The chimera of "sustainable development"

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1. Introduction: sustainable development rides again

Back in 1972 the publication of *The Limits to Growth* (Meadows *et al*. 1972) rekindled an old doomsday fear that goes back to Malthus in the mid-19th Century, if not earlier. In Malthus the prediction was that population would continually press against the limits to world food supply. In 1866 one of the greatest economists of his time, William Stanley Jevons, predicted an inevitable shortage of coal within a short space of time (Jevons 1866). A World Bank report on *The Limits to Growth* reminded us of a 1929 study that predicted an imminent exhaustion of supplies of lead (World Bank 1972a). In fact the first half of the 20th Century was littered with such predictions.[1]

None of the subsequent refutations of these predictions discouraged others from making similar predictions. One of the most famous of these is Paul Ehrlich's prediction in the early 1970s that "The battle to feed humanity is over. In the 1970s the world will undergo famines – hundreds of millions of people are going to starve to death." (quoted in *The Economist*, 1997)[2] *The Limits to Growth* report was thus in distinguished company and was following in a long tradition of falsified predictions. The absurdity of its basic assumptions was soon exposed, and as the years went by the falsification of its predictions was soon apparent. For instead of the world running out of non-renewable resources, the known reserves of these resources went on rising and their prices were falling. Twenty years after the report was published the World Bank was able to state that "The evidence....gives no support to the hypothesis that marketable non-renewable resources such as metals, minerals, and energy are become scarce in an economic sense. This is because potential or actual shortages are reflected in rising market prices, which in turn have induced new discoveries, improvements in efficiency, possibilities for substitution and technological innovation" (World Bank 1992: 37).

Indeed, as can be seen in Table 1 on the following page, during the three decades following the publication of *The Limits to Growth*, consumption of all the minerals in question had been substantial and increasing and, in some cases, even exceeded the initial estimates of known reserves! In spite of this, reserves at the end of the period were greater than they were at the beginning. In other words, by some miracle (known to most of us as "market forces") the world had consumed more resources than it possessed and yet finished up with more than it had started with.

However, none of the mass of evidence falsifying the predictions of exhaustion of materials prevented the World Commission on Environment and Development from publishing, in 1987, the report, known as the Brundtland Report, *Our Common Future,* which launched the concept of "sustainable development" on its path to universal popularity. It defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." [3] But such a criterion is not very helpful given that "needs" is a subjective concept. People at different points in time, or at different income levels, or with different cultural or national backgrounds, will differ about the importance they attach to different "needs". Hence, the injunction to enable future generations to meet their needs does not provide any clear guidance as to what has to be preserved in order that future generations may do so.

As Shakespeare put it:

> O, reason not the need! Our basest beggars
> Are in the poorest thing superfluous.
> Allow not nature more than nature needs –
> Man's life is cheap as beast's
> (*King Lear*, II.4)

None of the glaring deficiencies of the concept of sustainable development inhibited its growing popularity or prevented politicians of all colours from affirming

Table 1 **Reserves and consumption of key minerals, 1970 and 1999 (million metric tons)**

Product	*Estimated Reserves*		*Cumulative Consumption*
	1970	*mid-1999*	*1970–1999*
Aluminium	1,170	34,000	430
Copper	308	650	290
Lead	91	140	150
Nickel	67	140	22
Zinc	123	430	190

Notes: 1970 reserve estimates are from Meadows et al., 1972, pp.56–58. 1999 reserves estimates include "…demonstrated reserves that are currently economic or marginally economic plus some that are currently sub-economic" (*World Almanac 2000*, p.131, taken from the US Geological Survey and the US Department of the Interior). The figures of aluminium reserves include bauxite expressed as aluminium equivalent. Consumption estimates are from *Materials Bulletin's Prices & Data*, annual, (pub. by Metal Bulletin Books Ltd., Surrey, UK).

their allegiance to it. And during the last decade or two developments in the field of climate change appear to have given some renewed hope to the advocates of sustainable development that the concept ought to be taken seriously enough to provide operational guidance to environmental policy, instead of just the usual lip-service paid to it by politicians. This is because it appears that conventional economic analysis – and perhaps even ethical theory as well – is inadequate when we are confronted with environmental problems, such as climate change, biological extinction or disposal of nuclear waste, that have consequences that span generations. In the next section I shall consider why limitations on the economic analysis of climate change (and other very long range developments) may appear to justify the appeal to sustainable development as a guide to policies that will affect the welfare of future generations. And in the following section I shall return to the reasons why such an appeal would be futile.

2. The problem of climate change[4]

The question may well be asked whether the standard economist's cost-benefit framework is applicable to policies, such as climate change policy, the effects of which will span generations. There are two main reasons for raising this question. The first is the role played by the compensation test in standard cost-benefit analysis (CBA). The point of this is that insofar as the benefits of some project exceed the costs (both suitably discounted to present values) the adoption of the project would constitute a *potential* Pareto optimising move, since it would be possible, theoretically, for the gainers from the policy to compensate the losers and still remain better off. But any "move" (i.e. the adoption of some project or policy) can only be regarded as an *actual* Pareto optimising move if the gainers do compensate the losers. However, since full compensation is usually impossible, most CBAs in large communities are justified by the assumption that the losers from some projects will gain from the general increase in prosperity that the general application of CBA will bring about. What they lose on the swings they will gain on the roundabouts. In any case, if some group in society consistently loses out governments will devise the tax and benefit schedules to implement society's views as regards what constitutes an equitable distribution of income.

Now this may be all very well as far as policies affecting the same community and the same generation are concerned. But between generations compensation is impossible. Future generations cannot compensate present generations for any sacrifice the latter may make in the interests of the former. Nor can losers on the swings in the present generation expect to gain on the roundabouts of the next generation. And, finally, there can never be any trans-generational government that can adjust for any intergenerational inequities that may arise over time. So what role can standard welfare economics play in such a situation?

The answer is to adopt the totally impersonal consequentialist approach that is used in the "Stern Review", and that is, indeed, characteristic of conventional welfare economics. For if the value to society of a unit of welfare is the same irrespective of to whom it accrues one can forget compensation tests and all that. One can just assume that a unit of welfare accruing to some future generation is equal to the value of a unit of welfare accruing to the present generation. One can also ignore the distinction between *potential* Pareto optimising moves

and *actual* Pareto optimising moves. But how valid is this approach for projects spanning generations? This question is basically an ethical question which is clearer when one looks at the formula used to determine the rate of discount that society ought to employ in comparing alternative streams of costs and benefits.

This has been clearly brought out in the recent "Stern Review" (*Stern Review of the Economics of Climate Change*, 2006, hereafter referred to as "the Review"). For this is probably the most comprehensive study of the economics of climate change produced so far. Some critics have shown that its selection from the scientific evidence has been biased so that its predictions of the likely harmful effects of climate change and of the *possible* worst-case scenarios are far too alarmist.[5] Others have suggested that the discount rate that is implicit in its estimates of future damages from climate change is too low.[6] I am not qualified to adjudicate on the former, but I believe that there is much force in the latter critique. And this is crucially important to any analysis of climate change policy.

For it is now well-known that the dominant ingredient in any cost-benefit calculation of climate change policy is the discount rate used to compare the costs of mitigating climate change with the expected benefits (i.e. the avoidance of the damage that climate change might otherwise do under what is known as a "business as usual scenario"). For example, with a constant consumption discount rate of only 4 per cent, the present value of benefits accruing in one hundred years' time is only one fiftieth of the value of those benefits today (all comparisons being in real terms – i.e. adjusted for inflation).[7] This ratio, which is one fiftieth in this instance, is what is known as the "discount factor".[8] Thus, one natural reaction might be to say that economics tells us that we should not worry about climate change. For with such a discount factor the benefits accruing in 100 years' time from the Review's proposed policies would have to be fifty times as great as the costs of mitigating climate change (assuming that most of the costs are incurred in the near future). It might seem very unlikely that the benefits will be fifty times the costs. From this perspective it could be concluded that unless the first two chapters or so of the Review justify the use of a relatively low discount rate, it is not worth reading the next 500-odd pages.[9]

But, as the Review points out, the choice of discount rate for projects spanning generations raises difficult ethical problems. Indeed, a major weakness of the Stern Report is that after recognising that its choice of discount rate does raise ethical issues it then goes on to more or less ignore them. But how can something that is usually regarded as a purely technical issue, namely the choice of a discount rate for project analysis, turn out, in the context of climate change, to raise basic ethical issues? The answer has been straightforward thanks to various articles dating back to Ramsey's great 1928 paper on optimum growth and savings rates (Ramsey 1928).

What discounting does is to attach lower and lower present values to given units of "wellbeing" or "benefits" that are expected to accrue in the future. The greater the discount rate, the lower the present value of these future benefits. The rate that society ought to adopt for public policy purposes is conventionally expressed in what is sometimes known as "the Ramsey equation" This equation may be written as:

$$r = \delta + \eta g$$

where r = social rate of time preference (the rate that ought to be used for discounting public projects);
δ (delta) = the "utility discount rate";
η (eta) = the "elasticity of marginal utility" with respect to consumption;
and g = the expected future growth rate of consumption.

The ethical problems arise because both *delta* and *eta* are basically ethical parameters. For *delta* represents the degree to which we value a given unit of *welfare* (or utility) accruing to a future generation less than an equal unit of *welfare* (or utility) accruing to somebody alive today – i.e. how far we take a purely impersonal consequentialist view. And *eta* reflects society's degree of inequality aversion.

3. The ethical parameters in the discount rate

(a) pure time preference

As indicated above, the Review, in common with most economists, has decided that the appropriate value of *delta* ought to be 0.1, which only differs from zero on account of a very small allowance for the possibility of the extinction of the human race.[10] It does so on the grounds of the value judgement that a unit of utility for a future generation is as valuable as an equal unit today – i.e. no pure time preference. For example, it writes "In Chapter 2 we argued, following distinguished economists from Frank Ramsey in the 1920s to Amartya Sen

and Robert Solow more recently, the only sound ethical basis for placing less value on the utility (as opposed to consumption) of future generations was the uncertainty over whether or not the world will exist, or whether those generations will all be present" (Stern Report 2006: 45). In the same vein, a few pages later, it writes "In other words, if you care little about future generations you will care little about climate change. As we have argued that is not a position which has much foundation in ethics and which many would find acceptable."(Stern Report 2006: 48)[11]

However, these assertions are difficult to justify. First, the widespread acceptance in the economics profession of zero pure time preference seems to be based – judging by the ubiquity of the references to them – on the assertions by various great economists in the past, namely Ramsey, Pigou and Harrod, to the effect that failure to see that a future unit of satisfaction will be just as good when it arrives as an equal present unit represents some form of "impatience" or myopia, or, in Harrod's words, "...the conquest of reason by passion". However, as Schelling pointed out, while the references of Ramsey and Pigou to "impatience" or "myopia" might accurately describe the virtually universal preference for consumption during one's lifetime by oneself, it is absurd to apply these adjectives to the consumption of somebody one will never know in 200 years' time (Schelling 1995).

Second, the Review's claim that no other ethical position is tenable seems to have taken no account of agent-relative ethics, which go back at least as far as David Hume, arguably one of the greatest moral philosophers of all time (Hume 1739 [1969]). Agent-relative ethics have also been proposed in the present context by Ken Arrow (Arrow 1999), as well as by several other distinguished philosophers.[12] Indeed, it is a common argument used by philosophical critics of the impersonal assumption underlying classical utilitarianism.

Hume developed at some length his view that morality is firmly based in human behaviour and that this, in turn, is basically agent-relative (though he did not use this term). For example, he writes; "A man naturally loves his children better than his nephews, his nephews better than his cousins, his cousins better than strangers, where every thing else is equal. Hence arise our common measures of duty, in preferring the one to the other. Our sense of duty always follows the common and natural course of our passions." (Hume 1739: 3.2.1)[13] But Hume was not suggesting that agent-relative ethics implied complete moral subjectivism. He was arguing that the moral codes that had evolved in society were based on a shared human nature and common codes of conduct. Furthermore, Hume provided a fully articulated theory of the way this has evolved – namely in a manner conducive to the peaceful and successful evolution of human society (1739: 3.2.2). Indeed, one of the foremost contributors to game theory, Ken Binmore, goes as far as to say that "...a game theorist ought to have recognized from the start that Hume is the original inventor of reciprocal altruism – the first person to recognise that the equilibrium ideas now studied in game theory are vital to an understanding of how human societies work" (Binmore 2005: ix).

Of course, the fact that our moral intuitions and our sense of justice reflect human nature as it has evolved though time in a way that prevents anarchy and promotes co-operative solutions to repeated "games", does not necessarily give it irresistible normative value. Hume is famous for deploring the tendency of people to jump readily from "is" propositions (such as comments on human nature) to "ought" propositions.[14] However, as some philosophers have argued, it would be wrong to interpret this as meaning that Hume did not attach normative significance to his description of the development of moral beliefs, or that he failed to spell out the normative basis for a moral system anchored in human nature.[15]

However, it would be beyond the scope of this article to develop further this long-standing philosophical debate. All that I wish to show here is that there are alternative ethical systems to that selected by Stern and that, in particular, if an agent-relative perspective is adopted the case for a significant rate of pure time preference is very strong. In turn, this means that a conventional CBA would rule out any large sacrifice of present consumption in order to mitigate climate change. Many people would infer from this that CBA is simply inappropriate in the context of climate change analysis, as Broome suggested many years ago.[16]

(b) inequality aversion, or the size of eta

Traditionally, in economics, *eta* represents the assumed curvature of an individual's utility function – i.e. the way utility increases less-than-proportionately to an increase in consumption. That is to say, it is generally assumed that individuals experience diminishing marginal utility with respect to consumption. This also implies that, over any significant range, people will tend to be risk averse, since, starting from any particular point, they will expect to lose more utility from a fall in consumption than they would gain from an equal increase in consumption.

To arrive at a value of *eta* in the *social* rate of discount, one generally assumes that society also has a concave social welfare function. That is to say, it is assumed that society ought to attach less *social* value to an extra unit of consumption to a rich man than to an equal extra unit of consumption to a poor man. The greater is society's inequality aversion, the greater would be the value of *eta*. The Review adopts a value of unity for this parameter. Some commentators, notably Dasgupta (2007) have argued that this does not represent adequate inequality aversion.

Unfortunately, *eta* is a reflection of three different preference relations. It is a mixture of inequality aversion at any point in time, inequality aversion over time, and risk aversion. It may well be that society ought to care much less about inequality over generations than inequality at any point of time. The reason for this could be that a rational case can be – and usually is – made out for equality at any point in time in terms of its instrumental value. This could include, for example, more harmonious relationships in society, less envy, and so on. But these admirable effects of greater equality clearly cannot apply between generations. Hence, the case for intergenerational equality would have to rest on its intrinsic value. And, for reasons I have set out in more detail elsewhere, it is difficult to make this claim if one accepts Parfit's "person-affecting claim".[17] For this reason it is arguable that society need not be averse to inequality between generations.

On the other hand, generations are not homogeneous. And there are enormous disparities between the income levels of people alive today. A large proportion of today's population live at, or not far above, subsistence level. If a high level of inequality aversion is adopted as between members of the present generation it would be difficult to justify imposing any sacrifice at all on the poorest people alive today in order to prevent a fall in the consumption levels of people alive in, say, 100 years' time when, even under the Review's growth rate assumptions, per capita average incomes are likely to be seven times as high as they are now.

On balance, therefore, there seem to be good reasons to adopt a higher rate of pure time preference than in the Review, and, possibly, a higher value of inequality aversion than in the Review. The resulting upward adjustment in the Review's discount rate would, as pointed out at the beginning of section 2 above, render conventional economic analysis virtually inapplicable to the climate change debate. We would then be thrown back on value judgements about the future, without, apparently any clearly compelling moral principles to guide us. But hark! Something is coming in the nick of time to save humanity from extinction. It is "sustainable development".

4. Sustainability to the rescue

If the conventional economic analysis of climate change – or any other very long term environmental issue for that matter – is inappropriate because of the difficulties surrounding the size of the discount rate that ought to be used, it is not surprising that some people will look around to see if there is any other principle that can provide some handy, simple guidance on long-range problems. In popular and political discourse, of course, such a principle is provided by the concept of sustainable development and its close ally, the "precautionary principle". Indeed, the Review makes a respectful – if somewhat vague – reference to it when it says "A concept related to the rights of future generations is that of sustainable development: future generations should have a right to a standard of living no lower than the current one." (Stern Review 2006: 27)

This assertion raises more than one question. First, it matches the assertion that "We take the simple approach in the Review: if a future generation will be present, we suppose that it has [sic] the same claim on our ethical attention as the current one." (Stern Review 2006: 31) But it is difficult to see how some future unborn generation can "have" – in the present tense – anything at all, including rights. Characteristics simply cannot be predicated of non-existent entities.

Secondly, even if we ignore this little technical difficulty it is difficult to see why future generations should have a right to a standard of living no lower than the current one. Personally, I hope that my children will have a standard of living higher than my own, but I do not think they have a "right" to it. And aggregating across the whole world population does not seem to make any difference.

Thirdly, the assertion quoted above points to a concept of sustainable development that has been widely accepted in public discussion, namely that per capita income ought not to be allowed to fall below that of the present generation.

This brings us to the question of what the concept of sustainable development actually means.

5. What does "sustainable development" actually mean?[18]

Reference has been made above to the meaninglessness of the Brundtland report's definition of sustainable development in terms of satisfying the "needs" of future generations. And, of course, it soon became obvious that the "strong" concept of sustainable development – i.e. to preserve existing resources at their present levels –was morally indefensible, as well as totally impracticable. So, most advocates of the concept shifted their ground. A new version was adopted, known in the literature as "weak" sustainability. This allows for some natural resources to be run down as long as adequate compensation is provided by increases in other resources, perhaps even in the form of man-made capital. But what constitutes adequate compensation? How many more schools or hospitals or houses or factories or machines are required to compensate for using up some mineral resources or forests or clean atmosphere? The answer, it turned out, was that the acceptability of the substitution had to be judged by its contribution to sustaining human welfare.

For example, John Pezzey (1992: 11), in an authoritative and extensive survey, concluded that most definitions still "understand sustainability to mean sustaining an improvement (or at least maintenance) in the quality of life, rather than just sustaining the existence of life". He went on to adopt as a "standard definition of sustainable development" one according to which welfare per head of population must never decline.[19] The same definition is adopted in the editorial introduction to a more recent extensive collection of articles on sustainable development, where it is stated that "Consequently, non-negative change in economic welfare per capita becomes the inter-temporal equity objective" (Faucheux, Pearce and Proops 1996). The same definition has been confirmed in other authoritative sources and seems to be accepted in the Review as quoted above.[20]

But even if it were feasible to follow a sustainable development path for the rest of eternity it is not clear why such a path has any particular moral force. Although advocates of sustainable development may disagree about its precise definition one thing they all agree on is that society *ought* to adopt it as a goal. They do not seem to recognise the need to demonstrate why it is morally superior to other goals that one could think up.

One obvious rival objective would be to seek the highest cumulative welfare for society over some specified time period. This would closely resemble the standard economist's approach, which is to define the conditions that will ensure that society achieves the maximum total cumulative welfare over whatever time period is regarded as relevant. This it the path that maximises the present discounted value of future consumption streams. Leaving aside the limitations on the discounting concept outlined in section 2 above, such a path could very well include periods during which consumption per head fell.

One common method of protecting any precise definition of sustainable development from inevitable criticism is simply to avoid anything resembling a precise definition and to replace it with a collection of all sorts of desirable objectives in whatever field of human activity one likes to imagine. For example, in the United States the Clinton administration set up the President's Council on Sustainable Development in 1993 and, in 1996, an Interagency Working Group on Sustainable Development to oversee implementation of the Council's recommendations. In its turn, the Working Group created three Task Forces. The first of these set out in detail its main objectives, which included items such as increased per capita income and employment, decreased violent crime, decreased traffic congestion and hosts of other worthy objectives, none of which seem to have any connection at all with the overall conception of sustainable development.

Similarly, in the introduction to a recent survey of sustainable development policies, the authors suggest that, for their purposes "...it is not necessary to adjudicate among slightly different presentations of the core principles of sustainable development. In our view, it is sufficient to note that ...sustainable development indicates an interdependent concern with: promoting human welfare; satisfying basic needs; protecting the environment; considering the fate of future generations; achieving equity between rich and poor; and participating on a broad basis in development decision-making. While these points may appear vague, they are not without content..." (Lafferty and Meadowcroft 2000: 19).

These are just two illustrations – it is too easy to cite many others – of the way that sustainable development has become an all-embracing concept to the extent that it has no clear analytical bite at all. It is true that – as the great British economist Arthur Pigou spelt out clearly several decades ago – economic welfare is not the whole of welfare, it is merely that part of it that can, in his famous phrase, "...be brought directly or indirectly into relation with the measuring rod of money" (Pigou 1932: 11). It is right that one should also be concerned with other ingredients in the quality of life, such as the state of the environment defined as widely as possible, security, conditions of work, and so on. But most people

would be in favour of measures to help improve all such aspects of human welfare. Only criminals would oppose a reduction in violent crime, and only people desperate to get away from their spouses would oppose a reduction in traffic congestion. The whole problem is to find an analytical principle that helps one select the means towards desirable ends by the assessing the trade-offs of one against the other. Here the concept of sustainable development has absolutely nothing to add. Indeed, it subtracts from the objective of rational maximisation of human welfare since the slogan of sustainable development seems to provide a blanket justification for almost any policy designed to promote almost any ingredient of human welfare irrespective of its possible costs in terms of other ingredients of welfare.

6. Measuring sustainable development

The impossibility of devising an intellectually coherent and operational definition of sustainable development is illustrated by the difficulties faced by bodies that have attempted to measure sustainability. For example, the UK committed itself, at the Rio conference, to developing a set of indicators to show whether our development was becoming more sustainable [DOE 1996a: 1]. As part of this effort an Interdepartmental Working Group was set up, of course, to consider the matter and report on its findings. Few bureaucrats are likely to dispute the necessity for such a group since for many people committees are places where conversation is a substitute for the boredom of work and loneliness of thought, so that the opportunity to sit on a new committee is always welcome.

In its "sustainable development strategy" the British government is also committed to take forward work on environmental accounts. And, to this end a unit has been set up in the official national statistical office to develop environmental accounts. While admitting that there may be one or two little local difficulties involved in this business, the unit could hardly bring itself to say that the concept of "green GDP" and environmental accounting was a lot of nonsense. Unfortunately, as the Working Group's own report concedes, it is not at all clear what sustainable development means, so it is difficult to know how to measure it or which policies promote it (DOE 1996: 5).

Very recently (January 2001) an important attempt has been made to introduce some intellectually respectable measurement into the sustainability literature. This is the "environmental sustainability index" (referred to below as "ESI"), which was produced by a team under the direction of Dan Esty, of Yale University and involving the collaboration of teams at the Yale and Columbia Universities (Esty 2001). [21] It is an attempt to produce an internationally comparative index of "environmental sustainability" in 122 countries. It is undoubtedly is the most serious, original and thoughtful contribution to the debate produced so far. Its statistical analyses are highly professional (notwithstanding what seems to be a mysterious elementary arithmetical mistake).[22] It clearly represents a major research effort to bring together a new and extensive range of environmental data; and it is very honest both about gaps in the data and the methodology. The study was also supported by private funds, not the taxpayer.

Unfortunately, the index does not really get to grips with the "sustainability" part of the concept of "environmental sustainability". It is claimed that "environmental sustainability" can be presented as a function of five phenomena: (1) the state of the environmental *systems*, such as air, soil, eco-systems and water; (2) the stresses on those systems, in the form of pollution and exploitation levels; (3) the *human* vulnerability to environmental change in the form of loss of food resources or exposure to environmental diseases; (4) the *social and institutional* capacity to cope with environmental challenges; and finally (5) the ability to respond to the demands of *global stewardship* by cooperating in collective efforts to conserve international environmental resources such as the atmosphere. "Then, environmental sustainability can be defined as the ability to produce high levels of performance on each of these dimensions in a lasting manner. These five items are referred to as the core components of environmental sustainability." (Esty 2001)

But then, later, the report goes on to say that "Environmental Sustainability can be measured...The Index creates a series of comparative benchmarks of environmental *conditions* in different countries" (Esty 2001, our italics). So it is not really an index of environmental *sustainability* after all. For example, it includes urban SO_2 and NO_x concentrations, and many other stock variables that are clearly indicators of environmental *conditions*. No explanation is given of why and how they are proxy variables for environmental *sustainability*.

Furthermore, the index lacks any firm conceptual basis for aggregating together the constituent items. The aggregation method used in the study is to group the basic 67 variables that are believed to be related to "environmental sustainability" into 22 core indicators. Within each of these 22 groups the underlying variables are given equal weight – i.e. they are simply averaged.

And then each of the 22 core indicators are given equal weight in arriving at the overall ESI (Esty 2001: 23).[23] Thus a variable that is used together with five others to construct some core indicator will have only one third of the weight of a variable that is used, in conjunction with only one other, to construct some other core indicator. It is not obvious that there can be any conceptual basis for this discrimination. There is no explicit attempt to weigh either the underlying 67 variables or the 22 core indicators in terms of what their marginal contribution to what the index is supposed to be measuring, namely environmental sustainability. Indeed, without some independently defined concept of environmental sustainability – i.e. other than it is what the index measures – it is difficult to see how any such weighting could be carried out.

Furthermore, how should one interpret individual indicators? For example, suppose we take the urban NO_x indicator that is included in the index. How many people are affected? And for how long? Do people have to live and work in it all day long, pass through it for two minutes on their way to work, or for an hour? How far does it differ at the junction of major roads in the middle of the city from a point half a mile away? Widely different answers to these questions according to the precise location of monitoring instruments and so on could correspond to changes of several orders of magnitude in to the importance of the pollution in question, however that "importance" is to be interpreted.

And even if one could draw up an index that did measure environmental conditions in a conceptually satisfactory manner it would still not necessarily tell us anything about sustainability. For example, many of the indicators of environmental conditions would have shown that, back in the 19th Century, or even in the first half of the 20th Century, environmental conditions were awful in most big cities in advanced countries. Did this mean that they were not environmentally sustainable? Of course not. Their environments have been dramatically improved over the last few decades. In short, one cannot measure environmental sustainability – let alone sustainable development – just by combining together in a largely arbitrary manner a collection of whatever environmental indicators one can put together. Attempts to do so are doomed to failure in the absence of any clear conceptual meaning that can be attached to the term.

7. Conclusions

Recent work on the economics of climate change have reinforced what has been obvious to economists for decades, namely that if anything like a plausible discount rate is used, the discounted value of benefits accruing to future generations from a policy having very long term consequences is invariably much smaller than the likely costs of the policy. But it has also become clearer that our moral intuitions regarding the ethical parameters on which a discount rate that is applied to very long term projects is based cannot easily be grounded in any established ethical system. Hence, in the context of policies affecting future generations there is a temptation to discard traditional economic methods and established ethical systems and replace them by the concept of "sustainable development". But it is argued here that this concept is a useless tool. This is because the definitions of sustainable development are so vague as to be operationally completely useless and deflect detailed analysis. Hence, although the relevance of standard cost-benefit analysis to intergenerational policy decisions may be negligible, to look for a substitute in concepts such as sustainable development and the precautionary principle is to look in the wrong place.

It may well be that the ethical principles of justice that have emerged over the ages in response to the challenges of biological evolution and then the development of viable human societies are no longer adequate in an age where human activities have very long range effects on future generations. It may well be, for example, that the Humean "circumstances of justice" can no longer suffice as a basis for our moral intuitions. In that case there may be a need for new ideas about justice that can help provide guidance in modern society. Pending their arrival, however, there is not much point in clutching at the straw of sustainable development.

In fact it is its all-embracing and conceptually confused character that explains its widespread and enduring popularity in spite of its intellectual incoherence. For it is this that provides a slogan that can be used to promote the objectives of any number of vested interests. These will include, for example, manufacturers of energy-saving equipment, wind turbines, fuel cells, egalitarian pressure groups and so on; some scientists – including social scientists – who want to expand their research budgets; politicians pandering to politically correct sympathies; bureaucrats whose chief ambition is to expand their empires, their regulatory power, and the number of international conferences and committee meetings that they can attend; environmental pressure groups eager to expand their budgets and membership; the media milking the public's taste for dire prophecies of impending catastrophe; and all backed up by well-intentioned members of the public who are easily brainwashed to

believe that, unless draconian policies are adopted, the planet is heading for catastrophe. Anybody can join in. No special knowledge is required; just a gift for rhetoric, and a taste for demonstrating one's moral fibre and one's compassion (though not for poor people alive today who might be forced to make sacrifices in order to save the planet).

And unfortunately it all distracts attention from what really matters if we are concerned with the welfare of future generations. This is to pass on to them a greater respect for human rights throughout the world than is the case today. It may well be impossible to predict what precise "needs" future generations will have as regards their levels of private and public consumption. But one can safely predict that they will always want freedom from fear and humiliation. For that purpose the only development that is sustainable is development that enables people to live together peacefully. The most important endangered species today is the human race.

Notes

1. See my *In Defence of Economic Growth*, pp. 216–18 for references.
2. One of the referees for this article reminded me of the bet that Ehrlich and two colleagues made against the late Julian Simon, in 1970, that the average price of five metals that they chose would rise over the following decade. In the event, the prices of all five fell and Simon won his bet. I am also grateful to a different referee for informing me that, in recent publications, Ehrlich may have softened his stance somewhat on related environmental issues.
3. For a recent brief history of the development of the concept and its use in international conventions see Lafferty and Meadowcroft (2000) ch. 1.
4. In sections 2 and 3 of this article I draw heavily on material published in Beckerman and Hepburn, 'Ethics of the Discount Rate in the Stern Review on the Economics of Climate Change', *World Economics*, Vol. 8, No. 1, Jan – March 2007. I am grateful to *World Economics* and to Cameron Hepburn for kind permission to do so.
5. See Carter, de Freitas, Goklany, Holland and Lindzen (2006).
6. See comments by Dasgputa (2006), Nordhaus (2006), and Weitzman (2007), among others.
7. The current rate for use in cost-benefit analysis in the United Kingdom begins at 3.5 per cent and falls over time to reflect uncertainty in the macroeconomy (HM Treasury 2002).
8. The (discrete time) discount factor equals $1/(1 + r)^t$ where r = the discount rate and t = time.
9. Weizman (2007) provides striking calculations that demonstrate how the uncertainty as to which discount rate one should use in climate change analysis swamps the uncertainty about the science, even though, as Carter *et al*. (2006) show, this is also too great to be used in the way the Stern Review has used it.
10. Lord Rees (Martin Rees), the British Astronomer Royal, has recently written that "I think the odds are no better than fifty-fifty that our present civilisation on Earth will survive to the end of the present century." (Rees 2003) If this statement is taken to refer to extinction risk, which is consistent with the title of the book "Our final century", this implies that the appropriate components of *delta*, to account for extinction risk is 0.7% [where P = the probability of survival, and $P = 1/(1+\delta)^{100}$, so that for P = 0.5, δ equals 0.7]. The Review picks a value of 0.1, which corresponds to the assumption of a 10 per cent chance of survival by the end of the century, although it comments that this may be too high on the grounds that "indeed if this were true, and had been true in the past, it would be remarkable that the human race had lasted this long". But, of course, for more than 99.9 percent of the time that the human race has existed it did not possess the means of total self-destruction that it now has available.
11. Actually, the last word in this quotation in the Review was "unacceptable", but it is clear from the context that "acceptable" was intended and the authors must have been confused by their own double negative.
12. See, for example, the contributions to Scheffler (1988).
13. He also gives a detailed account of why we tend to attach less value to distant benefits than to present benefits (Hume 1739: Bk. II).
14. e.g. Hume (1739): 3.1.1
15. See for example, the contributions by A.C. MacIntyre, G. Hunter and others, to an important collection of articles in Hudson (ed.) (1969).
16. For example, Broome (1992: 72). Broome did, however, recognise that economic analysis is relevant, if only to bring out more clearly some of the ethical choices that have to be made.
17. This is basically the claim that one situation cannot be judged "better" than another unless at least one person is better off in it, so an increase in equality obtained simply by reducing the incomes (or welfares) of the rich without any corresponding rise in the incomes (or welfares) of the poor could not lead to a better situation, even though it would lead to greater equality. See full discussion of this in Beckerman and Pasek (2001), chapter 4, and Temkin (1993), pp. 245–263.
18. This and the following sections draw heavily on chapter 1 of my *A Poverty of Reason* (2003), and chapter 5 of W. Beckerman and J. Pasek, *Justice, Posterity, and the Environment* (2001).
19. In a more recent paper, Pezzey (1997) indicates that the variety of definitions of sustainable development

has proliferated enormously since his 1992 survey, and provides a useful classification of the three most common sustainability "constraints" encountered now in the literature.

20. See, for example, a recent study that emerged from the collaboration between the World Bank and the Centre for Social and Economic Research on the Global Environment (CSERGE), by Atkinson *et al*. (1997), which, in the introduction, defines sustainable development as non-declining human wellbeing over time.
21. More precisely, the index, known as *2001 Environmental Sustainability Index*, which was compiled by a team involving the Yale Center for Environmental Law and Policy and Columbia University's Center for International Earth Science Information Network, was presented at the annual meeting of the World Economic Forum, in Davos, Switzerland, January 2001.
22. The apparent mistake is that the report continually refers to the "67" environmental indicators that are the basic building blocks of the final Index, but the list of these variables in Table 2 (Main Report, page 11) shows only 66. However, in case there is some explanation for this discrepancy somewhere that I have been unable to locate I shall refer to "67" variables in the rest of this text.
23. The report does, however, point out that, in the end, the underlying 67 variables do not finish up getting equal weight in the final ESI since unequal weights are implicit in the manner in which they are grouped in the higher level 22 core indicators.

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