



Environment & Society



White Horse Press

Full citation:

Daly, Herman, Michael Jacobs, and Henryk Skolimowski, "Discussion of Wilfred Beckerman's article 'Sustainable Development: Is it a Useful Concept?'" *Environmental Values* 4, no. 1, (1995): 49-70.  
<http://www.environmentandsociety.org/node/5532>

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## On Wilfred Beckerman's Critique of Sustainable Development

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Beckerman's discussion of sustainable development (*Environmental Values* 3: 191-209) provides some useful clarifications, and a good occasion for making a few more. Since I advocate what he calls the 'sustainability as constraint' position, I will move straight to it, and begin with the dilemma in which he claims to have placed those like me:

The advocates of sustainable development as a constraint, therefore, face a dilemma. Either they stick to 'strong' sustainability, which is logical, but requires subscribing to a morally repugnant and totally impractical objective, or they switch to some welfare-based concept of sustainability, in which case they are advocating a concept that appears to be redundant and unable to qualify as a logical constraint on welfare maximisation. (p.203)

I advocate strong sustainability, thereby receiving Beckerman's blessing in the realm of logic but provoking his righteous indignation in the realms of morality and practicality. Consequently I will focus on a reply to those charges. But first, I must congratulate him for his effective demolition of 'weak sustainability'. I hope he has more success than I have had in converting the many environmental economists who still cling to it.

Beckerman's concept of strong sustainability, however, is one made up by himself in order to serve as a straw man. In the literature, weak sustainability assumes that manmade and natural capital are basically substitutes. He got that right. Strong sustainability assumes that manmade and natural capital are basically complements. Beckerman completely missed that one. He thinks strong sustainability means that no species could ever go extinct, nor any nonrenewable resource should ever be taken from the ground, no matter how many people are starving. I have referred to that concept as 'absurdly strong sustainability' in order to dismiss it, so as to focus on the relevant issue: namely are manmade and natural capital substitutes or complements? That is really what is at issue between strong and weak sustainability. Since Beckerman got the definition right for weak sustainability his arguments against it are relevant, and as I said above, convincing. But since he got the definition of strong sustainability wrong, in spite of the obvious symmetry of the cases, his arguments against

it are irrelevant. He indeed demonstrated that ‘absurdly strong sustainability’ is in fact absurd! Let me accept that, and move on to the real issue.

I did not even find the word ‘complementarity’ or its derivatives in the article, and that is the key to strong sustainability. If natural and manmade capital were substitutes (weak sustainability) then neither could be a limiting factor. If, however, they are complements (strong sustainability), then the one in short supply is limiting. Historically, in the ‘empty world’ economy, manmade capital was limiting and natural capital superabundant. We have now, due to demographic and economic growth, entered the era of the ‘full world’ economy, in which the roles are reversed. More and more it is remaining natural capital that now plays the role of limiting factor. The fish catch is not limited by fishing boats, but by remaining populations of fish in the sea. Economic logic says to economise on and invest in the limiting factor. For this reason we put the constraint on natural capital. Maximise current welfare subject to the constraint that natural capital be maintained intact over generations.

Let me agree with Beckerman not only in rejecting weak sustainability, but also in rejecting the attempt to define sustainable development in terms of welfare of future generations. To his reasons I would only add that the welfare of future generations is beyond our control and fundamentally none of our business. As any parent knows, you cannot bequeath welfare. You can only pass on physical requirements for welfare. Nowadays natural capital is the critical requirement. A bequest of a fishing fleet with no fish left is worthless. But even the bequest of a world full of both fish and fishing boats does not guarantee welfare. The future is always free to make itself miserable with whatever we leave to it. Our obligation therefore is not to guarantee their welfare but their capacity to produce, in the form of a minimum level of natural capital, the limiting factor. This can be operationalised in some simple rules of management. Projects should be designed (constrained) so that:

*Output Rule:* waste outputs are within the natural absorptive capacities of the environment. (i.e., nondepletion of the sink services of natural capital).

*Input Rules:* (a) For renewable inputs, harvest rates should not exceed regeneration rates (nondepletion of the source services of natural capital). (b) For nonrenewable inputs the rate of depletion should be equal to the rate at which renewable substitutes can be developed. If a renewable stock is consciously divested (i.e. exploited nonrenewably), it should be subject to the rule for nonrenewables.

Rule (b) is a ‘quasi-sustainability’ rule for the exploitation of nonrenewables, based on the fact that they are a capital inventory, and it has been operationalised by El Serafy<sup>1</sup>. The question of what qualifies as a renewable substitute is important, and relevant to strong versus weak sustainability. Weak sustainability would imply acceptance of any asset with the required rate of return. Strong

## DISCUSSION

sustainability requires a real rather than a merely financial substitute – e.g., a capital set-aside from petroleum depletion should be invested in new energy supplies, including improvements in energy efficiency, but not in, say, law schools, medical research, or MacDonald's Hamburger franchises.

A point sure to be contested is the assertion that manmade and natural capital are complements. Many economists insist that they are substitutes. Since this really is the key issue, and since Beckerman ignores it, it is necessary to repeat here the case for complementarity.

- (a) One way to make an argument is to assume the opposite and show that it is absurd. If manmade capital were a near perfect substitute for natural capital then natural capital would be a near perfect substitute for manmade capital. But if so, there would have been no reason to accumulate manmade capital in the first place, since we humans were already endowed by nature with a near perfect substitute. But historically we did accumulate manmade capital – precisely because it is complementary to natural capital.
- (b) Manmade capital is itself a physical transformation of natural resources which are the flow yield from the stock of natural capital. Therefore, producing more of the alleged substitute (manmade capital), physically requires more of the very thing being substituted for (natural capital) – the defining condition of complementarity!
- (c) Manmade capital (along with labour) is an agent of transformation of the resource flow from raw material inputs into product outputs. The natural resource flow (and the natural capital stock that generates it) are the material cause of production; the capital stock that transforms raw material inputs into product outputs is the efficient cause of production. One cannot substitute efficient cause for material cause – as one cannot build the same wooden house with half the timber no matter how many saws and carpenters one tries to substitute. Also, to process more timber into more wooden houses, in the same time period, requires more saws, carpenters, etc. Clearly the basic relation of manmade and natural capital is one of complementarity, not substitutability. Of course one could substitute bricks for timber, but that is the substitution of one resource input for another, not the substitution of capital for resources.<sup>2</sup> In making a brick house one would face the analogous inability of trowels and masons to substitute for bricks.

The complementarity of manmade and natural capital is made obvious at a concrete and commonsense level by asking: what good is a saw-mill without a forest; a fishing boat without populations of fish; a refinery without petroleum deposits; an irrigated farm without an aquifer or river? We have long recognised the complementarity between public infrastructure and private capital – what good is a car or truck without roads to drive on? Following Lotka and Georgescu-Roegen we can take the concept of natural capital even further and distinguish

between endosomatic (within-skin) and exosomatic (outside-skin) natural capital. We can then ask, what good is the private endosomatic capital of our lungs and respiratory system without the public exosomatic capital of green plants that take up our carbon dioxide in the short run, while in the long run replenishing the enormous atmospheric stock of oxygen and keeping the atmosphere at the proper mix of gases – i.e. the mix to which our respiratory system is adapted and therefore complementary.

If natural and manmade capital are obviously complements, how is it that economists have overwhelmingly treated them as substitutes? *First*, not all economists have – Leontier's input-output economics with its assumption of fixed factor proportions treats all factors as complements. *Second*, the formal, mathematical definitions of complementarity and substitutability are such that in the two-factor case the factors must be substitutes.<sup>3</sup> Since most textbooks are written on two-dimensional paper this case receives most attention. *Third*, mathematical convenience continues to dominate reality in the general reliance on Cobb-Douglas and other constant elasticity of substitution production functions in which there is near infinite substitutability of factors, in particular of capital for resources.<sup>4</sup> Thankfully some economists have begun to constrain this substitution by the law of conservation of mass! *Fourth*, exclusive myopic attention to the margin results in very limited and marginal possibilities for substitution obscuring overall relations of complementarity. For example, private expenditure on extra car maintenance may substitute for reduced public expenditure on roads. But this marginal element of substitution (car repairs for road repairs) should not obscure the fact that cars and roads are basically complementary forms of capital.<sup>5</sup> *Fifth*, there may well be substitution of capital for resources in aggregate production functions reflecting a change in product mix from resource-intensive to capital-intensive products. But this is an artefact of changing product aggregation, not factor substitution along a given product isoquant. Also, a new product may be designed that gives the same service with less resource use – e.g., light bulbs that give more lumens per watt. This is technical progress, a qualitative improvement in the state of the art, not the substitution of a quantity of capital for a quantity of resources in the production of a given quantity of a specific product.

No one denies the reality of technical progress, but to call such changes the substitution of capital for resources (or of manmade for natural capital) is a serious confusion. It seems that some economists are counting as ‘capital’ all improvements in knowledge, technology, managerial skills, etc. – in short, anything that would increase the efficiency with which resources are used. If this is the usage, then ‘capital’ and resources would by definition be substitutes in the same sense that more efficient use of a resource is a good substitute for having more of the resource. But formally to define capital as efficiency would make a mockery of the neoclassical theory of production, where efficiency is a ratio of output to input, and capital is a quantity of input.

## DISCUSSION

It was necessary, I think, to go deeply into the issue of complementarity because it is the key to strong sustainability, and by omitting it Beckerman failed to deal with the most important issue in the sustainable development debate.

Turning now to other problems, Beckerman thinks that discounting is the proper way to balance present and future claims on the resource base. But a discount rate is part of the price system, and prices allocate subject to a given distribution of ownership. The key question is the given distribution of ownership between different generations, which are different people. If the resource base is thought to belong entirely to the present generation we get one set of prices, including interest (discount) rate. If the resource base is thought to be distributed in ownership over many generations we get an entirely different set of prices, including a different interest rate. Both sets of prices are efficient, given the distribution.<sup>6</sup> Strong sustainability as a constraint is a way of implicitly providing property rights in the resource base to future generations. It says they have ownership claims to as much natural capital as the present – i.e. the rule is to keep natural capital intact. Strong sustainability requires that manmade and natural capital each be maintained intact separately, since they are considered complements: weak sustainability requires that only the sum of the two be maintained intact, since they are presumed to be substitutes. As natural capital more and more becomes the limiting factor the importance of keeping it separately intact increases.

Beckerman recognises that sustainability of consumption is built into the Hicksian definition of income. But he downplays this respectable lineage by saying that Hicks's definition of income is a purely technical concept, containing no moral injunction against capital consumption. While this is true in terms of accounting definitions, it is also rather disingenuous to pretend that the prudential motive of avoiding inadvertent impoverishment by consuming beyond income played no role in Hicks's formulation of the concept. Hicksian income is a concept consciously designed to inform prudential (sustainable) consumption, even though it does not mandate it. Extending the definitional requirement to keep capital intact to natural capital as well as manmade capital is a small step, and one totally within the spirit of Hicks's prudential concerns. And, given that natural capital is now the limiting factor, leaving it out of consideration vitiates the very meaning of income and runs contrary to its prudential motivation.

In sum, I agree with Beckerman that weak sustainability is a muddle, and that definitions in terms of the welfare of future generations are nonoperational. However, I have shown that strong sustainability is neither morally reprehensible nor operationally impractical, and that Beckerman's view to the contrary is based on his mistaken definition of strong sustainability. With proper definition strong sustainability retains Beckerman's blessing as a logical constraint, since it really does limit present welfare maximisation and is not defined implicitly in terms of the same welfare maximisation that it is supposed to limit. Strong sustainability also provides a better way of respecting the rights of future

generations than does discounting. Furthermore, it represents a logical extension of the Hicksian income concept.

For all of the above reasons I believe that sustainable development, properly clarified (as Beckerman rightly demands), is an indispensable concept. All important concepts are dialectically vague at the margins. I claim that sustainable development is at least as clear a concept as 'money'. Is money really M1 or M2, or is it M1a? Do we count Eurodollar-based loans in the US money supply? How liquid does an asset have to be before it counts as 'quasimoney', etc.? Yet the human mind is clever. We not only can handle the concept of money, but would have a hard time without it. The same, I suggest, is true for the concept of sustainable development.

#### NOTES

<sup>1</sup> El Serafy 1988.

<sup>2</sup> Regarding the house example I am frequently told that insulation (capital) is a substitute for resources (energy for space heating). If the house is considered the final product, then capital (agent of production, efficient cause) cannot end up as a part (material cause) of the house, whether as wood, brick, or insulating material. The insulating material is a resource like wood or brick, not capital. If the final product is not taken as the house but the service of the house in providing warmth, then the entire house, not only insulating material, is capital. In this case more or better capital (a well-insulated house) does reduce the waste of energy. Increasing the efficiency with which a resource is used is certainly a good substitute for more of the resource. But these kinds of waste-reducing efficiency measures (recycling prompt scrap, sweeping up sawdust and using it for fuel or particle board, reducing heat loss from a house, etc.) are all rather marginal substitutions that soon reach their limit.

<sup>3</sup> The usual definition of complementarity requires that for a given constant output a rise in the price of one factor would reduce the quantity of both factors. In the two factor case both factors means all factors. and it is impossible to keep output constant while reducing the input of all factors. But complementarity might be defined back into existence in the two factor case by avoiding the constant output condition. For example, two factors could be considered complements if an increase in one alone will not increase output, but an increase in the other will – and perfect complements if an increase in neither factor alone will increase output, but an increase in both will. It is not sufficient to treat complementarity as if it were nothing more than 'limited substitutability'. That means that we could get along with only one factor well enough, with only the other less well, but that we do not need both. Complementarity means we need both, and that the one in shortest supply is limiting.

<sup>4</sup> N. Georgescu-Roegen deserves to be quoted at length on this point because so few people have understood it. He writes the 'Solow-Stiglitz variant' of the Cobb-Douglas function as:

$$Q = K^{a_1} R^{a_2} L^{a_3} \quad (1)$$

'where Q is output, K is the stock of capital, R is the flow of natural resources used in production, L is the labour supply, and  $a_1 + a_2 + a_3 = 1$  and of course,  $a_i > 0$ .

## DISCUSSION

From this formula it follows that with a constant labour power,  $L_0$ , one could obtain any  $Q_0$ , if the flow of natural resources satisfies the condition

$$R^{a_2} = \frac{Q_0}{K^{a_1} L_0^{a_3}} \quad (2)$$

This shows that  $R$  may be as small as we wish, provided  $K$  is sufficiently large. Ergo, we can obtain a constant annual product indefinitely even from a very small stock of resources  $R > 0$ , if we decompose  $R$  into an infinite series  $R = \sum R_i$  with  $R_i \rightarrow 0$ , use  $R_i$  in year  $i$ , and increase the stock of capital each year as required by (2). But this *ergo* is not valid in actuality. In actuality, the increase of capital implies an additional depletion of resources. And if  $K \rightarrow \infty$ , then  $R$  will rapidly be exhausted by the production of capital. Solow and Stiglitz could not have come out with their conjuring trick had they borne in mind, first, that any material process consists in the transformation of some materials into others (the flow elements) by some agents (the fund elements), and second, that natural resources are the very sap of the economic process. They are not just like any other production factor. A change in capital or labour can only diminish the amount of waste in the production of a commodity: no agent can create the material on which it works. Nor can capital create the stuff out of which it is made. In some cases it may also be that the same service can be provided by a design that requires less matter or energy. But even in this direction there exists a limit, unless we believe that the ultimate fate of the economic process is an earthly Garden of Eden. The question that confronts us today is whether we are going to discover new sources of energy that can be safely used. No elasticities of some Cobb-Douglas function can help us to answer it.' (Georgescu-Roegen 1979)

<sup>5</sup> At the margin a right glove can substitute for a left glove by turning it inside out. Socks can substitute for shoes by wearing an extra pair to compensate for thinning soles. But in spite of this marginal substitution, shoes and socks, right and left gloves, etc. are still complements. Basically the same is true for manmade and natural capital. Picture their isoquants as L-shaped, having a 90° angle. Erase the angle and draw in a tiny 90° arc connecting the two legs of the L. This seems close to reality. However, this very marginal range of substitution has been over-extrapolated to the degree that even a Nobel Laureate economist has gravely opined that, thanks to substitution, '....the world can, in effect, get along without natural resources.' (Solow 1974)

<sup>6</sup> See Norgaard and Howarth 1991.

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# Sustainable Development, Capital Substitution and Economic Humility: A Response to Beckerman

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## 1. INTRODUCTION

Wilfred Beckerman<sup>1</sup> accepts two of the premises of the environmentalist argument: that long-term environmental impacts may have serious effects on future generations, and that these future generations should be the object of ethical concern. However he rejects the conclusion that is widely claimed to follow: namely that 'sustainability' should be a principal objective of economic policy. For him, the proper (and ultimately the only) objective of economic policy remains optimality, the maximisation of benefits over costs – even when environmental concerns are taken into account. His argument has five elements: a redefinition, a positive proposition, two negative ones, and a very large assumption. I shall take each in turn.

## 2. REDEFINING OPTIMALITY

The redefinition is of the concept of optimality. It is rather disingenuous of Beckerman to claim that 'it has long been conventional to include distributional considerations into the concept of economic welfare' (p. 197). This is true in theory – though even then (as illustrated by the quotation from Pigou) the discussion has been almost entirely about distributional changes within a given total, not the more challenging case where the total is reduced in return for greater equality.<sup>2</sup> It is in any case far less true in practice. In cost benefit analysis the treatment of distribution and the use of distributional weights are a matter of continuing dispute; some authors (such as Little and Mirlees) are in favour; others (such as Harberger) against.<sup>3</sup> In practice, the majority of CBAs carried out in Britain (such as under the CoBA procedure for trunk roads) do not apply distributional weights. As for national income, if taking distribution into account were such a standard practice, one is minded to ask, why did Beckerman have to publish his own estimates of growth rates so 'adjusted'?

But of course none of this is a criticism of Beckerman himself, since he *does* think that distribution is a component of welfare. Indeed, he appears to go further. ‘Welfare can also be defined to include considerations of social justice and freedom, and so on.’ (p. 197) This redefinition is clearly a pre-emptive strike against the criticisms made by environmentalists and other non-utilitarians that the economic concept of optimality ignores those aspects of the good society – and therefore those aims of public policy – which are not characterisable in terms of costs and benefits. These might include justice, the protection of rights, consideration of the interests of other species, and the upholding of other ethical principles.<sup>4</sup>

Unfortunately, this expansion of the components of welfare creates difficulties for the economic method. For – as Beckerman seems to realise – these aspects of the good society are not commensurable. To weigh up the amount of right and wrong in society against its costs is to misunderstand the nature of right and wrong. It therefore makes only tautological sense to speak of ‘maximising’ these aims. That is, ‘maximisation’ can only mean achieving the best society we can, an objective with which no-one could disagree, but which does not provide much assistance in deciding exactly what combination of incommensurable social goods constitutes the best society. The method economists have generally used to do this – commensurating all goods through monetary willingness to pay – is clearly inadequate for incommensurable values and non-tradable principles.<sup>5</sup>

Beckerman’s redefinition of welfare therefore has two effects. First, it implies a considerable reduction in the importance of economic methods (such as cost benefit analysis) in public decision making; a reduction which might perhaps be reflected by greater humility in many economists’ pronouncements on public policy. Second, it suggests that the term ‘optimality’ is not appropriate. Optimality is defined as the maximisation of benefit over cost: at its conceptual heart lies the intersection of marginal benefit and marginal cost curves. If welfare does not consist in maximising benefits over costs, but in deliberation and judgement on the best course of action, then optimality is not the right term to describe the social objective. We should keep to ‘welfare’; or perhaps better, to ‘wellbeing’ and ‘the public good’.

### 3. DISCOUNTING

The arguments made so far do not address Beckerman’s criticisms of sustainability. His claim is that even within a wider concept of welfare, sustainability does not have a place. Beckerman’s positive proposition in support of this claim is that the welfare of future generations, which the concept of sustainability is supposed to safeguard, are already safeguarded within the concept of optimality. Sustainability is redundant.

## DISCUSSION

Environmentalists will be surprised to find that the way in which the welfare of future generations is taken into account is through the technique of discounting. This is widely supposed to be the very way in which it is *not* taken into account. But Beckerman is right to say that discounting equalises the value of a unit of consumption in different time periods, given economic growth. As he says, such growth provides a broad measure of the rate of return which one could get if (instead of consuming) society invested its money in the stock market. It also means that future people will be better off than present people, so future people will get less welfare from each unit of their consumption than present people. For both these reasons, as Beckerman says, discounting the future income streams from environmental investments ensures that economic welfare is maximised not only for the present generation, but for future generations too.

This argument, however, rests on a crucial assumption. This is that the environment is just another form of capital, and the benefits it provides to humankind are no different from other streams of welfare-providing income. In economic jargon, natural and human-made capital (and the benefit streams to which they give rise) are regarded as infinitely substitutable.

Now if this is the case, Beckerman is right. Environmental capital should be treated in exactly the same way as other kinds of capital: investment in it should only occur where this will bring a higher return than anywhere else, and future returns should be discounted by the rate of capital growth. If this is done, economic welfare is maximised for all generations.

But of course natural and human-made capital are not infinitely substitutable. As Herman Daly argues in his accompanying response in this volume, the environment provides humankind with 'benefits' which no human-made capital can replicate: both particular functions (such as climate regulation and genetic diversity) and non-eliminable inputs (such as raw materials, land and waste assimilation capacities). As Daly shows, natural capital is for the most part complementary to human-made capital, not substitutable by it.

But if the assumption of infinite substitutability is removed, Beckerman's argument for discounting collapses. For it will not then be possible to compare the 'returns' of financial investments with those from environmental investments. These are different in kind. Trading off environmental quantity and quality for higher income doesn't maximise welfare if the environment provides humankind with specific and valuable benefits that income from human-made capital – however much of it we have – cannot substitute for. It is precisely this claim, of course, that advocates of (strong) sustainability make.

The other plank of Beckerman's justification for discounting also falls away. Economic growth may make future people better off in *financial* terms. But if natural and human-made capital are not infinitely substitutable, that is not the point. What matters is whether future people will be better off *environmentally*; that is, in terms of the non-substitutable benefits which natural capital provides.

If future people will be worse off environmentally they are likely to get *more* not less welfare from a ‘unit’ of environment than the current generation. Discounting future environmental consumption is therefore completely inappropriate: what we should really be doing (on this argument) is negative discounting, giving future environmental consumption *more* not less weight.<sup>6</sup>

It surely cannot have escaped Beckerman’s notice that in fact the quantity and quality of the natural environment – or, to be more economic, the benefit streams humankind is obtaining from natural capital – *are* generally declining; not in every respect in every country, but in many in most. Indeed, one might have thought this was the reason we are having a debate about sustainability at all.

#### 4. ENVIRONMENTALISTS, ECONOMISTS AND WEAK SUSTAINABILITY

I shall explore the issue of capital substitution a little further below. Before doing this however we need to dispose of the first of Beckerman’s negative propositions. This is that the concept of ‘weak sustainability’ is both absurd and redundant. It is absurd, Beckerman argues, because the objective of ‘non-declining welfare’ is nonsensical: on what grounds should one prefer a low lifetime path of welfare that happens never to decline to a higher one that does so decline? It is redundant because the welfare of future generations which sustainability seeks to protect is already (through discounting) incorporated in the concept of optimality.

How is this argument disposed of? By agreeing with it. Given the assumption about the substitutability of natural and human-made capital, on which the concept of weak sustainability also depends, Beckerman’s criticisms of it are absolutely correct. They are not necessary, since the assumption itself would disqualify the concept from further consideration; but they are welcome further nails in its coffin.

However, attacking weak sustainability does not make ‘environmentalists’ feel threatened. For very few people who would call themselves ‘environmentalists’ believe in weak sustainability. It is true that David Pearce and a number of other prominent environmental economists have espoused the concept of weak sustainability. It may even be true of this group that they have ‘retreat[ed] from strong sustainability to weak sustainability, and then from weak sustainability as an objective of policy to weak sustainability as just a constraint’ (p. 202). But this is emphatically *not* true of ‘environmentalists’. It is not even true, I would argue, of the majority of environmental economists. (At the 1994 conference of the International Society for Ecological Economics, the discipline’s main biennial gathering, weak sustainability was hardly mentioned.) Advocates of strong sustainability include some of the subject’s most distinguished theorists and practitioners – Herman Daly, Richard Norgaard, Robert

## DISCUSSION

Costanza, Juan Martinez-Alier, Enrique Leff, Paul Ekins and many others.

If neither environmentalists nor many environmental economists are interested in weak sustainability, it is worth asking just where this concept has come from. The answer is instructive. For essentially what has happened is that an economic metaphor has been reified, and the environment then treated as if it actually *were* the metaphorical thing.

The metaphor is that of ‘natural capital’. In thinking about the environment economically, this is quite a helpful idea: we can understand the notion both of an exhaustible environmental ‘stock’ and of the ‘stream of benefits’ which flows from it. The metaphor seemed particularly applicable to the ethic of intergenerational equity. Derived from a broadly Rawlsian view of social justice, this had emerged from philosophical consideration of future trends in environmental damage.<sup>7</sup> Drawing on the long-established principle of ‘sustainable yield’ in respect of renewable resources, and the Hicksian concept of ‘true’ or ‘sustainable’ income (total income minus capital depreciation) the metaphor generated a simple environmental economic objective. This was ‘sustainability’, and it was defined as the maintenance of the natural capital stock over time.

As metaphor this was and remains useful. But the Pearcean economists took it further. First, they monetised the environment. Just what did it mean to ‘maintain the natural capital stock’? As with human-made capital, it must mean to maintain its *value*. New economic techniques, such as hedonic pricing and contingent valuation, were available to impute money values to the environment; it was these which sustainability demanded were maintained. But once ‘natural capital’ had a money value, a question arose. Why should society be concerned only with maintaining one kind, the ‘natural’ kind, of capital stock? Why not all capital? Future generations wouldn’t thank us for leaving natural capital intact if we depleted our human-made capital, including machines, buildings and knowledge. So sustainability became the maintenance of all forms of capital. But then a further question arose. Why should we be so concerned about capital? Capital after all isn’t really what we want. What we want is the benefit stream which flows from it. So sustainability was redefined again, as the maintenance of welfare (or utility) over time.<sup>8</sup> The concept of weak sustainability was born.

Now one effect of this progression, as Beckerman observes, is that it renders the concept of sustainability altogether redundant. But the more startling one is that it is no longer anything much to do with the environment. Once natural capital has been monetised and its benefit stream integrated with that of human-made capital, environmental protection is only contingently connected to the concept of non-declining welfare. It all depends on the values imputed to the environment and on the relative consequent sizes of natural and human-made capital. If the former are small and the latter large, it is quite possible for an economic development path to be regarded as ‘sustainable’ even if it involves large and increasing damage to natural functions. The attempt by Pearce and his colleagues to measure the ‘sustainability’ of nations reveals this starkly.<sup>9</sup>

## 5. STRONG SUSTAINABILITY

Of course, this criticism (that weak sustainability allows continuing significant environmental destruction) cannot be made by Beckerman, since he shares with the advocates of weak sustainability the assumption that natural capital and its benefit streams are infinitely substitutable with human-made capital. The obvious response therefore, on both their parts, would be to defend this assumption.

Surprisingly, Beckerman chooses not to do this. He attacks strong sustainability, which is based on the rejection of this assumption, but not on these grounds. Rather, he attacks it (this is his second negative proposition) for being ‘morally repugnant’ and ‘totally impracticable’ (p. 203). His arguments here are cursory, based upon a single sentence from the section of the Brundtland Report which sets out in simple terms what sustainable development means. A whole chapter of the report elaborates upon this sentence.<sup>10</sup> As a substantial literature now shows, advocates of strong sustainability are quite capable of making sustainability operational in practice, and they are aware of the potential for ethical conflict.<sup>11</sup>

No-one has ever suggested that sustainability is ‘the requirement to preserve intact the environment as we find it today in all its forms’ (p. 194). This would be impossible even if it were necessary. Rather, sustainability is the injunction to maintain the *capacities* of the natural environment: its ability to provide humankind with the services of resource provision, waste assimilation, amenity and life support. This allows for change in the composition of the environment, even (above certain sustainability thresholds) in its ‘level’. Of course, there will be disputes about exactly which changes maintain capacity and where the thresholds should lie: this is inevitable in practical policy making. But the principle is perfectly comprehensible, and simple rules have been formulated to make it operational. Policy makers are now applying these rules in practice.<sup>12</sup>

It is interesting that Beckerman should criticise strong sustainability for being impractical. One might equally say this of ‘welfare’, which he admits can be defined ‘however one wishes’. General concepts like these are always fuzzy at the edges, and need more precise rules to make them operational. This does not make them useless, so long as they represent meaningful core ideas, and practical rules can be formulated.

Beckerman’s other criticism of strong sustainability is that it is ethically unacceptable, since it would (for example) require large resources to be spent on preserving every species of beetle when such resources could be spent on environmental improvements which would benefit the poor, such as clean drinking water. This is an important charge. There are two and three quarter responses to it.

The first is a concession: the concept of sustainability does not itself incorporate internal rules on how to adjudicate between preserving different

## DISCUSSION

environmental capacities when these are in conflict. Some other principle, for example that of intragenerational equity, or a simple imperative to relieve present suffering, is required. If either of these were added to the sustainability principle – always assuming that the choice is inescapable – the beetle would be sacrificed to the need for clean drinking water.

Second, and following on from this, sustainability is not the *only* ethical principle espoused by its advocates. Most of us are ethical pluralists, and recognise that sometimes sustainability conflicts with other ethical principles to which we are also committed, such as intragenerational equity and the relief of present suffering. (It is precisely because of such ethical pluralism that sustainability is held to be a constraint on the maximisation of present welfare; these objectives are both supported, and can be in conflict.) In such circumstances we have to make ethical judgements; different people will make different ones. Personally, in the circumstances described by Beckerman, I would choose drinking water.<sup>13</sup>

The three quarters of a response denies that in practice we are faced with many choices of the beetle versus drinking water type. As the Brundtland Report itself took pains to demonstrate, the poorest people in the world are generally dependent on the natural environment for their daily wellbeing; protecting it against damage benefits them as well as their descendants. Even when there do appear to be conflicts between sustainability and the present needs of the poor – the preservation of large animals in Africa might be a case in point – there are often solutions available which can benefit both.<sup>14</sup> Moreover, the choice of resource spending need not be limited to two environmental goods. We might prefer to divert some of the billions of dollars spent in other fields, such as arms, and have both beetle and drinking water. This is only three quarters of a response because the possibility of conflict remains in theory; but in the real world it is nevertheless a strong one.

### 7. CAPITAL SUBSTITUTION AND WELFARE PLURALISM

It will be noticed that both my attack on Beckerman's arguments and my defence of strong sustainability rely on the assertion that natural and human-made capital – and their benefit streams – are not infinitely substitutable. I do not propose to justify this contention further; Herman Daly does this extremely well in his piece. But it is worth exploring its sources in a little more detail.

The use of the term 'infinite' is not hyperbole. What is meant by this is that there are some valued functions of and services provided by the natural environment which are not exchangeable *however much* human-made capital is offered in return. After all, one response to the strong sustainability argument would be to agree that many aspects of the natural environment are valuable, but to say that this merely increases the exchange rate between them and human-

made capital. We would have to get a hell of a lot of extra income to justify building a road through this landscape; the value of the ozone layer far outweighs the mere protection from ultra violet radiation we could get from sun creams. In practice, the strong and weak sustainability positions could be rendered identical simply by giving the natural environment a high enough value: though weak sustainability would allow substitution in theory, it would never actually be worth doing.

But this is precisely what strong sustainability denies. The theoretical concept of non-substitution has two sources. One concerns use of the environment in production. This is the theoretical-empirical assertion, made by Daly, that there is a non-eliminable requirement for natural capital in all economic activity – not just (though most obviously) in the provision of basic life support services, but in ordinary production itself. Human-made and natural capital are basically complements, not substitutes.

The second concerns use of the environment for ‘consumption’ – that is, for the direct ‘benefits’ (broadly defined) it brings to human beings. In this case the source of strong sustainability is an ethical and/or empirical belief in what we might call *welfare pluralism*. By this is meant the belief that human beings need a variety of different kinds of goods, services, experiences and relationships in order to achieve wellbeing. One might say that the welfare function is multidimensional.

This goes against orthodox economic thinking. Welfare economics generally assumes that welfare is a single value in which all goods can be measured. Some types of goods might have strong weights, especially when they are in short supply, but ultimately all things which contribute to welfare are exchangeable. In so far as the argument for strong sustainability is extended to use of the environment for consumption as well as production it is this belief which is implicitly being rejected. The environment, it is being claimed, provides humankind with goods (social and cultural as well as individual) which are necessary for wellbeing; without them both individual lives and societies are impoverished, an impoverishment for which no substitution of human-made benefits can make up.<sup>15</sup>

It is interesting that Beckerman criticises the Brundtland definition of sustainable development for its use of the term ‘needs’. For it is precisely in the literature on the concept of human needs that the argument for welfare pluralism has been most interestingly articulated. Maslow, Max-Neef, Doyal and Gough and others argue precisely that the monolithic concept of welfare must be broken down into separate needs, each of which must be fulfilled for people to achieve wellbeing, and none of which are substitutable for each other.<sup>16</sup> Beckerman’s complaint that ‘needs’ are subjective is rejected. Needs, these authors argue, are universal; what changes in different cultures and periods are the ‘satisfiers’ of these needs. The argument draws on empirical evidence about different human

## DISCUSSION

societies and what must (in my view) be accepted to be an intuitive or socio-philosophical belief in what constitutes human wellbeing.

There is no space to elaborate on this argument here. But it is worth noting the connection between needs-based welfare pluralism and the non-commensurability of public policy objectives with which this article began. The denial of orthodox economic rationality – the idea that the aim both of individual and social choice is to maximise a single welfare value – is a powerful source of the environmental ideal.

### 8. ‘USEFULNESS’ AND ECONOMIC HUMILITY

All this brings me to Beckerman’s very large assumption. This is that what makes a concept ‘useful’ is its usefulness to economists. Now I have argued that sustainability, in its strong form, *is* useful to economists, with a non-redundant meaning capable of being made operational. But even if we found that we could not, in the end, pin sustainability down to a precise economic meaning and set out its practical policy implications to general agreement, would this make it ‘useless’?

It needs to be remembered after all that sustainable development and sustainability were not originally intended as ‘economic’ terms. They were, and remain, essentially ethico-political objectives, more like ‘social justice’ and ‘democracy’ than ‘economic growth’.<sup>17</sup> And as such their purpose or ‘use’ is mainly to express key ideas about how society – including the economy – should be governed.

In this task sustainable development has done very well. In stark contrast (it must be said) to Beckerman’s favoured ‘optimality’, it has helped to focus attention on the environment and on the impacts of current activity on future generations. Indeed, it has also captured the connections between environmental degradation and the needs of the poor in the South, and between environmental degradation and the ‘quality of life’ in the North.<sup>18</sup> By bypassing the unhelpful debate about ‘zero growth’ which plagued earlier waves of environmental concern, the term has helped to create an unprecedented level of at least rhetorical political commitment to the environment. Its ‘motherhood’ character and ability to be interpreted in different ways by different people can sometimes breed cynicism, which is unhelpful; but its very universality has generated a debate about environmental economic policy which shows no sign of abating.

The fact that the practical implications of sustainability are open to interpretation and political debate does nothing to diminish its usefulness. All key ethico-political concepts are contestable in this way. How many definitions are there of ‘democracy’? The most famous one (‘government of the people, by the people, for the people’) is comparable to the Brundtland definition of sustainable

development: it is short and vague, and does not lend itself to precise interpretation and immediate application. But it captures the core idea. The possibility of different interpretations does not mean that democracy is either meaningless or non-operational. Both democracy and sustainable development contain key essential principles, which are substantive, meaningful and non-redundant. This is why they are useful concepts. It so happens that sustainability can also be given an economic definition which can be made operational in policy terms; its usefulness is therefore doubled.

The conclusion of this particular story seems to me to be something to do with the humility with which economists need to approach the environment. It is not surprising that Beckerman should define ‘usefulness’ as ‘useful to orthodox economists’. There has been a tendency among neoclassical economists to assume that the environment can simply be incorporated into the standard economic framework, analysed using the same concepts and methods as used for ordinary produced commodities. To people in other disciplines, such economists have sometimes seemed to assume that theirs is the only approach required to formulate environmental policy.

In fact, it is not an adequate approach at all. Economic metaphors can be helpful tools of understanding, but they do not actually turn the environment into another form of monetised ‘capital’. There are economic functions carried out by the environment which cannot be replaced by human economic activity. The environment makes people better off, but not in ways which can simply be exchanged with other sources of a unitary ‘welfare’ value. As well as providing human beings with many economic benefits, the environment has moral standing which must be taken into account in public policy, a process for which economic methods are ill-suited.

In recognising these limitations of orthodox economics, a growing school of ecological economists have not just developed a better understanding of the environmental economy, but have changed our conception of economics in general. Their approach deserves to be adopted more widely.

#### NOTES

<sup>1</sup> Beckerman 1994.

<sup>2</sup> See for example Ng 1979, Broadway and Bruce 1984.

<sup>3</sup> For a discussion see Ray 1984.

<sup>4</sup> It is not clear whether Beckerman regards freedom and justice as ethical principles, or simply as goods which can be traded off against other goods, perhaps with strong weightings in their favour. If the latter, then the following argument does not apply; but this is not how most philosophers and ordinary people regard these values.

<sup>5</sup> For the argument in the environmental context, see for example Sagoff 1988, Jacobs 1991, O’Neill 1993.

## DISCUSSION

<sup>6</sup>In fact, the debate about appropriate discount rates is a distraction. Reducing the discount rate for environmental projects, as some have advocated, is not of itself an environmental measure. The environmental effects of discounting depend on whether costs or benefits occur first. If (as in, say, afforestation projects) the costs fall early and the benefits later, discounting penalises the environmental investment. If (as in, say, pollution control) the benefits are immediate and the costs can be deferred through borrowing, discounting encourages the investment. Environmental considerations should be taken into account, rather, by imposing a sustainability constraint to protect critical or target aspects of environmental capital, and incorporating other environmental considerations into public policy judgements. Such judgements can be assisted by CBA for genuinely financial benefits, including marketed environmental benefits. These arguments are made more fully in Jacobs 1991, chapters 7, 8, 16 and 17.

<sup>7</sup> Page 1977.

<sup>8</sup> See for example Pezzey 1992.

<sup>9</sup> Pearce et al. 1992.

<sup>10</sup> World Commission on Environment and Development 1987, p46 and chapter 6.

<sup>11</sup> See for example, Daly and Cobb 1989, Goodland et al 1991, Jacobs 1991, Carley and Christie 1993.

<sup>12</sup> For the general rules, see Jacobs 1991. For detail, see for example English Nature 1994.

<sup>13</sup> Because of this, some advocates of sustainability have wanted to incorporate the principle of intragenerational equity into that of sustainability. This would rule out inequitable preservation of environmental capacity. An internal rule or procedure is then needed to balance between the two elements. My own preference is to keep the concepts of sustainability and intragenerational equity distinct, and recognise their potential conflict. In *The Green Economy* I distinguish between sustainability and sustainable development, arguing that equity (along with the idea of quality of life) is integral to the latter but not the former. But this distinction has not been used elsewhere: the two terms are now generally treated as interchangeable.

<sup>14</sup> McNeely 1988.

<sup>15</sup> See for example Fox 1990.

<sup>16</sup> Maslow 1954, Max-Neef 1992, Doyal and Gough 1991.

<sup>17</sup> For two recent discussions see Redclift 1994, Heinen 1994.

<sup>18</sup> See for example Carley and Christie 1993.

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## In Defence of Sustainable Development

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Mr Wilfred Beckerman, of Balliol College, Oxford has written a crisp essay attempting to undermine the meaning of the concept of 'Sustainable Development'. As I read his first arguments, I couldn't agree with him more that the concept is excessively stretched, that there is a lot of sloppy usage, and indeed that a spurious intellectual industry has been created in manufacturing various by-products of Sustainable Development.

Now, my first reaction, after the Brundtland Report (*Our Common Future*) was published, was that there was nothing new in it, and that all it conveyed was already known and discussed in a greater depth in the literature pertaining to Eco-philosophy<sup>1</sup> and environmental ethics. Yet something was new: the very idea of *Sustainable Development*. It struck a middle ground between more radical approaches which denounced all development, and the idea of development conceived as business as usual. The idea of Sustainable Development, although broad, loose and tinged with lots of ambiguity around its edges, turned out to be *palatable* to everybody. This may have been its greatest virtue: it is radical and yet not offensive. The language is very important. Language is tested in time. And the test of the idea of Sustainable Development proved to be positive. The idea has become widely accepted. It allows thinking people to rally around the platform on which a multitude of things can be discussed. It has permitted ordinary people to understand the new economic thinking and the new directions of our civilisation.

Yet the concept is loose and our sense of intellectual respectability is often offended by its ambiguities, as Wilfred Beckerman pointedly argues. We should not worry too much about intellectual respectability. We should worry more about the survival of the species, and the intellectual tools which have inadvertently led us to grave intellectual, moral, existential and ecological crises. Now Mr Beckerman left me behind when he proposed, in his analysis, that the idea of Sustainable Development should be used as a purely technical concept; and he even mentions something about defining it operationally. Who on earth would want to operationalise the idea of Sustainable Development? And to what purposes?

The real debate is not about Sustainable Development. The debate is about the legacy of material progress, about *the sustainability of life itself*. It is clear that

the new economic thinking of the 90s is different from the old economic thinking. As Cristovam Buarque spells out in his book *The End of Economics: Ethics and the Disorder of Progress* (Zed Books, 1993); and as Simon Zadek (reviewing this book in the same issue of *Environmental Values* in which Beckerman's piece is published) eloquently summarises, the new economics is impatient with the old one which aspires and pretends to be value neutral, with its inadequacies in accounting environmental costs, with its blindness to qualitative aspects of life, with its crass allegiance to the materialist world view.

Yes, the new economics holds that ethical and environmental components must be built into our theory and explicitly recognised. In this way economics could become a useful tool in understanding our present environmental and economic problems, and could even be a tool for ameliorating our condition. The old economics is a tool of rape and destruction of the environment at large. It is also an instrument justifying (if indirectly) social injustices and inequities, and thereby deepening the chasm between the South and the North, between the poor and the rich.

It is in this context that we must view the debate on the meaning of Sustainable Development. Is the idea ambiguous? Yes. Is the idea useful? Yes, it is very useful. It tries to combine what needs to be combined: the economic and the moral, the idea of justice with the appropriate economic tools which should serve the idea of justice – particularly with regard to the poor and the underprivileged.

The period of cognitive purity is over. We can no longer separate the cognitive and the ethical, especially in economics – but also in exact sciences, for the very idea of objectivity is morally loaded. Even if some neutrality can be claimed for theories of natural science, it is not so in social science, and especially in classical economics: its basic theory implicitly contains utilitarian ethics, and also contains the whole legacy of material progress – which itself is impregnated with moral values and moral prescriptions.

Our intellectual honesty requires that we recognise economic theories as normative, at least as containing the normative substratum. If there is a clash between our intellectual honesty and our intellectual respectability, we must choose the former, for intellectual respectability so often is a euphemism standing for institutional commitment and servitude to the old, while our intellectual honesty is a new moral stance through which we attempt to help the threatened life on the whole Planet.

Mr Beckerman admonishes us that we use vague concepts as a vehicle leading to the amelioration of the environment and of human life. Yes, we do. It is better to muddle through to salvation than go crisply to damnation.

#### NOTE

<sup>1</sup> See for instance: Henryk Skolimowski, *Eco-philosophy, Designing New Tactics for Living*. Marion Boyars, London 1981.