations must be differentiated and "specific needs and special circumstances" of vulnerable countries taken into consideration. This is confirmed in the UN Millennium Declaration, which states that global challenges must be managed in a way that "distributes the costs and burdens fairly in accordance with basic principles of equity and social justice" (UN 2000, Article I.6).

I have argued elsewhere (Arler, 2001b) that the basic ideals behind international agreements on global challenges ought to be complex equality and equal respect (cf. Walzer, 1985; Miller, 1995). Complex equality means that justice cannot be based on just one master good, one common nominator, one distributive criterion, one distributor, or one procedure. There are simply too many different kinds of goods: love, friendship, health, strength, wealth, political influence, beauty, offices, honour, etc. Not only are these goods too different to be distributed the very same way; different people also pursue different combinations. Justice demands that procedures, criteria etc. be adjusted to the specific goods at hand. In cases where more than one distributive solution is possible, as is the case with regulations of the increasing greenhouse

effect, the guiding ideal should be to promote equal respect for all world citizens despite their differences. An easily understandable rule, which complies with this ideal, would be to distribute tradable emission quotas to countries on the basis of population size; but there are several other reasonable solutions. The specific solutions should, in principle, be settled in international agreements, which are developed through procedures based on principles resembling the ideals of discourse ethics as far as possible (Habermas, 1981), even though these ideals may be difficult even to resemble in a world which is extremely diversified in social and economic terms.

The need for more binding international agreements in these areas is obvious. But what if the actual procedures are too far from ideal to be relied on, and equitable international agreements are impossible to reach? In this case, there seems to be two roads to take. The first road is to rely on the Kantian categorical imperative: act in accordance with a rule, which you would find reasonable for all to follow (Kant, 1965; Rose, 1992). If, for instance, you believe that it is important that fossil fuels are faced out before the mid-century, and that everybody, as a general rule, ought to act in accordance with this, you should follow this rule yourself. This rule can be applied to countries as well as to individuals.

A second road to take is to rely on a principle which Wenz has called the Principle of Anticipatory Cooperation: act in a way which is somewhat better than that of people that are similar to you in relevant respects (Wenz, 1988). The point is that it does not seem reasonable to prescribe very strict rules to people with strong moral commitments, if this means that they are likely to come out much worse than less committed people. This principle can also be applied to both countries and individuals.

The two rules may actually end up the same place with fairly similar results, because the categorical imperative must not necessarily be interpreted in the strictest possible manner, where actions of other people become irrelevant. The recommended general rule, which everybody ought to follow in the example above, may just as well turn out to be something like this: act in a way that reduces the use of fossil fuels as quickly as possible without making your own living condition significantly worse than that of people similar to you in all relevant respects. Both of the rules leave us with a number of voids to fill out by interpretation: How strongly are we committed by the needs of future generations? How much better do I feel obliged to act? Who should I compare myself with? Etc. These are obvious issues for public discourse. Still, the basic point is

that there is little sense in demands for extreme sacrifices from a morally committed minority, particularly not as long as there are solutions to be found which do not demand such sacrifices. However, if business just continues as usual, equitable solutions may become less and less easy to find.

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