

THE DAVID HUME INSTITUTE



**The Political Economy of
Sustainable Development**

Presidential Address to The David Hume Institute

2 October 2003

Professor Sir Alan Peacock DSC, FBA, FRSE

Hume Occasional Paper No. 63

The David Hume Institute
25 Buccleuch Place
Edinburgh EH8 9LN

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ISBN 1 870482 63 8

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2003

Foreword

On Thursday 2 October 2002, the Honorary President of The David Hume Institute, Professor Sir Alan Peacock, gave his Presidential Address. This is a custom that has been upheld by all of our Presidents within the three-year term of their office. Sir Alan's predecessors form a distinguished list and include Professor George Stigler, Judge Thijmen Koopmans, Judge David Edward, Sir Samuel Brittan and, most recently, Lord Mackay of Clashfern. Sir Alan adds further lustre to this eminent list.

We are very grateful to Cairn Energy for sponsoring the lecture. Sir Alan chose a challenging topic, "The Political Economy of Sustainable Development", and allowed us for publicity purposes to use the provocative strap-line or sub-title "What's posterity done for me?" The extensive research necessary was aided by a grant from the British Academy.

The occasion of the Presidential Address is always very special. But this Address is particularly pleasing, as our current honorary President, Professor Sir Alan Peacock, is not only one of the country's most eminent economists but also The David Hume Institute's founding director, some 18 years ago (1985). And, over the years, Sir Alan has continued to play a central role in shaping the Institute's development.

The lecture was delivered to an attentive audience which was treated to an extremely lucid analysis of the approach of economists to the notion of sustainable development. Economists have long been accustomed to confronting questions of allocating scarce resources across competing demands. Recently, however, a new challenge has arisen in the form of the cause of sustainable development. There is a demand, promoted vigorously and vociferously by pressure groups, that society should place a high priority on leaving things 'no worse' than they were found to be at the outset. Thus, buildings must be preserved, wildlife and, in particular, species must be protected, scenery must maintain its present appearance, and so on. Governments have turned out to be extremely responsive to such demands – demands which are often portrayed as 'rights'. But their reactions are haphazard and lack co-ordination or consistency.

Sir Alan provides an economist's perspective on this thorny problem. He starts with the nineteenth century economists John Stuart Mill and William Stanley Jevons (who dismissed the possibility of finding a substitute for coal and had serious doubts about wind power), and systematically explains how our thinking on these issues has developed, coming right up to date in his discussion of Loomberg's 'sceptical environmentalism'. Of course, Sir Alan, himself, has contributed to this debate throughout his career, starting as long ago as a 1955 paper in which he engaged in debate with the grandson of Charles Darwin.

The analysis is separated into considerations of the demand for sustainable development and of the supply of sustainable development. At one point, Sir Alan carefully demonstrates the extent to which estimates of the impact of global warming as made by the Intergovernmental Panel on Climate Change rest on inappropriate exchange rates. He also calls for greater awareness of the difficulties of making intergenerational comparisons of welfare and suggests that policy makers in this field may wish to remind themselves that there is always an opportunity cost of any policy action. Issues of global warming and measurement of the much-used Index of Sustainable Economic Welfare are critically scrutinised and the general government policy stance of attempting to change human nature is taken to task. Near the end of the paper, the example of wind power is used as an effective example of the shortfalls in government policy in this area. This discussion is all the more convincing because of Sir Alan's ability to draw on first hand experience, in this case as Chief Economic Adviser to the DTI (1973-76).

Sir Alan's message is one of optimism in the ability of our socio-economic system to deploy technology in ways that allow reasonable economic growth while, at the same time, leaving mankind with an environment in which they can continue to take enjoyment, pleasure and utility. He refers back to the observation of Adam Smith, that there is 'a deal of ruin in a nation', to support his general view of the robustness of the world economy and environment in terms of finding an accommodation with the important central notion of sustainable development. After reading or listening to this lecture, one is left with the firm impression that economics really does not deserve its sobriquet as the 'dismal science'.

The lecture was introduced by the Institute's Chairman, Eileen Mackay who chaired the evening's event. This publication of the lecture as a Hume Occasional Paper is made possible by a grant from ScottishPower, and The David Hume Institute is extremely grateful to them for this support. As always in our publications, it is necessary to make clear that the Institute holds no collective view or opinion upon the issues raised, the views expressed being those of the author alone.

Brian Main
Director
October 2003

Sir Alan Peacock, DSC, FBA, FRSE
Honorary President, The David Hume Institute

Sir Alan has a long and varied career. After war-time service in the Royal Navy, he graduated from St. Andrews in 1947 and from 1948 to 1956 was a member of the economics staff at the London School of Economics before being appointed at the age of 34 to the Chair of Economic Science at Edinburgh. In 1962 he was invited to accept the first professorial appointment at the new University of York becoming head of what has become one of the most successful Economics Departments in the UK. A supporter from the beginning of the foundation of an independent university, in 1978 he joined the then University College at Buckingham as Professor of Economics and became its first Vice Chancellor when it was awarded university status. 'Retirement' – a term that risks offending the Trade Descriptions Act – took him back to Edinburgh in 1984 where he has an Honorary Professorship in Public Finance at Heriot-Watt University alongside his continuing connection with the Institute.

Like many academic economists he has written reports for international agencies, such as the UN, OECD, and IMF, and served on government enquiries, notably the Kilbrandon Commission on the Constitution but as a dissenting member. He took leave (1973-76) to become Chief Economic Adviser to the DTI. Later appointments have included Chairman of the Committee on the Financing of the BBC (1985-86) and of the Scottish Arts Council (1986-92). He was knighted for public service in 1987.

Recognition of his intellectual contributions include becoming a Fellow of the British Academy (1979) and of the Royal Society of Edinburgh (1989) as well as of the Italian Academy (1996). He has been awarded 11 honorary doctorates and an honorary fellowship of the London School of Economics. In 2002, he was awarded the Royal Society of Edinburgh's Royal Medal presented by the Princess Royal.

The Political Economy of Sustainable Development

I Introduction

The purpose of this lecture is to consider the contribution that political economy can make to the debate about the aims of and prospects for sustainable development (SD). The term has a grand sound about it and like such terms is open to many interpretations¹. To clarify its meaning it is useful to trace its emergence from the long debate about population and resources which engaged political economists and others from Malthus onwards. I then turn to consider the 'demand for SD' in operational terms, how far it enters into the calculations of ordinary people and not the 'demands for SD' contained in the value judgments of those wishing to arrange our lives. With the strong commitment to SD already pronounced by our national and devolved government, I must then show how economic analysis throws light on the policies which they promote. It is soon revealed that these policies are based on somewhat tenuous foundations, over-influenced by the dramatic utterances of environmentalists. Finally, I offer a few comments on current policies to influence the economy in ways considered consistent with the aims of SD, insofar as one can make sense of them.

II The 'Development' of Sustainable Development

Sustainable development (SD) is a process aimed at achieving a situation where future generations are left at least as well-off as present generations and poorer countries a good deal better off than they are at present. Clearly there are problems in defining the content of this definition. As an economist would put it, 'welfare' is a dependent variable and its value depends on the identification of the independent variables which govern it and the constraints which determine the movement in those variables.

It may help to present the problem of definition by a potted history of SD. It might be said to begin when census material provided information on the size, structure and potential growth of population and comparisons of population change with economic growth could be made. The well known conclusion of Malthus that there was a tendency for population growth to outstrip the means of subsistence still influences present-day discussion, notably in doomwatch scenarios². There can be no doubt that economic

¹ The Scottish Executive identifies no fewer than 24 Indicators of Sustainable Development, their relative importance not being revealed. For a useful discussion of definitions, see Julian Morris, "Reconceptualising 'sustainable development'" in Morris (Ed), *Sustainable Development : promoting progress or perpetuating poverty?*, Profile Books, London 2002.

² Fifty years ago the Institute of Biology sponsored a debate on these matters in which the biologists tended to maintain that biological factors over-rode social factors emphasised by the social scientists,

growth is still central to the achievement of SD and a careful examination of how the constraints on growth, particularly those relating to the availability of natural resources, must be brought into consideration. However, if a necessary condition, growth per head of population is not a sufficient condition, though how far other independent variables can be identified and measured for inclusion in our welfare equation is a matter of judgment.

The next stage in the refining of the concept of SD concerned what is now called the negative externalities of growth. The Lake Poets, Ruskin and later Morris and Patrick Geddes were fond of attacking economists for allegedly only being concerned with material welfare. John Stuart Mill and later Alfred Marshall and Maynard Keynes put paid to this slander. Here is a piece of Millian rhetoric which can rival anything thrown at my profession by latter-day conservationists:

"It is not good for man to be kept perforce at all times in the presence of his species. A world from which solitude is extirpated is a very poor ideal. Solitude, in the sense of being often alone, is essential for any depth of meditation or of character; and solitude in the presence of natural beauty and grandeur, is the cradle of thoughts and aspirations which are not only good for the individual, but which society could ill do without. Nor is there much satisfaction in contemplating a world with nothing left to spontaneous activity of nature; with every rood of land brought under cultivation, which is capable of growing food for human beings; every flowery waste of natural pasture ploughed up, all quadrupeds of birds which are not domesticated for man's use extinguished as his rivals for food, every hedgerow or superfluous tree rooted out, and scarcely a place where a wild shrub or flower could grow without being eradicated as a weed in the name of improved agriculture. If the earth must lose that portion of its pleasantness which it owed to things that the unlimited increase in wealth and population would extirpate from it, for the purpose of enabling it to support a larger, but no better or happier population, I sincerely hope, for the sake of posterity, that they will be content to be stationery, long before necessity compels them to it".³

including the present author, in the determination of human population growth. Their number included Sir Charles Darwin (grandson of the Charles Darwin) who had published his *The Next Million Years* in 1952. See Cragg and Pirie (editors), *The Numbers of Animals and Man*, Oliver and Boyd, Edinburgh and London, 1955, which includes a very early contribution by the author – Alan T. Peacock, "Economic Theory and the Concept of an Optimum Population" with comments by Le Gros Clark and Fraser Darling.

³ For a penetrating analysis of the controversy between Ruskin and J.S. Mill and others, see Donald Winch, "Thinking Green, Nineteenth Century Style: John Stuart Mill and John Ruskin" in Bevir and Trentmann, *Markets in Context : Critical Thinkers and Social Movements*, Princeton, 2003. The

That SD includes a constraint on methods of economic growth which produce these externalities is important, the difficulty is the extent of agreement about the strength of this constraint.

One notices how the concept of welfare has now been extended to cover the interests of 'posterity' and how these interests will be affected by the economic activities of present generations. This consideration was present in the growing concern in the 1860s about the possibility that supplies of coal would run out and economic growth would decline if not cease altogether. William Stanley Jevons (1835-1882), the economist, became a public figure when he published *The Coal Question* (1865), a work noted for the detailed statistical analysis now beginning to penetrate economic investigation and its conclusion that the problem was not that coal would run out but that the need to dig from less accessible seams would raise its costs and reduce the rate of growth in output. He dismissed the prospect of finding substitutes and contended that more efficient use of coal would be counteracted by the expansion in output which this would engender and which in the long run would accelerate exhaustion of supplies⁴. He would not be the last economist to have his predictions falsified by the difficulties of forecasting technological advance, but he demonstrates once again the longstanding concern of economists with the longer-term implications of economic change.

Our stylised history of the concept of SD continues with a fascinating conundrum – whose welfare? An anthropocentric view raises the obvious problem of the distribution of the costs and benefits of SD amongst humankind. This has always been a central issue in political economy, particularly how far government intervention is necessary to protect the poor from the pace and change produced by economic advance. This is only mentioned to absolve economists from the charge that such an issue is only marginal to the debate on SD, though there is no space to deal with it here⁵. However, a non-anthropocentric view was not promoted in the work of economists who sympathised with 19th Century poets and artists though it was to gain wide currency. It is evident in earlier times in the belief of Ruskin that beautiful buildings and artefacts had property rights of their own, and we were obliged to protect them if only to save our souls⁶.

quotation from Mill comes from his *Principles of Political Economy* Book IV Chapter VI (1848), edited by Bladen and Robson for Toronto University Press, 1965.

⁴ For a useful short account of Jevons' position and its influence on policy discussion, see R.D.Collisson Black, "William Stanley Jevons" in *The New Palgrave : A Dictionary of Economics, Volume 2*, pp.1008-1013, Macmillan, London 1987. In 1868, Mill gave a speech in the House of Commons insisting on "the duty of paying off the National Debt before our coal supplies are exhausted". See J.S.Mill, *Autobiography* (1873), Oxford University Press : World Classics, 1924.

⁵ It is simply accepted that some distributional constraint is embodied in the 'welfare function'. Some account of this is taken later in examining the effect of such influences as climate change on the distribution of income between countries.

⁶ Ruskin argued that historic buildings (or rather those he approved of) had inalienable rights of preservation : " (i)t is again no question of expediency or feeling whether we shall preserve the buildings of past time or not. *We have no right to touch them* (itals. in original). They are not ours. They belong to those who built them and partly to all generations of mankind who follow us" from

Latterly it is more evident in the view that animals have rights, but, so far as I am aware, are not perceived to have duties towards one another which would modify the laws of the jungle. So far as such a view is operational today, it seems reasonable to suppose that SD extends to preservation of animal habitats and concern for our built heritage, if only because they are objects which afford human beings satisfaction. An economist might argue that indulgence towards animals and artefacts is closely associated with the improvements in the standard of living produced by economic growth. Those living at the margin of subsistence are likely to be less pre-occupied with the need to improve their welfare by such concerns.

The final stage in the evolution of the SD concept harks back to an earlier concern of economists, namely the extent to which economic conditions were governed by external forces beyond man's control. Thus Jevons, influenced by the famous Herschel and other astronomers, believed that he had detected a relationship between sun spots, as they affected weather conditions, and economic cycles in crop yields. This link with the investigations of natural scientists presages another which concerns the influence of climate change not so much on creating cycles of economic activity but on the effect on SD in the long term. Climatic conditions are certainly influenced by exogenous forces, about which natural scientists aided by modern methods of computation have made major contributions. However, the paths of natural science and economics cross with the more recent emphasis on endogenous influences on climate change resulting from the growth in greenhouse gas emissions caused by the fuel inputs which sustain economic growth. A common agenda is suggested in which a sensible division of labour could obtain between economists and natural scientists. The latter must be the authorities on the relative influence on climate change of terrestrial and of extra-terrestrial factors. The economist must be able to give some idea of future economic growth patterns and the consequential changes in energy inputs which affect global warming. She must also be able to make some estimate of the differential effects of scenarios of climate change on the economic future of different parts of the world.

I wish I could complete this potted history of the 'development' of SD by assuming that this close co-operation between the different disciplines claiming an interest in it could easily be achieved. However, economists and social statisticians, it seems, are well advised to tread carefully when it comes to dialogues with scientists, particularly those who have produced doomwatch scenarios. The same cordial atmosphere surrounding previous experience of the author in friendly controversy with biologists, including Sir Charles Darwin, about the dynamics of population growth (see footnote

J.Ruskin, "The Seven Lamps of Architecture", Chapter VI of Cook and Wedderburn (eds), *The Works of John Ruskin*, London, George Allen and Unwin, 1903. For an analysis of heritage policy, see Alan Peacock, "Towards a Workable Heritage Policy" in Hutter and Rizzo (eds) *Economic Perspectives on Cultural Heritage*, Macmillan, 1997.

2) cannot be taken for granted. I find it rather sad that an admittedly controversial but serious criticism of the evidence for doom and gloom in human advance – Lomborg's *The Sceptical Environmentalist* – has been condemned by no less a luminary than the Astronomer-Royal as the work of 'an anti-gloom environmental propagandist'⁷, leading a procession of protesters. (Arguments about global warming, for example, so it seems, raise the temperature of debate.) Edward Wilson, described by *The Times* as the 'greatest living writer on science' makes some attempt to put the economist's view alongside that of environmentalists. However, he confuses the issue by presenting the debate as one about value judgments, what should be done, rather than about what is going on. After all, many economists favour environmental controls. Moreover, he sullies his attempt to be fair by visualising the economist as the associate of financial interests whereas the environmentalist finds it more congenial to be friendly with non-profitmaking foundations⁸ works on a higher moral plane. Three years ago, Sir Crispin Tickell, formerly Adviser to the Government on environmental matters, made some rather insulting remarks about economists before an international audience at the Natural History Museum, which led me to rise to my feet to interrupt his closing speech, so I cannot claim to have acted with customary propriety, though I did apologise to him later⁹, but not for the content of my reply. I owe it to him, nevertheless, for having re-kindled my interest in SD and what I said in reply to him forms the kernel of this address.

III The Demand for SD

It has been shown that the derivation of the concept of SD owes a great deal to the evolution of economic ideas concerning the causes and consequences of economic growth and long before international agencies made a takeover bid to become the prime movers in furthering its aims. As we have seen, these aims are value judgments, usually couched in language which has a Messianic quality about it, and, like the Ten Commandments, directing us on how to lead our lives¹⁰. However, the major 'stakeholders' and those who have to bear the costs of any move to implement SD are ordinary citizens with tastes and preferences of their

⁷ See Sir Martin Rees, *Our Final Century*, Heinemann, 2003, p.106. More's the pity because Rees's book itself is a *tour de force*. A forceful and reasoned criticism of Lomborg by an economist is to be found in M.A. Cole's review article "Environmental Optimists, Environmental Pessimists and the Real State of the World", *Economic Journal*, Vol.113, No.188, June 2003. For a vigorous defence of Lomborg's position, see Matt Ridley, "The Profits of Doom", *The Spectator* 23 Feb 2002.

⁸ Edward O. Wilson, *The Future of Life*, Abacus, London 2003, pp.22-28. The passage is followed, it is true, by a partial retraction.

⁹ No warning of his views could be derived from his celebrated advocacy of international co-operation to influence climate change. See his *Climate Change and World Affairs*, Pergamon Press, 1977.

¹⁰ For a wide selection of such statements, see I. Moffatt, *Sustainable Development : Principles, Analysis and Policies*, Parthenon, New York, 1996. Moffatt takes the conventional position that the concept of SD is of recent origin and derived largely from statements by and commentary on documents provided by such bodies as the UN and UNESCO.

own. How far are they likely to be willing to adjust their behaviour, if that is necessary, including the willingness to accept that SD will require government actions which entail restricting their freedom through taxation and regulation?

Is there a demand for considering the welfare of future generations revealed from the preferences of those who will pay the cost? There is ample evidence that individuals derive positive satisfaction from conferring benefits on future generations. Individuals not only bequeath assets to their children but to a large variety of causes of at most indirect benefit to their offspring. There is evidence, too, that international redistribution to poorer countries offers a similar satisfaction provided that the funds are properly used, and likewise control of the environment, hopefully without too much interference with individual freedom. In short there is widespread support in the UK, as in other mature countries, for public action. If *present generations* did not follow these courses of action to help future generations it would be *their* satisfaction that would be diminished. A particular reason for this is our aversion to the risk that future generations would think ill of us if we did not so act.

This emphasis on the positive reason for intergeneration transfer of resources removes the necessity for having to specify and choose between moral arguments in favour of SD. Such arguments must rest on a set of value judgments about what is best for our successors and some conception of a contract between present and future generations. Both these assumptions are shot through with difficulties¹¹. There is no way of proving that one set of value judgments is better than any other. One might hope for some sort of consensus about the content of SD which, if it did not make any particular judgment absolute, might give it some operational status. That seems unlikely, and much said later will attempt to prove this. The second assumption is based on an impossibility. A contract means an agreement signed by two parties and not knowing in advance whether the actions of present generations taken to benefit future generations will accord with the latter's preferences, which are unknown, the idea of a contract becomes meaningless. A simulation of a contractual arrangement in which the present generation believes it possible to guess what the preferences of their successors will be makes no sense. In any case, the idea of a contract between generations, short of millions of individual arrangements, presupposes some general agreement of its contents, both on behalf the living and the unborn is hardly worth discussing.

The positive approach does not preclude consideration of the wider question as to whether those who express preferences through their individual actions know how to choose either in their own interests or for

¹¹ For an excellent discussion of this issue, see Wilfred Beckerman, "the precautionary principle and our obligations to future generations" in Julian Morris (ed). *Rethinking Risk and the Precautionary Principle*, Butterworth/Heinemann, 2000.

those of future generations so far as SD is concerned. The role of experts, natural scientists and economists, is clearly defined as offering informed judgments on what the effects will be of different courses of action, which is a crucial one in helping the public make up their minds about what fits with their interests and what it entails in the way of intervention in their lives which they agree to support, if need be by political action. There is a parallel here with the common situation where consumers are not sure what the consequences of their own choices will be because they lack the knowledge or find the cost of obtaining information about what alternatives are available are prohibitive, as in the case of building a new house or major surgery.

If this situation calls for reliance on expert advice in the choices to be made by the public, an onerous responsibility falls on those who put themselves forward as advice-givers, including governments. The choice of objectives fulfilling the aim of SD is based on value judgments, what is believed to be 'best' for those who have to pay for it. The methods for reaching them must rest on careful analysis of the factors which influence their achievement, so far as these can be ascertained. The methods themselves usually postulate that government intervention is necessary, and implies that the public, who bear the cost of this intervention, be it by regulation or by tax and spending programmes, are assured that the most efficient methods will be used. In a democracy, the positive preferences of the public will require that there is transparency in the process by which the policies presented to them are reached and, of course, that persuasion that they are in accordance with their interests are balanced by general consent. If there is an ethical question central to SD policy it lies less in having to exhort people to look after future generations and more in being able to trust scientists, including economists, to tell the truth, so far as it can be ascertained, about the benefits and costs of alternative ways of doing so.

Of course, this statement is a counsel of perfection. In turning to review what we know about the obstacles to achieving the aims of SD, one finds that there is considerable disagreement, and the lines are not necessarily drawn according to discipline. There are observed differences of view between different sections of government. When such a review is followed by considering policy measures, it is not surprising that there are differences arising about the appropriate courses of action by government. The confusion this may bring to the mind of the public must be compounded by the extraordinary number of organisations, (NGOs) as well as government, who claim to be sources of knowledge about what is happening and how to act. Apart from the welter of information sheets about various aspects of SD issued by government departments, there is a plethora of special interest groups, albeit with laudable intentions, anxious to induce the public to support causes which they claim will benefit posterity. They are normally non-profit organisations, which suggests a degree of respectability not afforded to, say, commercial oil

companies, but that does not mean that their methods for mustering financial support and for lobbying for increased government interventions remains untinged by special pleading. At best, their advertising is informative and educative, but it can also be manipulative. They are important because some of them acquire a special status as advisers to government and international agencies because of their claim that they represent the interests of the public.¹²

IV The Supply of SD

The supply of sustainable development is closely linked with the growth in GDP per head, a fact not to be forgotten. Not being a treatise on the sources of continuing economic growth it is taken for granted that this depends on the input of skills, innovation, technology and management and the incentives to maintain and improve them. The essence of SD policy is to deal with particular externality problems associated with economic growth. The first is that growth itself produces a feedback effect through the production process of which the one most commonly identified as the most important is carbon and associated emissions. These in turn may produce climate changes which can affect the growth process and its distribution. The second is that the growth requires growing inputs of energy and so the using up of natural resources which, in the long run, may raise the costs of production on which growth depends. These two costs of the growth process are not automatically internalised because firms have no direct incentive to do so. If they introduce ways of reducing emissions they pay costs from which others benefit. If they wish to minimise the cost of energy inputs, they can be indifferent to its fuel content.

The supply of SD therefore requires identifying the extent of the 'damage' created by these two influences and the devising of methods for minimising the damage. Both climate change and using up of natural resources will require international discussion and agreement about what to do and any method for minimising damage, from preventing certain industrial practices and encouraging others, has to consider both benefits and costs. These are not matters at which natural scientists appear to be particularly skilled at handling and, even if social scientists know much more about political and economic mechanisms, that does not make devising of solutions an easy matter.

a) Climate Change

The enormous technical literature on the process of climate change has the important characteristic of very considerable disagreement amongst

¹² For forceful criticism of their stance on global economic problems, see David Henderson, *Anti-Liberalism 2000*, Institute of Economic Affairs 2001, Part IV.

scientists. These are reflected in government publications themselves. On the one hand, in the Budget Report 2003, it is stated that the UK Climates Impact programme maintains that 'strong evidence' suggests that 'average annual temperatures across the UK could rise by between 2 and 3.5°C by the end of the century'. On the other hand, the National Environmental Research Council, the originator of this statement, is careful to list the "scientific certainties and uncertainties" attached to climate change and its measurement.¹³

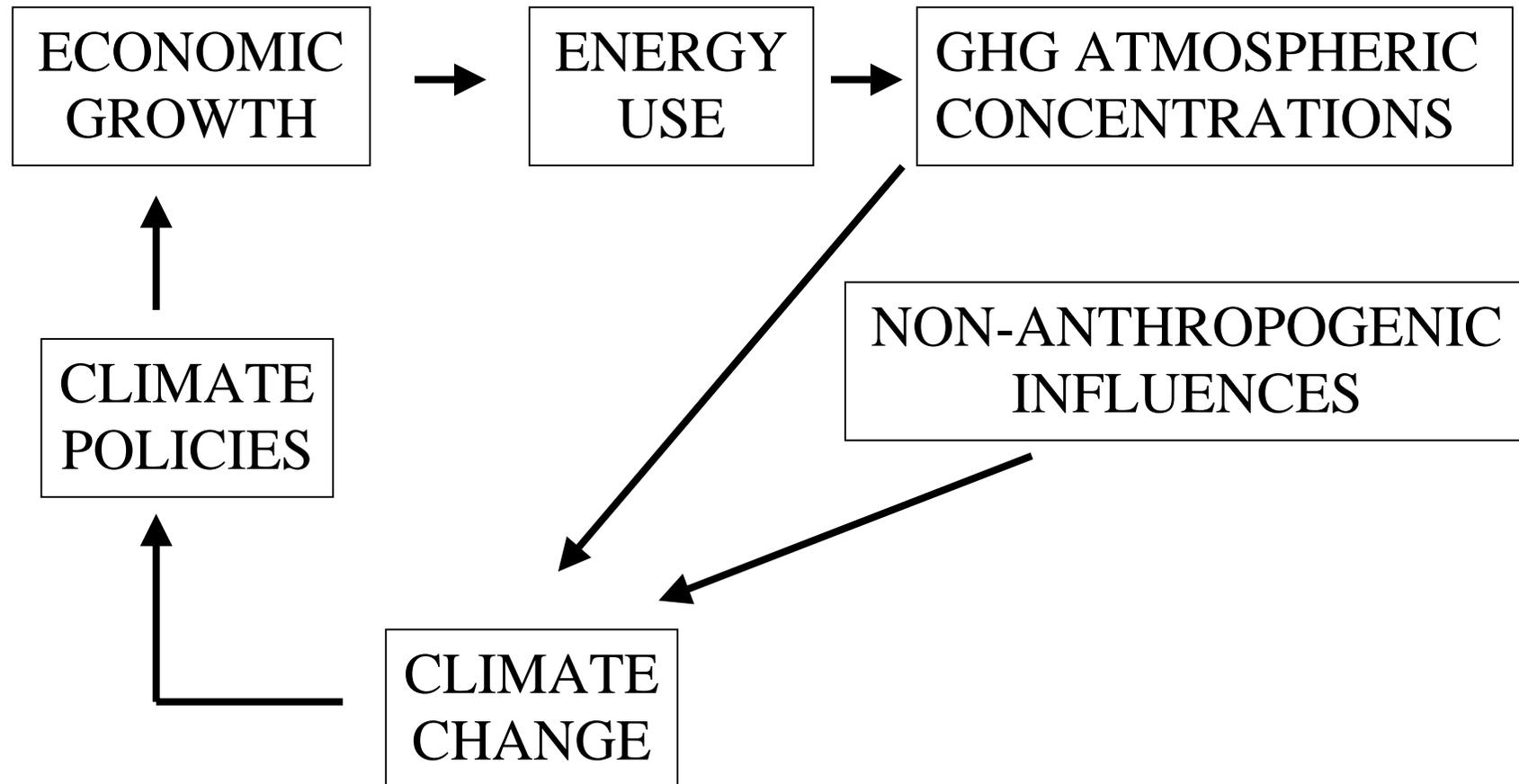
Carbon dioxide along with other greenhouse gases such as methane and nitrous oxide trap radiation from the Earth's surface and keep it warmer than it would otherwise be. Their degree of concentration is increasing, mainly as a result of the rise in inputs of energy and raw materials used to increase production. Therefore increases may be expected in global warming if economic growth continues, unless offsetting influences are at work. Depending on its magnitude, global warming, even overall temperature changes of 0.5°C, could have dramatic effects on weather conditions. The greater the degree of warming, the more intense these effects could be. However, it would be naïve to expect that carbon emissions are the sole or even the most important influence on climate change. Much attention is now being devoted to examining such influences as solar radiation now made possible by satellite observation, other absorbents of carbon dioxide on the earth itself such as vegetation, and ozone changes which, close to the earth have a warming effect as ozone levels increase but are counteracted by ozone depletion in the stratosphere which has a cooling effect.

The *process* of change is well-defined (See Diagram 1) but the *timing* and *magnitude* of change must be uncertain. To work on the presumption that a doubling of carbon dioxide levels would lead to a warming of 0.5°C takes no account of feedback effects from changes in our physical and man-made environment which are going on simultaneously. Clouds can have both positive and negative effects on warming and how clouds respond to climate change itself is simply not known with any degree of certainty. There may be positive feedback from the increase in water vapour resulting from a warmer atmosphere, yet a negative feedback from plant growth as it absorbs more carbon from the atmosphere. But even if the direction and some idea of the magnitude of change can be determined, what will be the time profile? NERC offer a salutary reminder of the uncertainties of estimation : "*if* (my ital.) the observed warming so far is indeed the result of the greenhouse effect, emissions of greenhouse gases which have already taken place have committed us to several degrees of warming in the next century, and more beyond thatCarbon dioxide has

¹³ See NERC Publication - Climate Change Briefing Note, 17 June 2003. <http://www.nerc.ac.uk>

Diagram 1

THE CLIMATE CHANGE CHAIN



an effective lifetime in the atmosphere of about 100 years, so concentrations respond very slowly to changes in emissions. Even if we significantly reduce carbon emissions, global temperature will take several decades to stabilise and sea level centuries longer".

Enter Economics. First questions : how is economic growth and its distribution between countries translated into rates of emission. Second question : assuming global warming, what are its economic consequences? Third question : what is the rationale of laying down emission targets?

A summary of the findings of the Intergovernmental Panel on Climate Change¹⁴ (IPCC) is given in Table 1.

The first thing that will strike the reader is that the range in the data provided in all the columns is incredibly wide. One need only look at the final outcome in terms of extrapolated temperature and the rise in sea-level to discover this. However, while sympathetic to the use of 'scenarios' based on alternative assumptions, one has to be sure that the models into which alternative parameter values are inserted are robust¹⁵. Two well known experts, Castles and Henderson, have discovered that the IPCC scenarios are based on both faulty methodology and dubious economic projections¹⁶. The IPCC calculations crucially depend on being able to express income levels in developed and developing countries in real terms according to relative purchasing power and there are well known techniques for doing so which take account of relative national differences in prices for goods entering into the budgets of income receivers. Before such data were available, a very crude method of comparison between countries was made by using official exchange rates. It is incredible that the IPCC have sanctioned the use of a method abandoned by international agencies over thirty years ago.

The result of adjusting the projected GDP figures used by the IPCC for their 'central case' is a major reduction in the ratio of GDP per head in developing regions compared with developed regions from 16.7 to 6.2 – in other words the gap is much lower when a more accurate measure is used.

¹⁴ This body is sponsored by the World Meteorological Organisation (WMO) and the United Nations Environmental Programme (UNEP). Table 1 is an updated assessment of its Special Report on Emissions Scenarios and it is understood it will form part of the briefing now being prepared for the Fourth World Assessment of IPCC as part of the monitoring of emissions targets laid down by the Kyoto agreement.

¹⁵ No information is provided in the IPCC calculations about how population and GDP changes are translated into the growth in emissions.

¹⁶ For an account of their criticisms, see *The Economist*, 13 February 2003. For their full professional statement of them, see their article in *Energy and Environment*, Volume 14 No.4, 2003.

<u>Table 1</u>				
GLOBAL WARMING SCENARIO : 1990-2100				
	1990	2000	2050	2100
Global Population (billions)	5.3	6.1-6.2	8.4-11.3	7.0-15.1
Per Capita Income Ratio (a)	16.1	12.3-14.2	2.4-8.2	1.4-6.3
CO2 Concentration (b)	354	367	463-623	478-1009
Global Temperature Change (C) (c)	0	0.2	0.8-2.6	1.4-5.8
Global Sea-Level Rise (cm)	0	2	5-32	9-88
Notes : (a) ratio of developed countries and economies-in-transition to developing countries as listed in Annex 1 of IPCC website. (b) measured in parts-per-million by volume (ppmv) (c) change in global mean temperatures relative to 1990 averaged across climate areas. Source: Climate Change 2001 : Impacts, Adjustments and Vulnerability. Technical Summary. IPCC website www.grida.no/climate/ipcc_tar/vol4/english/132.htm Update 12/08/03				

However, the story of calculation incompetence goes much further than this. The IPCC extrapolations of income per head in developing regions display a rapid convergence to that of developed countries within the next half-century and beyond. Their central case assumes a growth in this indicator of 5% per annum. Noting that the IPCC calculations begin in 1990, we now know that this percentage was nowhere achieved in the last decade of the 20th Century, and yet the IPCC maintain that their forward projections take some account of past trends! That the central case figure seems improbably high may be gathered from the projection that by the end of the 21st Century the income per head of South Africa would exceed that of the United States and the gap between developing regions and developed ones would have disappeared. There is no economic reasoning behind such projections and as Castles and Henderson remark "it is a dubious procedure to project a specific sequence of events, not on the basis of argument and evidence, but on the grounds that the world would be a better place if it occurred"¹⁷. Moreover, other international organisations committed to endorse warnings of the effect of climate

¹⁷ See Castles and Henderson, *op.cit.* I have used also their re-calculations to take account of the PPP method used to compare GDP per head figures and of alternative extrapolations of growth rates.

change, have prepared simulations using extrapolation of growth in the region of 2.5%.

The result of noting the narrower gap between the GDP per head of developing and developed regions and the use of more acceptable projections of growth rates in each of them must be that the IPCC figures cannot be safely used in measuring the relation between economic growth and climate change. According to Castles and Henderson, the counter-argument used by the IPCC is that the adoption of a lower growth rate scenario would not reduce the rate of emissions because it would be associated with a lower growth in technological advance and a higher emissions/output rate. If, as IPCC claim, Table 1 is derived from an "integrated assessment model", it is strange that there is no such association reflected in the data!

The mistakes in the IPCC methodology and the refusal (so far) to acknowledge them is a disturbing reflection on the lack of influence or, worse still, of lack of interest of those senior economists in governments who participate on a regular basis in discussion of international economic policy problems and at the highest level. Unfortunately, this criticism must cover the UK for, as shall be observed later, government policy in regard to environmental questions contains important measures which are designed to influence energy policy in a radical manner specifically in order to meet the obligations placed on richer countries to control emissions. These accept without question that global warming will take place on a scale envisaged by the IPCC and that its effects will be such as to require us to make radical changes in energy policy.

The second question raises the important issue of the influence of climate change on standards of living. Over 20 years, economists have become particularly interested in the influence of the variables denoting such change on consumption patterns and have found it possible to trace the influence of global temperature on standards of living in different parts of the world¹⁸. The study of most interest here considers an assumed increase in global mean temperature of 2.5°C on relative standards of living, no side being taken, therefore, on whether or not this change is likely and how long it would take to reach it. The results obtained show that, in general, countries in high latitudes would experience a reduction in their cost of living whereas those in tropical areas would suffer an increase.

These results will appeal to those who regard the Kyoto agreement as a major step in helping poorer countries. The usual caveats must be entered

¹⁸ For full details, see David Maddison, "The amenity value of the climate: the household production function approach", *Resource and Energy Economics* Volume 25, Issue 2, May 2003. The temptation to use his data as the basis for measuring world welfare gains and losses is resisted. However, the fact that there are both positive and negative gains blurs the issue as to whether such information reinforces the argument for attempting to control climate change.

concerning simulation exercises. The study has to assume that consumption patterns are unaffected by other aspects of climate change such as the incidence of natural disasters, notably flooding. The degree of aggregation of the data, e.g. each percentage covers individual countries but cannot take account of regional differences. However, the care and caution exercised by the economists and statisticians undertaking these investigations is in marked contrast to the previously noted attempts to use forecasts of GDP per head to underpin estimates of changes in variables influencing global warming.

The third question that calls for a response from economics concerns the action to be taken as a result of what we claim to know about climate change. It has to be agreed that the prognosis is surrounded by a high degree of uncertainty, whether or not one accepts the methods for making it are sensible – and economic analysis itself casts doubt on that. The economist's approach is based on the principle of opportunity cost, that is to say the benefits of any course of action involving resources are measured in terms of the alternatives foregone. This suggests that any scenario on climate change should consider the costs and benefits of a series of possible courses of action. This is not the principle of operation behind the Kyoto agreement which simply lays down targets for emissions which it is agreed to be met over a specified period of time.

The justification for this refusal to weigh alternatives is to be found in the so-called 'precautionary principle' which is widely accepted amongst environmentalists¹⁹. Probably the most oft-quoted definition of this principle within the context of the global warming discussion is that derived from the so-called 1992 Rio Declaration: "Where there are threats of irreversible damage, lack of scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation". An analysis of this proposition reveals that it is full of ambiguities:

- i) What is a threat, how is it discerned and by whom? In the case of climate change, it is not even proven that there is such a threat and when, if at all, it will occur.
- ii) 'Scientific certainty' is a meaningless term. If it is agreed that a threat is likely, then its incidence and timing require the use of methods of prognosis which embody a weighting of probabilities of its occurrence. In short, how to embody uncertainty into the prognosis is an integral part of the process of making the best possible estimate of the likelihood

¹⁹ For a comprehensive survey of its meaning and applications, see Julian Morris (editor) *op.cit.* 2002. Its particular application to the Kyoto agreement and its consequences is surveyed in Bruce Yandle, "the precautionary principle as a force for global centralisation : a case study of the Kyoto Protocol" in the same volume, pp.166-188. For a well-aimed attack at the consequences of accepting this principle, see Colin Robinson, "Energy Economists and Economic Liberalism", *The Energy Journal*, Volume 21 No.2, 2000, pp.19-20.

of the threat occurring. Scientific procedures are the basis for making any sensible decision about the necessity for measures to be taken at all.

- iii) The word 'postponement' implies that what may be appropriate courses of action, given the best evidence available, could be ruled out. It probably introduces too much sophistication into the Rio statement to argue that 'postponement' is indicative of some form of collective 'risk averseness'. However, the correct way of treating attitudes to risk is to embody these in the prognosis itself and not to deny that scientific procedures have no part to play in delineating courses of action.

More generally, the precautionary principle contains a curious paradox. It rationalises taking action without regard to its consequences, so far as these can be estimated. The US refusal to sign the Kyoto agreement has been construed as an act of naked self-interest allowing US businesses to grow without regard to the negative externalities of global warming. It can also be construed, as its administration has done, as a removal of a barrier to US economic growth on which an increase in the value of its imports from developing economies and continuance of aid programmes depend²⁰. However, the opportunity costs of climate change are not on the environmental agenda. The paradox lies in its recommendation that alternative courses of action where the consequences are regarded as less precisely known should not be considered. Taken to its logical conclusion this would preclude scientists, including social scientists, from uncovering through invention and innovation what any such consequences might be. In other words, methods designed to improve our well being are being pre-judged and in a way which would prevent any progress from being made at all²¹.

b) Resource Depletion and Welfare

The argument for controlling carbon emissions centres attention on other aspects of the use of fossil fuels, which, as we have seen, worried Stanley Jevons 150 years ago. These fuels are non-renewable and therefore could give out and in the course of doing so would become more and more difficult to extract. Furthermore, carbon emissions may not only affect climate change with consequential effects on SD, but affect SD more directly by polluting the immediate environment. These direct attention at the more general issue about the measurement of SD itself, for account must be taken of depletion of natural resources and the effect of growth in

²⁰ For a spirited defence of US policy based on a critique of the global warming assumptions underlying the Kyoto Protocol, see Sallie Balivnas "The Kyoto Protocol and Global Warming", *Imprimis*, Volume 31 No3. Dr Balivnas is a distinguished astrophysicist at the Harvard-Smithsonian Center.

²¹ "The risks posed by science are sometimes the necessary concomitant of progress: if we don't accept some risk, we may forgo great benefits", Sir Martin Rees, *op.cit.*, p.132.

atmospheric pollution on maintaining and improving the economic base on which SD depends. In doing so, it is soon found that measuring SD in terms of Gross National Product per head is not satisfactory. It is necessary to examine the growth in the complementary changes in the use of resources which reflect the welfare benefits which economic growth produces.

Several alternative measures have been suggested which call for modification in and in some cases the abandonment of any national income measure in estimating changes in welfare²². It seems useful to concentrate attention initially on a measure which considers the adjustment necessary to take account of the depletion and environmental issues.

The Index of Sustainable Economic Welfare (ISEW) is the centre of attention of environmental economists wishing to make the necessary adjustments in definition and to facilitate calculation. It has the advantage of being easily identified as a modification of the standard GDP measure, and in fact is a 'welfare' or 'utility-based' measure of real national income. (I have slightly modified the labelling of its components.)

$$\begin{aligned}
 \text{ISEW} = & \text{Personal Consumption} \\
 & + \\
 & \text{Non-Marketed Labour Services} \\
 & + \\
 & \text{Welfare Producing Public Services} \\
 & + \\
 & \text{Net Capital} \\
 & - \\
 & \text{Personal Costs of Production} \\
 & - \\
 & \text{Pollution and Environmental Damage} \\
 & - \\
 & \text{Depreciation of Natural Capital}
 \end{aligned}$$

(The ISEW is expressed in per capita terms)

A few words of explanation. *Personal Consumption* is self-explanatory but includes an adjustment for changes in income distribution which is inevitably arbitrary. *Non-marketed Labour Services* are largely household labour services. *Welfare-Producing Public Services* are those, such as education and health, which might otherwise be purchased as part of personal consumption. There is a problem here because the recorded expenditures on such public services are measures of *inputs* and not *outputs* and simply to take estimates of the value of the former is

²² Discussions of such measures abound. Confining attention to useful ones emanating from Scotland, see I. Moffat, *op.cit.*, Chapter Part 2 and Nick Hanley, Jason F. Shogren and Ben White, *Introduction to Environmental Economics*, Oxford University Press, 2001, Chapter 6.

misleading. How this problem may be circumvented is explained below. *Net Capital* is the surplus over and above that amount necessary to maintain capital per head though that makes no allowance for technological progress. *Personal Costs of Production* are expenditures which are necessarily undertaken by persons, e.g. commuting costs or by government on their behalf such as defence and protection of persons and property. *Pollution and Environmental Damage* can add to production costs and diminish personal welfare, and *Depreciation of Natural Capital* must be deducted to allow for depletion of non-renewable resources.

The taxonomy of ISEW may be broadly acceptable, provided definitions are carefully investigated, but its movement through time depends on estimation techniques. It is important to consider these, particularly as it has been claimed that in recent years there has been a decline in the ISEW in the UK and in Scotland in particular²³. The depletion of natural resources can be measured in two ways related to the issue of depreciation of national capital on which growth depends. The first method is to calculate the replacement cost of primary energy consumption. The deductions made to real output assume that costs rise steadily through time. There are two formidable objections to this. The first is that proven reserves of non-renewable energy will last a long time and even if cost rises in real terms are assumed, these alone would offer signals to producers that they should look for substitutes or invest in technological improvements. The second method is to calculate what proportion of rents from extraction need to be reinvested in order to sustain the consumption levels of future generations when the non-renewables become exhausted. Using a simple discounting formula, it can be shown that the sustainable development criterion suggested can be met by a very small proportion of current annual output.

The environmental damage caused by the use of fossil fuels requires additionally some calculation of the extra social cost resulting from emissions of greenhouse gas. Any such calculations require taking into account any future damage discounted to the present. Estimates of the degree of damage will be difficult to make but as before the principle of calculation is based on what money would have to be set aside to compensate future generations. Here a curious bug has entered the calculation. Once the extra or marginal social cost of a ton of emissions is calculated, the total expected future damage is determined. The ISEW calculations, however, let this value accumulate over time and this leads to multiple counting of the future damage. The implausibility of this

²³ For a presentation and discussion of these results for the UK, see Nicholas Crafts, "UK Real National Income, 1950-98: Some Grounds for Optimism", *National Institute Economic Review* No.181 July 2002. Calculations for Scotland are given in I.Moffatt, *op.cit* Chapter 6 and in Nick Hanley, Ian Moffatt, Robin Faichney, and Mike Wilson, "Measuring sustainability: A Time Series of alternative indicators for Scotland", *Ecological Economics* 28 (1999) pp.55-73. For detailed criticism of estimation methods of resource depletion and environmental damage, see Eric Neumayer "On the methodology of ISEW, GPI and related measures", *Ecological Economics*, 24 (2000), pp.347-361.

method of estimate may be judged from the fact that, in the process of deduction of environmental damage costs from the conventional national income data to conform with the ISEW definitions, the calculation yields an amount representing 23% of all deductions.

Nicholas Crafts has devised a more accurate measure of ISEW based on a proper understanding of the process of economic growth. Moreover, having accepted that conventional national income accounts do not provide suitable estimates of SD, he has dealt in an ingenious way with the difficulty of how to reflect the welfare benefits provided by public expenditure on health. This is done by a measure of the value of reduction in mortality risks which has resulted in an increased life expectation²⁴. A comparison of the accepted conventional methods of estimation with the revisions is shown in Table 2.

TABLE 2 : ISEW VARIANTS FOR UK, 1950-1998 (£ per head at 1955 prices)			
	Year 1950	1973	1998
GDP	4,216	7,338	12,100
(Growth rate %)	-	(2.4)	(1.8)
ISEW	2,142	3,271	2,849
(Growth rate %)	-	(1.9)	(-0.6)
ISEW (R1)	2,863	5,400	9,526
(Growth rate %)	-	(2.8)	(2.3)
ISEW (R2)	2,755	6,773	14,674
(Growth rate %)	-	(4.0)	(3.1)
Source : Crafts (2002) (see footnote 23) Note : R1 = Revision excluding life expectancy R2 = Revision including life expectancy			

These re-calculations of the ISEW in the light of a more sophisticated economic analysis are important, to the extent that economic growth is a necessary condition for the achievement of SD. But no economist can argue that movements in the ISEW could ever tell the whole story, particularly as commonly accepted aims of SD represent constraints on the growth process. Thus the requirement of improving the quality of life, represented here by allowance for changes in mortality rates, could extend to the preservation not only of persons but also natural habitats and artefacts which comprise the 'national heritage'. This means that there

²⁴ Crafts *op.cit* contains a full account of his methods of estimation and how they compare with previous attempts. Attention is drawn particularly to the ingenious method for estimating the 'value of a death averted' which forms the basis of the adjustment which is reflected in Row 4 of Table 2. I am unable to produce comparable estimates for Scotland but it can be assumed that the ISEW calculations for Scotland would produce similar results to those criticised in this text. For details, see the references in Footnote 23.

cannot be complete substitution between man-made and natural capital and also between different forms of man-made capital. Nevertheless, the so-called 'dismal science' presents a much rosier picture of the possibilities of human progress than 'doom watching' environmentalism, and not for the first time!

V The Illusions of Policy Formation

So far, I have concentrated on the way in which economic analysis offers a different perspective on and different conclusions about the nature of the problem of ensuring SD than is found in much scientific discussion. The policy implications of that analysis are not considered. Rather than offer a detailed critique of present governments' policies, I would like to concentrate on dispelling some of the illusions which appear to beset the approach to policy issues, which requires me to look at some rather fundamental questions about the nature of human behaviour.

'People can be made to change'. This is a common illusion which is particularly prevalent in policies designed to give effect to the many forms of intervention that are in operation in promoting SD, most of which require some form of control which requires individuals to react like Pavlovian dogs to various stimuli offered by governments. It was David Hume who wrote "men are not able radically to cure, either themselves or others, that narrowness of soul which makes them prefer the present to the remote. They cannot change their natures. All they can do is to change their situation"²⁵. Hume is not making some moral judgment but expressing an assumption about human nature as it is. He does not imply that if individuals seek to follow their own interests that they are totally self-seeking, but that, as I have argued above, they regard concern with and co-operation with others as a constituent part of their own welfare. The corollary of his observation is that basing policies on the view that human nature will change or can be made to change is a foolish pursuit. He is making a testable proposition, and one which has been tested and proved correct in a myriad of economic studies of individual and collective economic behaviour. If individual behaviour depends on the circumstances in which they find themselves and does not change in its nature, then this has important implications for SD policy. The first of these is better dealt with *in extenso* on its own and the brief mention here is only to prepare the reader for the maxim that policies designed to improve the chances of meeting SD objectives enhance their success by working with and not against the grain of human nature. The second is that efforts to change human nature, particularly in circumstances where individuals have some opportunity to choose and reject governments, are not likely to succeed. The most that can be done is to present, so far as

²⁵ David Hume, 'Of the Origin of Government', *Essays, Moral, Political and Literary*, Liberty Classics, Chapter 5.

can be known, the choices that they face in endeavouring to control their environment.

So far as SD is concerned, successive governments in the UK have not thought it advisable to rely on public understanding of these issues to determine the thrust of policies towards SD. An enormous educational programme has been devised which is clearly based on the assumption that human nature can and must be changed, implying that the precautionary principle must be the overall guide to policy²⁶. We are all bombarded with pamphlets from authorities at all government levels exhorting us to renounce our gross habits as untutored wastrels who waste energy, pollute the atmosphere and ravage the countryside – a fertile field for life arrangers. However, the most striking direction of effort to influence human minds is to be found in the recommendations for school education. One can applaud the devising of a curriculum that relates environmental issues to the daily experiences of children – my father was a pioneer in this area²⁷. One can welcome the emphasis on the understanding of modern technologies and the vistas of technological change that will transform even further how we live and work. One can tolerate a certain amount of advocacy of policies designed to restrict our behaviour and which command general agreement, if only to convince a new generation of potential parents of the virtues of not littering the streets with coca-cola cans and the detritus of takeaways. However, the promoters have wider ambitions, which I interpret as being the elevation of SD to replace religious studies by incorporating moral choices in its presentation²⁸. Clearly the opportunity cost of time becomes a matter of intense concern within schools – the sacrifice of time spent on basic disciplines. I suppose that the general approach would be more appealing if it were made clear that moral choices may offer differing conclusions about how we perceive changes in the environment and that no one course of action contains a monopoly of the moral high ground.

"When the market doth fail, government should prevail". SD is presented as the classic case where government intervention is essential to achieve its objectives. It may surprise some readers to know that economists are united in agreeing that there are particular circumstances where markets fail. This is because of the so-called public goods problem. Consider the

²⁶ See the Education for Sustainable Development programme and particularly the Annual Reports of its Education Panel. Consult its Website at <http://www.ne.uk.net/esd/>

²⁷ See A. D. Peacock and R. Garry, *Living and Learning*, Arnold, 1939.

²⁸ "Education for sustainable development (ESD) is an *approach to the whole curriculum and management of a school*" (Italics mine) *op.cit.* page 1 of 1. The long list of items in this curriculum culminate at the age of 16-19 to and understanding of "basic ethical positions and tensions regarding extending rights to nature and to future generations; be able to justify their own views and positions on ethical issues related to sustainable development; have an understanding of the principles and techniques of institutional and business greening and appreciate the social, economic and political problems involved at this level of implementing a full greening policy; be familiar with the meaning and methods of capacity building and regeneration at community level through case study" http://www.defra.gov.uk/environment/sustainable_development/educpanel/1998ar/ann4.htm updated 16/02/2003.

objective of providing cleaner air. Any firm considering supplying cleaner air voluntarily by some means of pollution control can normally not determine who will benefit from it and may not be able to prevent those not willing to pay from enjoying it. The incentive to offer the service may not exist. Here again, it is David Hume who is one of the first writers to see this dilemma as the starting point for some form of political action: "Two neighbours may agree to drain a meadow, which they possess in common, because it is easy to know one another's mind; and each must perceive, that the immediate consequence of failing on his part, is the abandonment of the whole project. But it is difficult, and indeed impossible, that a thousand persons should agree to any such action; it being difficult for them to concert such a complicated design, and still more difficult for them to execute it; while each seeks a pretext to free himself from the trouble and expense, and would lay the whole burden on others. Political society easily remedies both these inconveniences"²⁹.

One could read into this observation that the only solution to the "numbers problem" is public provision of the service, but that is not what Hume intended by an "easy remedy". As Hume makes clear in various of his writings, much depends on the nature of the "public good". In some cases it may be possible for government to facilitate agreement amongst individuals to create or simulate voluntary action, in others only compulsion will ensure a result, with the argument then transferred to the question as to which decision rule should govern the use of compulsion. Moreover, as is noteworthy in SD policies, governments induce private companies and individuals to offer a service which they would not otherwise provide by the use of fiscal incentives (or penalties) and regulation – all methods now made familiar by the requirements of environmental policies³⁰.

Biodiversity is widely regarded as a major element in securing SD, as pre-echoed in the quotation above from Stuart Mill. It happens to be an area where growing experience in devising methods for preserving wild life has increasingly led ecologists to see the sense of making these compatible with national and international markets in animal products on which farmers, primarily in developing countries, depend, of whom a large proportion will be relatively poor. The crux of the argument lies in the

²⁹ David Hume, *Treatise on Human Nature* (1739), Book Three : Of the Origin of Government edited by L.A. Selby Biggs, Oxford University Press, 1978.

³⁰ There is no more striking evidence of this than the Budget Report (Red Book) for 2003-4 where an entire section 10 pages long is devoted to an account of budget proposals to further the aims of SD. There are three noteworthy features: the use of incentive taxation as in the case of tax rate reductions on use of sulphur-free fuels, the Climate Change Levy (CC) where the proceeds are used to support business claiming to improve energy efficiency; the use of enhanced capital allowances to promote investment in energy-saving technologies and more efficient use of water; a clearly stated obligation to make fiscal policies consistent with EU rules on fiscal incentives designed to play an increasingly influential part in control of the environment. However, Budget Reports are statements of intention and do not contain details of the system of appraisal which justifies any particular mix of measures. See, further footnote 34.

fact that those producing such products offer the best chance that preservation will be efficient, while obviating the necessity to unduly restrict their property rights. This approach has met with intense opposition from interest groups with strong prejudices against any commercial activity, amongst them international agencies with their own agenda for increasing their power and influence. It is worth noting that such a controversial matter has not prevented The Royal Society from making 'the market approach' to biodiversity and climate change the subject of one of its recent volumes of *Philosophical Transactions*³¹.

My favourite example is unfortunately a negative one which demonstrates what has been termed 'eco-imperialism' in controlling the trade in animals. In 1968, Antony Fisher, founder of the Institute of Economic Affairs, set up a turtle farm in the Cayman Islands with the deliberate intention of demonstrating that what he called 'conservation through commerce' was feasible. In the 1970s the UN Convention on International Trade in Endangered Species (CITES) banned international trade in marine sea turtles, a major source of income to Cayman islanders. This was despite the fact that the turtle farm released to the wild every year about 2,000 turtles, culled about the same number and maintained its stock making the operation permanently sustainable. The ban on exports practically ruined its founder and meant that the most valuable turtle product, the carapace, could not be sold to the main potential buyer, Japan. Although it still survives, the farm, which keeps going as a tourist attraction and by the sale of turtle flesh, could double its income and improve the welfare of poor people in accordance with the distribution principles regarded by international agencies as a prime objective of SD³².

Reducing prejudice against market solutions is not a guarantee against overcoming the public goods problem, though our example indicates a case where an indivisible benefit is provided to those who do not have to pay directly for it. An example nearer home raises the question as to whether market solutions can be encouraged within the framework of private law, in which those who suffer directly from environmental pollution can seek protection under the law of contract and tort which favours support of private property rights³³. Anglers in English rivers have sought ownership of the riparian rights which enables them to claim that detriment to fishing is a breach of their rights. Such a detriment is caused by river pollution which can arise from upstream emissions and from downstream pollution in river estuaries which prevents the passage of migratory fish up river to their breeding grounds. This detriment extends

³¹ See Ian R. Swingland (editor), *Capturing Carbon and Conserving Biodiversity : The Market Approach*, Earthscan Publications, London, 2003, for The Royal Society.

³² For details, see Gerald Frost, *Antony Fisher Champion of Liberty*, Profile Books, 2002, Chapter 7.

³³ For an analysis of this approach, see the comprehensive survey of regulation of environmental damage in Andrea Ross, "Justifying Environmental Regulation" in *Environment and Regulation* (Edited by Andrea Ross), Hume Papers on Public Policy, Volume 8 No.2, Edinburgh University Press for The David Hume Institute, 2000. The example given below is derived from Roger Bate, *Saving Our Streams*, Institute of Economic Affairs, London, 2001.

to others who enjoy the river and are deterred from doing so because it is polluted. An alternative to state intervention to correct this market failure is for fishermen to claim damages, but this is an expensive process, unless, as happened, the anglers form an association which can monitor river pollution and fight actions on behalf of members. The result has been a major reduction in pollution in fishing rivers in England, which has created benefits other than to those with an immediate interest in its reduction. Moreover, the legal process has become well established, flexible and efficient.

'Only Government can relate the ends of SD to the means of achieving it'. This is a truism, provided that one adopts a definition of SD which goes far beyond ensuring that economic growth is sustained leaving to the private sector to negotiate under common law to decide when environmental damage is a detriment. When SD extends to the preservation of both the natural environment as a single entity and to preservation of artefacts of historical significance, when international agreements are entered into to reduce carbon emissions and to help developing countries, the public sector must at the very least be a co-ordinator of policy action in order to 'maximise' the welfare function containing all the arguments representing SD aims. However, this planning approach to SD makes a number of important assumptions about the governmental process and those who attempt to control it. It assumes that the function is stable, meaning that the 'arguments' are clearly identified, their relative importance and the trade-offs between them fixed and immutable, that the government possesses all the necessary information about the social and economic environment in which policy is to be implemented and has the necessary instruments to bring policies into line with objectives. In the case of SD, the planning period can cover several generations of voters, giving rise to the rather worn-out maxim that governments can look further ahead to its citizens using a lower rate of discount in trading off present as against future benefits to society.

There is much that could be said about the fundamental basis of SD policies, but the illusion that market failure has no counterpart in government failure can be clearly demonstrated in the case of energy policy. It can be accepted that where global environmental effects are involved, more will be required of government than a legal system which allows individuals to claim damages from pollution, for property rights then become difficult to define. This provides a case for intervention in the energy market, and a whole range of possible ways of doing so are already in place³⁴.

³⁴ For an authoritative and comprehensive view of these, see HM Treasury, *Taxation and the environment using economic instruments*, November 2002. It is particularly interesting because of its consideration of circumstances where 'government failure' can be identified. But see the critical account of taxation and other measures influencing energy policy by Colin Robinson, "Gas, Energy and the Energy Review", Beesley Lecture, IEA, November 2002 (forthcoming).

Particular interest attached to the recent policy proposals to promote the expansion of renewable energy by the use of more wind power. These proposals remind us of how far government has committed itself to the view that global warming is inevitable but also that carbon dioxide emissions are the 'main contributor'³⁵. The target reduction in such emissions has been fixed at some 60% of the present level by 2050 with 'real progress' by 2020. The leasing of wind power sites is designed to generate 10% of our energy from wind turbines by 2010, enough to power 15% of all households in the UK. However, this will not be achieved by the incentive to adopt renewable energy sources by energy suppliers operating commercially but by placing an obligation on electricity companies to purchase specified proportions of their electricity from 'qualifying renewable sources' with wind power to the fore.

These proposals are unaccompanied by any reasoned discussion of the relationship between them and the economic model on which they must depend. First of all, the arguments in the 'welfare function' are not set out. Of course, governments always get themselves into difficulties in claiming that one policy instrument will achieve a number of different ends. Thus, while the general aim of a contribution to SD is implicit in documents presented to the public, there is no discussion of any incompatibility between the use of wind power and SD objectives associated with environmental protection, whether it be the despoiling of the wilderness of the Highlands or the threat to bird life. Of course, there will be disagreement about the evaluation of such objectives and counter-claims that any detrimental features can be minimised. Allegedly a trump card, the DTI claim that wind power has massive popular support. Successive opinion surveys sponsored by the British Wind Energy Association have suggested that nearly three-quarters of those polled support both the policy of generating 20% of electricity from renewable sources and the use of wind power to achieve this. The poll, however, gave no indication of the consequences faced by the pollsters if such a policy were carried out, the most important one being that of a rise in costs to consumers either through higher electricity prices or through having to effectively subsidise generators of renewable sources of energy³⁶. So much for transparency! As the former Chief Economic Adviser to the DTI (1973-76), I hope that the evidence of public support was published against the advice of my successor.

The question of the missing evidence provided to the public on the costs of accepting wind power leads naturally to the wind power 'production function'. It is not for me to resolve, if one could, the disagreements

³⁵ As stated in the press statement of the DTI covering The Energy White Paper published in February 2003. See the DTI website 14 September 2003. This categorical statement seems at variance with the view of the National Environmental Research Council – see footnote 13.

³⁶ The Treasury frowns on specific subsidies of this kind (see documents in Footnote 24, but claims that the obligation to supply renewable sources of energy placed on electricity companies "does not involve the transfer of state resources and is therefore not classified as state aid"!!!

amongst engineers about the degree of severity of the technological difficulties of providing a regular supply of energy from wind power, the relation between wind speed and output generation and the arrangement of turbines and how these difficulties might be overcome. Nor has one the resources to crawl over the cost data attached to the production process, and how the scale of production affects the structure of costs. In fairness to The British Wind Energy Association, the self-styled champions of wind power, they have published their own estimates in summary form of the economics of wind power, claiming that already it is or soon will be competitive with alternative sources such as new-fired coal plant and nuclear power³⁷, and that relative costs will continue to decline. Two comments are called for. It appears to be assumed that pollution from non-renewable sources of energy cannot be further reduced and that the relative cost of using conventional energy sources will rise. At least the BWEA has offered a starting point for a useful professional debate which should involve not only engineers but also energy economists and one which, hopefully, could generate more light than wind.

The wind power issue is symptomatic of the general problems of government policies which become increasingly interventionist. Vested interests are created in particular instruments of policy which dramatise the activities of individual departments and ministers. The choice of policy instruments then reflects the distribution of power within the government itself rather than the manifestation of a carefully prepared and consistent relationship between stated objectives, the analysis of the political and economic environment in which they are placed and the means of achieving them. In the case of SD, the prominence given to energy policies which entail the extension of powers of intervention of both a fiscal and a regulatory nature cuts right across the need to reduce the costs of compliance to industries attempting to maintain and improve their efficiency, including minimising their energy inputs³⁸. The priority given to wind power, despite the uncertainties about its place in fulfilling SD aims, may be explained by the quick political returns and anticipated from satisfying influential environmental NGOs, and the knowledge that, by the time it will be necessary to review its effects, those promoting it will not be around to face criticism of their actions. Alas, this is a familiar story associated with the growing complexity of government.

³⁷ See *Championing the UK Wind Industry*, www.britishwindenergy.co.uk/ref/econ.html, 15 July 2003. For critical press comment on the economics of wind power, see Philip Stott, *The Times*, 15 July 2003, and *The Financial Times*, 17 July 2003 (unsigned). Interestingly enough, Stanley Jevons seems to have been the first serious critic of windmills as a source of power. I owe this point to Robert L. Bradley Jr., *Climate Alarmism Reconsidered*, Institute of Economic Affairs, 2003, Appendix C.

³⁸ Although the Treasury analysis mentioned in footnote 34, refers to the possibility of 'government failure', its finger does not point towards any UK government department. The only example given is of the 'poor regulation' of the EU Directives on bathing waters!

VI Concluding Remarks

The main message that I mean to convey is that economic growth and improving the quality of life are complementary. It is certainly worth investigating the so-called 'negative externalities' of the growth process, of which economists have been well aware since political economy became a distinct discipline. Hence Mill's concern about the 'ecological footprint' and the importance of leisure. Moreover, it is the growth process itself that brings with it an expansion in the range of choices which alters the perspective of individuals about their own welfare. Sustainable development is a reflection of this process with its emphasis on the satisfaction we derive from helping those less fortunate than ourselves and from protecting the welfare of future generations. However, viewing the evidence, the economist cannot concede that economic growth is sowing the seeds of its own demise and that of SD through its alleged effects on climate change and its effects on the human and natural environment. It could be that climate change – not necessarily a function of economic forces – can increase the incidence of natural disasters, such as flooding, but unless we are imagining a doomwatch position such as that taken by prominent scientists where there is nothing anyone can do to prevent the extinction of the species³⁹ by the end of this century, technological advances and institutional changes to take account of these are not impossible to imagine. The natural propensity of many prominent natural scientists is to believe that if solutions exist that only governments can provide them whereas economists with close experience of government may go to the other extreme and see government as an inherently inefficient organisation without the discipline of competition⁴⁰, though a regrettable necessity in preserving economic stability and in negotiating international treaties on trade relations. All in all, there is, as Adam Smith maintained, "a deal of ruin in a nation" and sufficient grounds for believing that we have not reached the state where sustainable development, shorn of its more fanciful attributes, is under threat.

³⁹ See for example, Sir Martin Rees, *op.cit.* and Bill McGuire, *A Guide to the End of the World; Everything you never wanted to know*, Oxford, 2002.

⁴⁰ My hunch is that this division of opinion is a legacy of World War II in which the natural scientists found science taken increasingly seriously as a weapon of war. On the other hand, prominent economists in key positions in wartime planning saw such planning as a necessary evil and not as a guide as to how to formulate peace-time economic policies once personal freedom of choice was restored.

ACKNOWLEDGMENTS

I am indebted to the British Academy Small Grants scheme for financial support. This enabled me to obtain the services as a part-time research assistant of Ms Lindsay Kesal to whom I am particularly grateful. Various colleagues offered me suggestions and helpful criticism, notably Nick Crafts, Gerald Elliot, David Henderson, Brian Main, Colin Morris, Matt Ridley and Colin Robinson.

As ever, I am most grateful to The David Hume Institute and particularly to Kathy Mountain for typing and secretarial assistance and to Catriona Laing for help in preparing the diagrams. The unstinting support of the Trustees, notably from our Chair, Eileen Mackay, was a very necessary element in enabling me to meet the time constraints on presentation and publication.

Of course, I cannot absolve myself from imperfections detected in the resultant text.

Alan Peacock

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