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Options, sustainability policy and the spontaneous order

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This paper examines the implications for sustainability policy of environmental uncertainty and indeterminacy, and relates the associated problems with a conventional understanding of sustainable development to Hayek's critique of collective planning. It suggests that the appropriate recourse is not, however, a Hayekian endorsement of the free market, but an extension of his key idea of spontaneous order to characterise the learning society. The argument is illustrated by a practical application: the analysis of natural capital explored in this Special Issue is shown to be directly relevant to the improvement of the UK's headline sustainability indicators package.

Introduction

This paper has two aims, which will appear at least initially to be in tension. The first is to emphasise just how radical a revisioning of sustainability is entailed by the main considerations raised in this Special Issue. The second is to illustrate how readily that new vision could, nevertheless, be brought to bear in the current UK context of policy, planning and decision-making.

The necessary radicalism, in other words, is not a matter of throwing aside all the progress that has been made in getting the sustainability concept onto these agendas (a huge and historic achievement, if one looks back only 20 years), in order somehow to start afresh. Rather, it requires us now to understand what we are doing in ways which might enable this achievement to realise its potential and inform a viable human future, instead of defeating itself through weaknesses in our concept of sustainability, as otherwise seems probable. I shall suggest, with examples, how such a deployment of fresh understanding could begin to be made effective in the world as it is.

Thus my argument may alleviate the initial tension; but I shall not seek wholly to remove it. That could be done only if sustainability thinking, understood on the terms

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here proposed, could be imagined as becoming in due course a kind of normal policy science. But I hope it will become clear why nothing which could really count as sustainability thinking could ever become normal science.

Uncertainty, sustainability and behaviour change

As noted in several of the foregoing papers, particularly that of Gough (2005), a very broad range of environmental issues is characterised by significant uncertainty about the future. Some of this uncertainty—arising from complexity of causal interconnection in the movement of materials around ecosystems, for instance—consists simply in our not knowing things which we might come through progress in the relevant sciences to know. Some of it is a matter of our having only fairly well-defined probabilities to go on. But the domain of such 'positive uncertainty' is much narrower than we tend ordinarily to acknowledge.

For one thing, living systems are inherently unpredictable under novel anthropogenic stresses, and our attempts to manage them introduce further levels of unpredictability and open-endedness. Moreover, our attempts to *understand* them in order to manage them do precisely likewise. As amply demonstrated in recent controversies over GM crops, for instance, our choice of scientific framework for analysis and prediction is never going to be entirely unaffected by the economic and technological pressures driving those developments, the environmental effects of which we are seeking to predict. This is not to impugn the objectivity of science, just to point to the fact that it remains always a human activity conducted in a social context, and can only be objective at all within framing assumptions tacitly supplied by that context. But then, even the most precisely expressed scientific knowledge inherits the contingency and provisionality of the social interaction from which such frameworks emerge; and given the scope and complexity of human–environmental relations as a domain for that interaction, such contingency and provisionality will be pervasive.

The socially contingent character of scientific knowledge has been increasingly recognised in recent years, building on early insights by Kuhn (1962) and successors in the history and sociology of science—see for instance Medawar (1967), Wynne (1992), Jasanoff (2002). This shift in perspective challenges the positivistic Baconian picture of science as systematically unlocking the objective secrets of nature through steady cumulative empiricism, leading to associated reductions of uncertainty. Instead, science comes to be seen as a more serendipitous (if nevertheless extremely powerful) human construct, its directions, preoccupations and overall substance shaped, generally invisibly, at any particular stage by adventitious human cultural forces, conventions and norms. Correspondingly, the Baconian model, which had lived on until very recently in the political authority claimed for 'sound science' by governments like the UK's, is increasingly being recognised as inappropriate in the policy arena. In particular, a succession of science-related environmental controversies in the 1980s and 1990s—for example, climate change and fossil fuels, nuclear waste management, CFCs and the ozone layer, Brent Spar and marine science, agricultural practices and BSE/CJD, and disputes about the safety or otherwise of GM

crops (European Environment Agency, 2001)—have brought home how provisional and socio-politically shaped the state of scientific understanding of any sphere will tend to be at any particular historical moment (Grove-White, 1999).

A corollary has been the rise of issues about trust (in regulators, political authorities, and the scientific advisory mechanisms on which the latter have come to depend) as a central focus of discussion about the terms of reliance on scientific knowledge in public policy, and especially environmental policy, in the period since the mid-1990s. Such reliance, it has been shown, must recognise inherently unforeseeable contingencies such as new developments in the social and cultural domain which are always liable, because of the humanly contingent nature of science itself, to unsettle in the future the sound science claims of any present.

This kind of uncertainty, in fact, shades without any clear break into that in which we find ourselves over 'environmental values'. Uncertainty here is *in principle irresolvable*. Present actions, including those involved in representing future environmental values to ourselves, inevitably shape the future values which we are trying to anticipate. For instance, we do not know how our having decided to protect certain areas of wilderness on the basis of how we think they will matter to future people will alter the ways in which they do in the event matter to them—and if we did suppose that we could know, and tried to factor that putative knowledge in, we wouldn't in turn know what difference that might make. This is in the nature of 'environment' as a concept with an ineliminable reference to how their surroundings are ongoingly perceived and understood by humans. The valued environment, for future people, will be characterised among other things by the history of human engagement with it, and a key part of that history must now include our present expectations of future values. Such complexities specific to the environmental case only illustrate the fundamental point that the changing human world of value is something which we are always open-endedly creating (Foster, 1997a). One way of expressing the recent shift of understanding across this whole field would be to say that, *as far as our practical engagement goes*, the same has now to be said for the world envisaged by environmental science and science-based policy.

Environmental issues, that is, confront us not just with multiple unknowns, but with genuine and widespread *indeterminacy*. That is very far from alleging that no claim about the environment (framed scientifically or otherwise) is worth anything, or worth more than any counterclaim, or robust enough for the requirements of policy and practical action. Such a position would be quite implausible, as well as potentially paralysing in its implications. It does mean, though, that what is robust is always contingently so, and whatever is determinate is always relative to a particular, and provisional, context of understanding and practice—while even provisional closure of one set of questions is liable to be achieved at the price of exposing indeterminacies in other domains or at other levels of understanding.

All this is quite enough to present a serious difficulty of principle for any conception of the necessary sustainability of development which tries to get a constraint on present environmentally relevant action, and an incentive to possibly disruptive and uncomfortable change in the present, out of a determinate relation between the

present and the future. Under endemic and significant uncertainty, a future determinate enough to motivate present action only finally exists as *our present determination of it*. That process of determination is itself an activity which must be conducted under the full pressure of the present disincentives to change which we might be using our view of future likelihoods to counter. In such a situation, there is no firm distinction between preparing ourselves to handle the transition to the future, and construing the future so that the transition to it will be what we think we can handle. The genuinely indeterminate future is not sufficiently *independent*, motivationally speaking, of the present in which it is represented, to afford us any unambiguous leverage on that present.

The standard model of natural capital value as a sustainability constraint is fully exposed to this difficulty. If the value of a natural capital stock is the net present value of the discounted flow of benefits that it provides over time, the decision as to what course of action will count as maintaining its value is contingent on what we take (now) to be the factors affecting how its value is to be realised in the future—and relevant to that will be what we take to be the case about future patterns of preference, alternative possible sources of the benefit provided by the capital stock, what the technologies for making the stock productive are liable to be, and so on. It is not just that under significant uncertainty there is little to stop us putting figures on the probabilities of such developments which reflect the current state of our disposition to act, nor even that we may well be strongly inclined so to model the future that the net present value of our natural capital stock comes out as one which we *can* maintain into that future with a minimum of disruptive adjustment. The underlying point, as noted by Gough (2005), is that the capital model itself is unable to incorporate any restriction on these tacit inclinations and tendencies. Equally, and by the same token, it is unable to distinguish between our yielding to them, and our making a genuine effort not to. Should we, for instance, count the handing-on of reduced natural biodiversity together with improved techniques for manipulating the residual gene pool as preserving 'the same level of natural capital' for future use? There is nothing for us to do but to make a judgement about this, and in doing so we can try to attend conscientiously to what we think future people will think about it—but, precisely, what *we* think that they will think is necessarily the bottom line.

Sustainable development policies and plans, in other words, while they may express welcome awareness of new environmental agendas, do not really operationalise environmental limitation at all. They are exposed to the permanent possibility that we are constructing 'environmentally sustainable futures' only on the basis of what present lifestyles and behaviour patterns can readily accommodate, while purporting to offer ourselves a benchmark by reference to which these patterns are supposedly to be assessed and reshaped.

This is a problem with the *concept*, not just with the practice, of sustainability. We cannot avoid it by improving the predictive power, disciplinary integration or social ownership of our analytical tools (important though it may be to do this for other reasons). Fundamental to the sustainability concept is the adjustment of present

patterns of economic and social life to take account of cumulative longer-term consequences which might otherwise jeopardise their viability. The key notion here is that of a *constraint* on present action: we are pressed by consideration of future ecological trajectories to make changes which we might not have chosen spontaneously to make. But if any envisaged future is the upshot of a negotiated understanding, expressing present relations of comparative power, influence and 'voice', it will necessarily be a *reflection* of the conditions which it then guides us in reshaping. The idea of that kind of guidance cannot be the idea of constraint—even if the future we envisage is one which in fact prompts us towards changing present behaviours significantly. For since it might as rationally not have done so, we have no secure grounds for equating significance here with any sort of adequacy. In other words, while it is of course possible to express in purely formal terms the idea that we are to bring about whatever future conforms to some favoured set of requirements, this must always fail to translate into any idea of practical obligation so long as it cannot, for the above kinds of reason, capture the encounter with any genuine constraint. (One party cannot be under an obligation to another which it is ultimately down only to the first party to specify.[1])

This recognition presents a radical challenge to all the received models of how sustainability thinking can be given social and political purchase—whether in terms of preserving natural capital (Ekins *et al.*, 2003), respecting the claims of intergenerational justice (Barry, 1999), or developing the virtues of ecological citizenship (Dobson, 2003). For all these approaches share, quite unquestioningly, Andrew Dobson's view of the key sustainability question: 'What kind of world do we want to hand on to future generations?'—asking which is intended to confront us with the need for substantive changes to current habits, lifestyles and institutional arrangements (Dobson, 2003, p. 185). But actually, this question, with this expectation, cannot be distinguished in any real political practice from the subtly but crucially different question: 'What kind of world do we want to commit ourselves to wanting to hand on?'

This is not to say that we should, or could, stop looking to the future and trying to shape our present activities more sustainably by our best lights. But it means that any successes we have will always represent the concurrence of particular events and power relations, rather than submission to any genuinely objective requirements. Moreover, we shall never be able to tell our successes reliably from our mere shifts of expediency, since any criterion of success which we devise collectively is just as likely to be the expedient construction of a specific socio-political moment. Sustainability, given its unavoidable epistemic conditions, has an *inherently* compromised status as a criterion for action.

I have argued elsewhere (Foster, 2003) that widespread tacit acknowledgement of this situation could lie behind the much-observed phenomenon of the 'value-action gap'—the glaring failure of actual change to match the now-established sustainable development rhetoric at individual, institutional or societal levels, and the associated effectual stalling of an agenda which looks, superficially, to have been accepted into mainstream socio-political practice. Blake (1999), for instance,

observes that expressed environmental concern and comparatively undemanding pro-environmental behaviour (such as recycling) are now becoming widespread throughout the population, but few people take environmental actions involving the significant changes to their lifestyle which would actually match their expressed beliefs and concerns. He also, in the same article, quotes a UK government public attitudes survey which indicates that while 80% of people believe there is too much traffic, and 60% say they have considered alternatives to the car, only 25% have actually tried taking up such alternatives. Gardner and Stern (1996) similarly report surveys showing consistently strongly pro-environmental views among the US public (71%, for instance, believing that 'the USA is spending too little on environmental improvement and protection', 64% that 'economic growth should take second place to environmental quality', and 74% that 'environmental improvements should be made regardless of cost')—yet the USA shows no sign at all of changing its character as the most environmentally destructive society on Earth.

What is actually happening here, perhaps, is that the standard model of sustainability as a constraint on development is widely, albeit tacitly, *recognised* as not genuinely capturing anything which constrains us. By the same token, associated targets, indicators, project appraisal formats and planning decisions are generally sensed to depend on the aspiration to gain leverage on the present from the future, where nothing of the kind is really possible. It is only to be expected that, in these conditions, the pressures of political, corporate and institutional vested interests will work—and will generally be taken to be working—strongly beneath the surface. Issues of authority and trust obviously come very much to the fore in such a context. But they do so along with the further recognition, also widespread and tacit, that (given the dominant model) *nothing could count as satisfactorily resolving them*. Provisional and continuously negotiated scientific knowledge and political judgement, which look like all we can get in this domain, simply cannot fit the only role which that model makes available for them—the role of impartial and objectively warrantable criterion for the alignment of present actions to future needs. Just where it is supposed to generate the energy and provide the leverage for serious behavioural change in the direction of environmental sustainability, that is, the model based on the orthodox conception contains a void. The widespread disjuncture between environmental principles and actual behaviour might thus be seen as a manifestation and consequence of a whole discourse enmeshed in what the existentialists used to call *bad faith*—not so much the operation of double standards (letting one's actual conduct slide quietly past one's principles) as the demoralising half-suppression of an awareness that, where we demand an objective standard, there is really no such standard to be had. It is this, perhaps, rather than just our graduation to the 'hard politics' as such, which accounts for the environmental–political impasse described so tellingly by Robin Grove-White (2005).

That contention probably needs more work. But even as it stands, it is sufficiently suggestive of the radical order of failure to which conventional sustainability thinking is exposed.

Spontaneous order and the learning society

This whole argument, that sustainability cannot function in planning mode as a genuine constraint, has some affinities (noted by Gough, 2005) with Hayek's epistemological case against collective planning as such. In particular, it seems to be a Hayekian kind of thought that specific official versions of the forms of development to be accounted sustainable will ultimately reflect differential social power in the present rather than the encountering of ecological requirements on our collective behaviour. If centralised planning and policy-making are necessarily, in the last resort, arbitrary—for Hayek (1944, 1960), because they can never mobilise more than a tiny fraction of knowledge and awareness relevant to the matter in hand—no such activity can constitute the rational social acceptance of 'constraint from the future' which sustainable development is conventionally supposed to represent. And given the circumstances in which, realistically, social power will be exercised, including the very deeply embedded disincentives to significant structural change which bear on modern bureaucracies as the only plausible exercisers of it, its defensive use in environmental and sustainability planning contexts will then be entirely unsurprising.

We might also be moved to invoke Hayek in the present context when we recognise the kinship between his case for the necessary spontaneity of human development, as against the impositions of planning, and what might be called the 'real options mindset' which we have been exploring in relation to natural capital. Compare, for instance, with what is said on pp. 98–100 (this issue) by Gough (2005), these observations from *The constitution of liberty*:

> If we are to advance, we must leave room for a continuous revision of our present conceptions and ideals which will be necessitated by further experience…Though we must always strive for the achievement of our present aims, we must also leave room for new experiences and future events to decide which of these aims will be achieved…the advance and even the preservation of civilisation are dependent on a maximum of opportunity for accidents to happen. (Hayek, 1960, pp. 23–24, 29)

Here we certainly seem to have one authoritative example within economics of 'the positive valuation of endemic uncertainty' (p. 100, this issue).

There seems to me on reflection, nevertheless, good reason to be chary of assimilating our line of argument straightforwardly to a Hayekian perspective. That argument does not depend, as does Hayek's whole approach, on claims about the necessary dispersal and tacit grounding of knowledge. Instead it depends on the idea that environmental futures (specifically) are unknowable in advance because in principle indeterminate in relation to any given present. And what it does *not* provide is any basis at all for the classic Hayekian move from the critique of planning to an endorsement of unfettered free-market interaction.

Such interaction is supposed, by contrast with planning, to realise the full social potential for knowledge through the spontaneous coordination of the limited and often informal knowledges of multiple individuals. This might, indeed, seem to bypass the problems posed by environmental indeterminacy. Environmental futures, I argued in the last section, are essentially indeterminate because present attention to ecological

consequences (constructed in whatever discourse, scientific discourses included) is not only deployed under significant uncertainty, but will have altered the to-be-experienced profile of those consequences, even before we can act on the basis of it to address the implications of what we have taken the consequences to be. The spontaneous order achieved by the market, coordinating individual responses to price signals, is however precisely *not* a matter of society's 'acting on the basis of attention to the future'—its crucial characteristic for this contrast is that the action and the attention are not distinct. Free-market interaction is Hayek's answer to the deficiencies of all kinds of collective planning just because it is not a way of thinking about how we want the future to be *and then* doing something about it; rather, we access our preference-function as it envisages the future in the actions of relevant market exchange themselves.

This may be all very well as far as the theory goes. The trouble is that environmental futures are indeterminate in relation to the spontaneous free-market order in a different but just as decisive way. This order is achieved through, and is a resultant of, multiple individual actions and decisions, none of which can itself be conceived or shaped by reference to its ecological consequences—since none, considered as the action of an individual, *has* any ecological consequences.

This claim needs careful handling. My putting certain discarded household items into the waste stream destined for landfill, rather than into the appropriate recycling bin, certainly has consequences which an alertness to ecological considerations will highlight. At minimum, one more empty bottle or used battery goes into landfill. But this could not *by itself* be an ecological consequence, any more than my grandfather (who fought bravely and patriotically in the First World War) could have been at war with Germany *on his own*. To say that individual actions have no ecological consequences, in other words, is not a loose way of saying that they each have vanishingly small ecological consequences; it is to make the logical point that 'has ecological consequences' is a predicate which can attach only to the behaviour patterns of a sufficiently large collectivity. It is part of the *meaning* of 'ecological consequences' that only such patterns can bring such consequences (effects on the functional relations within and between ecosystems) in their train.

That logical point is what really lies behind the 'tragedy of the commons' account of the incentives to environmental damage under market individualism (Hardin, 1968). It is not, as sometimes pictured, that the individual considering whether he should refrain from this or that weighs the minimal ecological difference he could thereby make against the comparatively significant personal disadvantage which he would incur, and acts rationally in preferring to avoid the latter. Rather, what he implicitly recognises is that his own action can make literally *no* ecological difference. And while he can certainly reflect on the real ecological difference that would fail to be made if everyone failed to refrain, this has no tendency to alter the fact that *even in that case* his own action considered just as such could still make no ecological difference one way or the other. Ecology and methodological individualism are not just politically but logically incompatible.

This is not to rob the individual of responsibility for his relevant behaviour. Suppose there are a million used batteries in landfill, and I have put one of them

there. If a million people had decided, as I could have decided, to act differently, the million batteries would be absent. This is true, and expresses the sense in which ecological impact can be thought of as cumulative; but what it also brings out is the difference between my deciding not to put my battery in landfill, which has no ecological consequences, and my deciding to be one of a million people who don't, which might very well have such consequences. The point is that the latter decision is the one through which I genuinely exercise my responsibility, but it is necessarily not one which I can take, nor to which I can give effect, on my own.

Is it one to which I can give effect by pursuing my individual preferences in a free market which spontaneously coordinates me with the other 999,999? Well, I can decide to pay the additional cost (in time or money) of using the recycling stream, and if enough others make the same decision, this will send price signals which will shift the general pattern of action towards more recycling. But I have no market incentive to that decision in terms of my knowledge of ecological consequences, until I know that others are going to act similarly, which the market cannot tell me as it can send no signals about their intentions until they have acted on them, which none of them has any incentive to do until…and so on. If the market is comprised purely of a set of individuals responding independently to price signals, that is, there cannot be any price trails connecting the acts of these individuals with their ecological consequences, because they have none. There cannot therefore be any spontaneous working back through such price trails to the most ecologically favourable order—the one that realises to the full the supposedly dispersed and tacit ecological knowledge of these individuals.

But if a price trail to the genuinely ecological consequences of the overall pattern of action precipitated by the market is to be *introduced* into these arrangements (say, by legal pressure on producers to internalise environmental externalities within pricing structures, or by allocating property rights in environmental commons), it is no longer the spontaneous order of the free market which is in question—we are immediately back with all the problems posed by the relevant fiscal authorities' or regulatory agencies' having to act on the basis of necessarily fragmented knowledge. In either case, present actions cannot be governed by constraints rationally derived from anticipating environmental futures.

Whatever one might think about Hayek's free-market liberalism on other grounds, therefore (grounds such as the practical unfreedom, in the contemporary globalised economy, of any actual or imaginable market), it is evident that it cannot offer any plausible alternative to planning in ecological sustainability contexts.

If neither a willed order of would-be rational planning nor the spontaneous order of the free market can organise a pattern of social behaviour genuinely constrained by ecological consequences, what sustainability prospects have we? The answer seems to me still to follow Gough (and see also Gray, 1998) in trying to go with the grain of what is deep and powerful in Hayek's thought, though it is probably not one which Hayek himself would have recognised. It is to identify *a spontaneous order compatible with planning* in the idea and practice of the learning society.

'Learning society' has to be understood here very broadly, as the necessary mode of sense-making in a human condition where, as Hayek himself puts it, 'Human

reason can neither predict nor deliberately shape its own future. Its advances consist in finding out where it has been wrong' (Hayek, 1960, p. 41). Or, to repeat what I have written elsewhere on this topic (Foster, 2002), humans are creatures whose relation to the world is constantly problematising itself, whose being-in-the-world is always having to be achieved and re-achieved through the sense we make. Such sense-making has to be genuinely heuristic, exploring openly towards the challenge of the emergent and the perpetual ambush of the new. We can try to keep it so, not just by individual disciplines of responsive intelligence (important though they are), but—since sense-making is necessarily both individual and social—by ensuring that our common life flows through a wide variety of learning institutions, formal and informal, and generates a vigorous commerce of dialogical relations among them. This commerce can take many forms, but crucial to it will be institutions (the university, properly conceived, is an absolutely central one) which bring to living cogency in each present the cultural inheritances of knowledge and value. Vital, too, will be arrangements which enable institutions of this kind (others include those shaping the law and governing the scientific community), and institutions which register or construct lay responses to a variety of public policy issues, freely to communicate with and inter-animate one another—and which allow this inter-animation to inform policy-making in creative ways. What this whole process achieves, ideally, is a spontaneous order in terms of the best sense we can ongoingly make, at the full of our living social intelligence, of the always-changing human situation.

This, one might claim, is the fundamental form of spontaneous order. Other such forms canvassed in the Hayekian tradition, such as those emerging in the domains of law and morality (as well, of course, as the free market) can be referred by way of justification to very general features of human knowledge and behaviour. Even language, a spontaneous order on a different level, must be understood by reference to a natural order of reality, however problematic the status of that reference may be held to be. But the spontaneous order of our sense-making cannot be referred by way of justification to anything outside itself, since any proposed external referent could itself only be offered as a way of *making best sense* of our project of understanding. The order achieved in open, heuristic sense-making constitutes the self-ordering of experienced human life on which all other spontaneous orderings are based.

It is also perfectly compatible with planning, provided that planning is done (as there is no reason in principle why it should not be) in genuinely learning mode, and agencies with planning responsibilities are firmly part of, rather than aloof from, the complex 'dialogical economy' just indicated. The role of planning and policy on this account is to make provisional dispositions which mobilise a society's capacity for creative mistakes and productive accidents, and to facilitate (though not to organise or direct) the processes of ongoing learning from those mistakes and accidents, and of adaptive accommodation to their upshots. It is in this connection that the learning society in turn requires a rich texture of *optionality* in its economic, social and personal arrangements. We cannot be proactively learning our way into the open future if there is nothing we can *do* with what we ongoingly find out about the assumptions to which we had provisionally committed ourselves—if we haven't left ourselves scope for our

learning to make a real difference. This is precisely Hayek's point about leaving 'the maximum of opportunity for accident'. The link between a learning society and the conscious identification and enhancement of a real-option structure in our stock of capital, social and human resources, which we have been exploring and illustrating in the specific terms of natural capital, is actually a quite general and constitutive one.

Specifically in relation to those natural capital and sustainability issues, however, the identification of learning society with spontaneous order is the vital point. Spontaneous order here means human-natural order: a livingly responsive, adaptively self-adjusting order of shared sense. Its spontaneity resides in the reflexive registration of the emergent, in its being always an open question whether each new event will be interpreted by accommodation to existing categories of understanding, or will become a focus for their revision. The demands of sensitivity to this life-emergent ordering are actually the only form of ultimate constraint from its natural context which a creature that lives by consciously representing that context to itself (as past, present or future) can encounter. We run up against such constraint not in the particular forms of sense we make, which are always at key junctures referable back to our own shaping initiatives, but in the necessary mode of our sense-making.

Since we cannot condition in advance for how emergent events will affect the sense we make of overall human well-being, the genuine spontaneity of such an order of understanding is then the only real warrant we can have that our well-being will be preserved into the future across whatever changes in our social, technological or environmental situation we encounter. This is what it means to say that, finally, it is the indispensable structures and processes of a learning society which constitute the criteria of sustainability.

Aiming for sustainability: some policy implications

The foregoing sections, however radical in intention, may well have struck readers as pretty determinedly abstract. In the remainder of the paper, I try to illustrate how the ideas outlined could inform a realistic approach to an important policy issue—that of indicators of progress towards sustainability. Obviously I aspire thereby to recommend our thinking to the policy community; I hope, too, to make the ideas themselves—in particular those of the last few paragraphs—more perspicuous by this attempt to direct them at practice.

The UK Government's Sustainable Development Strategy, *A better quality of life*,[2] was first published in May 1999, and is now under review in central government, with the aim of having a revised version in place by early 2005. The Strategy defines sustainable development as 'ensuring a better quality of life for everyone, now and for generations to come'. It is a process of improving the human condition which can be continued indefinitely, without undermining itself. This is held to require the pursuit of four key objectives:

- social progress which recognises the needs of everyone;
- effective protection of the environment;

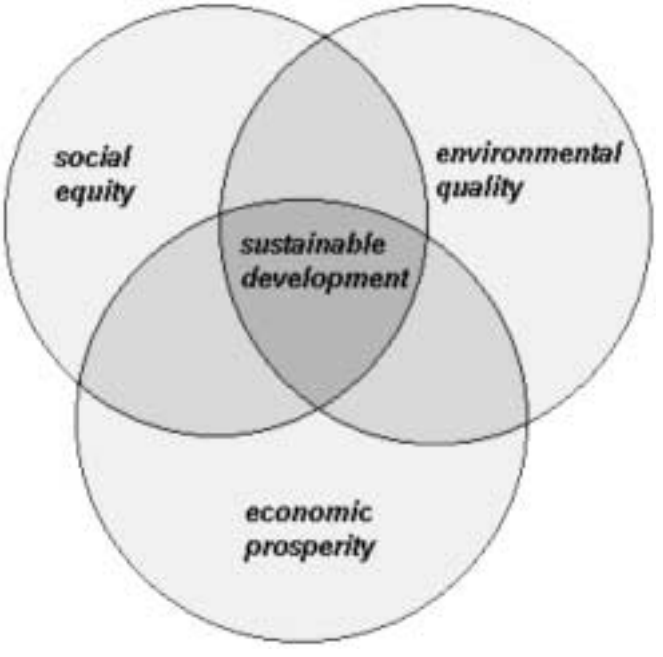

Figure 1. Sustainable development

- prudent use of natural resources;
- maintenance of high and stable levels of economic growth and employment.

In terms of Figure 1, society is supposed to be on track for sustainable development when our actions further its broad economic, social and environmental goals at the same time.

To ensure that we get and keep on track, the Strategy includes an ambitious package of indicators—statistical measures of performance in various areas crucial to the achievement of the broader goals. As the Prime Minister observes in his introduction to the Strategy: 'Talking about sustainable development is not enough…We must hold ourselves to account —as a government, but also as a country. All this depends on devising new ways of assessing how we are doing.' The full package includes about 150 such indicators, but 15 key or 'headline' indicators, giving an overview, have been selected to comprise a 'quality of life barometer'. These are set out in Table 1, taken from the government web site already noted. Perhaps a better image than that of a barometer for the way these statistics are used would be that of taking a compass bearing: if all the headline indicators can be lined up so that they are pointing the right way, we will know that we are pursuing a sustainable development pathway. The Strategy indeed makes explicit that:

> the Government's aim is for all the headline indicators to move in the right direction over time…When the trend is unacceptable, the Government will adjust policies accordingly and will look to others to join it in taking action.

Table 1. Headline indicators: UK sustainable development strategy

Themes and objectives	Ref no.	Headline indicators
ECONOMIC		
Our economy must continue to grow	H1	Total output of the economy (GDP, per capita GDP)
Investment in plant, machinery and research and development is vital to our future prosperity	H2	Total and social investment as % of GDP
Maintain high and stable levels of employment	H3	Proportion of people of working age who are in work
SOCIAL		
Tackling poverty and social exclusion	H4	Children in low income households/ adults without qualifications in workless households/elderly in fuel poverty
Equip people with the skills to fulfil their potential	H5	Qualifications at age 19
Improve health of the population overall	H6	Expected years of healthy life
Reduce the proportion of unfit housing stock	H7	Homes judged unfit to live in
Reduce both crime and people's fear of crime	H8	Level of crime
ENVIRONMENTAL		
Continue to reduce greenhouse gas emissions	H9	Emissions of greenhouse gases
Reduce air pollution and ensure air quality continues to improve	H10	Days when air pollution is moderate or higher
Improve choice in transport and access to services; reduce need to travel	H11	Road traffic
Improve river quality	H12	Rivers of good or fair quality
Reverse the long-term decline in populations of farmland and woodland birds	H13	Populations of wild birds
Re-use previously developed land	H14	New homes built on previously developed land
Move away from disposal of waste towards waste minimisation, reuse, recycling and recovery	H15	Waste arisings and management

This kind of commitment is welcome. But there is nevertheless a major problem with the whole approach. It is true that if the headline indicators are broadly negative, we can tell that the overall position is *not* sustainable. Unfortunately, this does not mean that when they are all positive the position necessarily *is* sustainable. Indeed, it is even possible that positive indicator results will operate perversely to move us *off* a sustainable pathway. The reasons for this can best be explained in terms of the 'capital' model which underpins the indicator framework.

Most of the headline indicators measure positive or negative changes in society's stock of capital assets, including human and social resources (for example, the health or skills of the population) and environmental resources (such as the quality of air,

water and other natural systems) as well as more traditionally economic assets like machinery and transport infrastructure. And of course, all these changes are closely interconnected. More roads and more cars use up material resources and tend to mean lower air quality and more greenhouse gas emissions. Improving air quality means better health, particularly in poorer areas. But meeting stringent environmental standards can also mean fewer jobs in certain industries. Increases in one kind of capital must always be balanced against any associated decreases in others—trying to maintain or improve human welfare overall.

In this connection, however, it is vital to remember that the economic indicators in the headline package measure how far stocks of economic capital are expanding, while the environmental ones basically measure how far society is *restoring* or *defending* environmental capital which has been—and continues to be—used up or damaged in the process of economic growth. And it is often a real question whether we have done *enough* along these lines. For example, a recent report in the scientific journal *Nature* (Thomas *et al.*, 2004) suggests that greenhouse gas emissions must not only fall, but fall very dramatically and very soon, to prevent global warming from killing off more than a million species by 2050. Such a swathe of extinctions would be likely to cause massive and unmanageable disturbance to the ecological systems on which all living creatures (including humans) depend. Whether or not this particular projection is true (and it is certainly very well documented), it emphasises how the environment is always the *bottom* bottom line. The other two goals, of material prosperity and social justice, are important and must be pursued in any civilised society, but there can be no prospect at all of achieving them unless basic survival conditions are met.

Another way of putting this is to say that there are *critical* levels of environmental capital, below which human welfare will decline, perhaps very seriously, whatever happens to economic or social capital. And research increasingly suggests that many environmental capital stocks are either already below the critical level, or heading rapidly that way (see for instance Ekins *et al.*, 2003). So, on this account, society could be improving the overall capital position on all the headline indicators, without restoring environmental capital sufficiently to compensate for the continuing pressures associated with keeping economic and social capital on the rise.

How, therefore, might we tell whether a set of positive headline indicator readings does show that we are on track for sustainability? Some economists used to hope that a single unified measure of total capital value might be devised. If the overall value of capital, in terms of its welfare yield (rather than just the stock of different assets), was being maintained, one could be reasonably confident that development was sustainable. But such unified measures typically involve assigning money values in non-market areas and assuming the substitutability of human-made for natural capital; as such, they are controversial and beset with technical problems (Foster, 1997b). What happens in practice is that policy-makers have to use the movements of the various indicators to inform value-judgements about whether overall welfare is improving. Where such judgements have to be made about how much positive movement in the indicators is *enough*, they will inevitably depend on assumptions about:

- future states of the relevant environmental capital stock;
- future technological developments, perhaps enabling us to increase the eco-efficiency and productivity of those stocks;
- future values (what kinds of environmental resource situation will matter to future people, and how much)

—and, as has been argued in some detail above, such assumptions cannot just be read off from reasonably well-established trends. They range over environmental possibilities which are not just uncertain but substantially indeterminate.

Given how the Strategy and indicator package are now set up, that is, the theoretical dangers to which I have been pointing in earlier sections are ever-present in practice. Policy-makers' picture of the likely future is not really independent of the many pressures which they are under now—including pressures not to make too many uncomfortable present changes for the sake of the future. That being so, it is very possible that they will interpret the sustainability indicators as pointing to a 'sustainable future' which can be achieved without too much alteration in our present overall direction. Indeed, the authoritative Royal Commission on Environmental Pollution (2002, p. 38) has recently commented on the current approach in just this sense:

> Environmental, social and economic goals are different in character. In many interpretations of sustainable development, environmental considerations have been far too readily subordinated to economic and social interests. There has to be a recognition that the environment can impose constraints on human actions.

As things are, policy remains finally driven by the importance of economic and social development: it is stressed repeatedly in the Government's discussion of these issues that curtailing economic growth is not an option. This is politically understandable, but it means that the environmental constraints which the Strategy acknowledges in theory will very likely fail seriously to reshape actual practice.

Recognising the value of environmental capital as comprising a significant real option component, however, could point to a way of getting a better grip on this problem.

A real option, to recap, is a feature of the structure or organisation of a capital asset which embodies the opportunity to make a future decision about how the asset is used, contingent on relevant circumstances at that time. This concept comes originally from financial markets, but recent innovative thinking has applied it to physical as well as financial assets (Amram & Kulatilaka, 1999). Building such features into human-made capital items usually costs extra, but buys us future flexibility. A good example here would be a power plant with burners that can run on either oil or gas, the switching capacity providing managerial flexibility to respond to future fuel price fluctuations. The 'real option' element is the set of material and organisational features allowing fuels to be switched, which are obviously going to be more complex and costly than for single-fuel burners. But their present value rises significantly with uncertainty about future conditions of operation. Importantly, this value doesn't depend on present predictions which managers make about these conditions, but is all about being able to cope with them as and when they arise, though of course such

value is only going to be *realised* if managers keep on top of fuel price movements and switch in anticipation at the right moments—good intelligence, proactive management and capacity-building are vital to real option value.

The relevance of this to environmental capital is that very many ecological systems and services seem to contain a naturally given 'real option' element: their inherent capacity for self-regeneration. Environmental capital is in fact the only kind of capital for which there are conditions of use under which it doesn't inevitably depreciate. For example, fish stocks harvested only up to a certain limit will continue to renew themselves in time for future catches; CO_2 emissions up to a certain volume can be absorbed and their effects neutralised by the Earth's cyclical systems. The more effort is invested in trying to keep within these limits, the less depreciation in the natural asset there is. So the more sustainably we are able to use these resources, the more we are investing in a real option to *buy time*—to have everything at the end of each cycle as it was at the beginning, ecologically speaking. And, since of course nothing else in human affairs stands still, buying time here is buying additional *flexibility* and capacity to choose—to learn how to use the resource ever more eco-efficiently, to bring new technological developments carefully to bear as they emerge, and to keep policy alert and responsive to changing public values. It is only such flexibility which might enable society, through an ongoing and essentially unpredictable process of just-in-time accommodation, to bring environmental capital into some kind of overall balance with economic and social needs—the requirement which the idea of 'critical levels' was meant, but must fail, to guarantee.

Pursuing this flexibility certainly means continuing to push the existing headline environmental indicators in the right direction. But proper use can only be made of it if we are at the same time deliberately and proactively building the kind of individual and collective *learning capacity* in society which I have sketched above. This is a capacity for what Gough calls 'Type 3' environmental learning (2005, p.102, this issue); see also Scott & Gough, 2003)—the exploratory, reflexive and open-ended negotiation of emerging situations as individual activity, society and environment co-evolve. (We might think of this as a special form of social capital, except that in a generalised form, something like it underlies the ability to make best use of *all* capital, social and economic as well as environmental.)

How might such capacity be built? Policies to do so would certainly have to include (though they would not be limited to):

- a significant increase in the curricular emphasis and attention given to environmental issues at all levels of formal education;
- greatly increased recognition of the inherently provisional and dialogical nature of *all* knowledge and value-frameworks, including those termed 'scientific';
- the development of a widely distributed and richly conceived environmental 'knowledge base' (including a mature appreciation of endemic uncertainty), with information commonly owned and widely accessible, and a variety of expert and lay perspectives mutually illuminating one another;

- equipping an increasing range of people to engage in discussion of the social, cultural and ethical dimensions of new technologies;
- a significant increase in real participation, open consultation and collective decision-making about environmental issues at all levels, both to facilitate the dialogue of expertise and lay knowledge and to ensure that wider public values are allowed to inform policy-making and decision-making at all stages.

And these, of course, are all things which society could deliberately try to do, and could in principle measure its progress in doing.

It would seem to follow that if environmental capital was being restored or maintained to the best of our present ability, social and economic capital was growing *and* there were reliable indications that this kind of social-environmental learning capacity was being deliberately and explicitly built up, then perhaps we could be as confident as it was ever reasonable to be that society was on a sustainable development track. Or, perhaps more plausibly, we should have in the absence of such an overall picture as reliable a measure as we could have of how far off a sustainability pathway we still were. Some initial ideas (and they are no more than that) of what the appropriate kinds of indicator for the learning society might look like are set out in Table 2.

Table 2. Features and possible indicators of an environmentally learning society

FEATURE	POSSIBLE INDICATORS (feasibility to be explored)
A widely distributed knowledge base	% of population with some kind of environmental study background at further or higher education level
	Measures of availability of relevant information
Encouragement of self-directed, exploratory and interdisciplinary learning at all levels	Component of quality assessment processes in formal education
	Participation in relevant adult education/continuing professional development courses
Expert and lay perspectives illuminating one another	Non-expert participation in scientific agenda-setting and advisory processes, and technological R & D
Resources for public judgement	Proportion of environmental study courses including a humanities and/or social science component
	People in environmental management positions with a wider than scientific background
	References to sustainable development in the media
Decision processes sensitive to public values	Extent of public engagement process on key environmental decisions
Review and reflexivity in institutional governance at all levels	Process, inclusiveness and periodicity of major strategic reviews

It seems to those of us involved with this Natural Capital project, therefore, an eminently practical suggestion—and one which we have in fact contributed to the Sustainable Development Strategy review—that some additional indicators measuring the progressive development of an environmentally learning society should be investigated and worked up, with a view to incorporating at least one or two of them in the headline package. (The suggestion should be of interest not just to the environmental and sustainable development policy community, but also to that concerned with education policy; it certainly presupposes a more dynamic kind of relationship among these groups than has obtained hitherto.)

This idea is one which could be pursued not only at the UK level, but also at the levels of devolved, regional and local governance to which sustainable development responsibilities are being increasingly rolled out. It is particularly relevant, for instance, to the requirement at regional planning level for implementation of the European Strategic Environmental Assessment (SEA) Directive (European Community, 2001) within the broad existing framework of sustainability appraisal. If SEA is basically just tacked onto sustainability appraisal, as a formalisation of its environmental component (which is clearly the Government's favoured route to implementing the Directive), then it remains an assessment of how far one set of objectives are likely to be met by the plans or policies being appraised, to be weighed up alongside the demands of other (economic and social) objectives. In capital terms, planning bodies are still going to be making judgements which trade off environmental against economic and social capital in the light of their best guesses about future capital values—and those judgements are still going to be endemically liable to undervalue critical natural capital, despite the more painstaking way in which environmental implications have to be assembled and commented on under SEA, since there is no testing them against a criticality criterion except by further such judgements, for example about scarcity or irreplaceability. But SEA as required by the Directive actually contains elements which could be seen, from the perspective explored in this paper, as helping to transcend this difficulty. It seems capable of supporting a comparatively reflexive and 'option-sensitive' process, given the requirements to identify strategic alternatives and to justify the selection both of these and of the eventually preferred course of action; and the requirements for baseline information, recursive consultation and the monitoring of actual effects during implementation could be taken as contributing to the social intelligence conditions for environmental option-value, which on our account go proxy for critical natural capital. There is the potential here for a planning methodology, and in particular a set of indicators and criteria for the appraisal of plans and projects, in which environmental sustainability could be protected structurally rather than just aspirationally.

All this remains to be explored in detail. Most importantly for the purposes of this paper, however, it should already be apparent that the rationale for the approach sketched in this section flows directly from the analysis and critique set out in the earlier ones. To repeat: what we are canvassing is actually a wholly pragmatic form of conceptual radicalism.

Conclusion: making our luck

It is a real practical possibility, that is, to improve our sustainability provision in and for a learning-society mode. That should not, however, be taken as any encouragement to revive the hope that sufficient foresight might save us. For one final recommendation of the line of thought which I have been pursuing is that it allows us to admit openly what must surely by now be obvious to anyone confronting the issues without illusions: that a sustainable human future, if it comes about at all, will come about essentially *by chance*—or, at best, through the quality of our responses to the chances which present themselves.

The idea that globalised late capitalist society can be progressively moved towards sustainability either by rational conversion of its ruling political and corporate elites, or by the gradual enlightenment of the population at large, is now—whatever one might have thought 30 years ago—profoundly unpersuasive. On those who have nevertheless gone on arguing and educating for sustainability, the strain of hoping otherwise must now be well-nigh intolerable. Relief comes from recognising that, in modern conditions, the survival of human civilisation can only be a matter of how skilfully we ride the wave of chance—that it will turn on eventualities like how a few hundred thousand presidential votes fall one way or the other, where and when the increasingly frequent storms and floods associated with global warming take their toll, what unforeseeable new possibilities arise in genetics and nanotechnology, where the next anthropogenic plague strikes, what strategic decisions are taken by key players in the emerging 'hydrogen economy', which oil-based economy suffers the first nuclear terrorist attack…; and also on how the states and global institutions involved happen to react to these eventualities, and what technical and institutional resources they will (by luck or judgement) have to hand at the relevant moments.

But these recognitions, though uncomfortable as well as liberating, do not entail abdication of what remains real in our responsibilities. At the mercy of such happenstance, we can nevertheless strive to make our own luck: not just by continuing the vital work of building sustainability understanding and practice where we can, but also—and crucially—by ensuring that we build the optionality, social intelligence and heuristic learning capacity to apply our knowledge adaptively and creatively in situations of perhaps extreme turbulence, and at comparatively calmer junctures to seize the unattended favourable opportunity, the suddenly available option.

Of course, none of this guarantees the future. Since there could be no such guarantee, we must do without. Ridding ourselves of the deeply mistaken belief that humans could shape their lives in any other way, is at any rate a necessary first step.

Notes

1. See also my comments on the metaphor of stewardship (Foster, 2005, pp. 28–29, this issue).
2. Available together with supporting material at: www.sustainable-development.gov.uk/uk_strategy (accessed 1 June 2003).

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