



COMMENTARY

Squaring the circle? Some thoughts on the idea of sustainable development

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Abstract

The paper reviews how the concept of sustainable development has played out in industrialized countries since 1987. It examines the theory and practice of sustainable development in the context of three criticisms (it is vague, attracts hypocrites and fosters delusions), and argues for an approach to sustainability that is integrative, is action-oriented, goes beyond technical fixes, incorporates a recognition of the social construction of sustainable development, and engages local communities in new ways. The paper concludes with a description of an approach to sustainability that attempts to incorporate these characteristics. © 2004 Elsevier B.V. All rights reserved.

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In the foregoing story I have striven to narrate the process involved in a defeat. I thought, first, of the Bishop of Canterbury who proposed to demonstrate the existence of God; then, of the alchemists who sought the philosopher's stone; next, of the vain trisectors of the angle and squarers of the circle.

Jorge Luis Borges: *Averroës' Search*

1. Introduction

There are three classical problems in Greek mathematics that were extremely influential in the development of geometry. One of them is the problem of

squaring the circle: how to construct geometrically a square equal in area to a given circle. The problem was famous enough in ancient Greece that Aristophanes devotes an anecdote to it in the late fifth century BC, from which, apparently the popular term “circle-squarer” was derived, meaning one who attempts the impossible. The problem went on to bedevil mathematicians for over 2000 years until Lindeman proved that the circle cannot be squared in a “planar” fashion (i.e. with compass and ruler). In the meantime, however, and indeed since, the mathematical world has been flooded by attempts to solve the problem.

I introduce this story in order to make a simple analogy. The term “sustainable development” has been seen by some as amounting essentially to a contradiction in terms, between the opposing imperatives of growth and development, on the one hand,

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and ecological (and perhaps social and economic) sustainability on the other. These critics might indeed be said to believe that trying to achieve sustainable development amounts to trying to square the circle, in the sense of trying to achieve the impossible.

Moreover, the analogy cuts a bit deeper than that. At the heart of the problem of squaring the circle is the attempt to reconcile two incommensurable areas, which cannot be expressed in terms of each other, using the algebraic equivalent of a ruler and compass. As I will argue below, a similar problem of incommensurability lies at the root of some of the most serious criticisms of the concept of sustainable development.

This paper represents an attempt to grapple with the concept of sustainable development. It will briefly touch on the history of the concept, and the record to date of attempts to implement it. Some lessons will be derived from this historical review and one attempt to apply those lessons will be described, with a few pointers at the end about the arduous process of squaring the circle in this field. The focus throughout will be on sustainable development as it has been written about in industrialized countries.¹ It is hoped, however, that some of the analysis or conclusions may have a broader applicability.

2. Sustainable development or sustainability?

Given the large array of concerns that have been expressed about the concept of sustainable development, it is perhaps not surprising that some have found it desirable to develop alternative terminology to express some of the same concerns about the linkage between environmental and social issues. In particular, while government and private sector organizations have tended to adopt the term sustainable development, academic and NGO sources have been

¹ This paper will not engage with the literature that discusses third world perspectives on sustainability and environmentalism. For a recent overview, see Guha and Martinez-Alier (1997). However, the arguments presented here are consistent with the view that sustainable development approaches should move beyond a technocratic, nature-centered view and explicitly address issues of power, the distribution of wealth, and the locally grounded experience of natural and human-made processes of production.

more prone to use the term sustainability in similar contexts.

In part this reflects the more managerial and incremental approach used in the Brundtland report which first popularized the concept of sustainable development. Such an approach almost by definition is more attractive to government and business than a more radical one. However, a more fundamental reason for this tendency to divide on terminological grounds is due to a concern, on the part of NGO and academic environmentalists, that development is seen as synonymous with growth, and therefore that sustainable development means ameliorating, but not challenging, continued economic growth. On this view, the preferred term ‘sustainability’ focuses attention where it should be placed, on the ability of humans to continue to live within environmental constraints.

I will return to this underlying issue below. But for the moment I will continue to use the term sustainable development, since that is the language in terms of which much of the debate has been framed. Moreover, it carries within it the dynamic tension between poverty and environmental concern that is the most radical message of the Brundtland Commission.

3. Sustainable development: brief history of an idea

It may be useful to recall that the concept of sustainable development emerged out of particular historical context.² Along with the concept of a sustainable society (Brown, 1981), the concept of sustainable development emerged in the early and mid 1980s (Clark and Munn, 1986; IUCN/UNEP/WWF/FAO/UNESCO, 1980; World Commission on Environment and Development, 1987) as an attempt to bridge the gap between environmental concerns about the increasingly evident ecological consequences of human activities and socio-political concerns about human development issues. In that sense sustainable development was a logical extension of argu-

² For an earlier discussion of that history, which contrasts the sustainable development and climate change discourses, see Cohen et al. (1998). For more conceptual analyses of sustainable development, see Pezzoli (1997); Mebratu (1998).

ments within the environmental literature of the 1960s, 1970s and early 1980s.

In turn those arguments had injected a new set of concerns into an environmental literature that since the late 19th century had been strongly focussed on questions about whether and how to preserve or conserve natural areas. On the one hand were those who favored the preservation of natural areas in what was perceived to be a pristine (i.e. undeveloped) form. This ‘preservationist’ position was often expressed in explicitly romantic or spiritual terms and had its intellectual roots in American transcendentalism and European Romanticism. The alternative ‘conservationist’ position also favored the protection of natural areas, but this protection was essentially a form of enlightened self-interest, conserving land and resources for later human use, including resource extraction and what today we would call eco-tourism. This position was often, though not always, explicitly rooted in a utilitarian and social philosophy that had as its goal the greatest good for the greatest number, and promoted access to the wonders of nature for all (Nash, 1982).

From the point of view of this paper, the importance of this difference is that the spectrum between a utilitarian and a more spiritual approach to environmental concern remains as contested terrain in the sustainability literature and environmental movement. As we will see, one’s interpretation of the meaning and significance of the concept of sustainable development is conditioned by one’s position on this spectrum.

While the conservation/preservation debate played out largely in the areas of wilderness preservation, renewable resource extraction and natural area management, a different set of concerns achieved prominence in the second half of the 20th century.³ These concerns centered around the issues of pollution, non-renewable resource depletion, and population growth (Boulding, 1966; Carson, 1962; Ehrlich, 1968; Hardin, 1968; Meadows et al., 1972).

Interestingly enough, this set of issues was also the locus of a debate not dissimilar to that between the preservationists and conservationists. This was nicely

illustrated in the argument between Paul Ehrlich and Barry Commoner in the early 1970s, which took the form of a disagreement over which were the most important causes of environmental degradation. To Ehrlich, the key problems were human overpopulation and overconsumption, problems that required fundamental changes in underlying individual beliefs and behaviors, while Commoner argued that the key term in determining impact was often technology, suggesting a rather different focus for finding solutions (see Commoner, 1991; Ehrlich and Ehrlich, 1991).⁴

The debate between Commoner and Ehrlich initiated a discussion about the relative importance of technology and individual human responsibility that has been an abiding theme in the population/resources/pollution literature since the early 1970s. While it is by no means identical to the utilitarian/spiritual divide in the wilderness/renewable resource literature, there are intriguing similarities between the two disagreements. In each case one side focuses more on questions related to values and fundamental changes in individual attitudes towards nature (the sustainability argument) while the other side takes what they believe to be a more pragmatic and collective approach, oriented towards efficiency gains and improvements in technology (i.e. sustainable development). Both sides of these divides often band together in marriages of convenience against what are seen as explicitly anti-environmental arguments, but the well-springs of their concern, and their ultimate goals, are rather different.

One way to summarize these connections is shown in Table 1, which groups the various positions discussed here into two columns: technical fix and value change. Table 1 also suggests a linkage between preferred use of either the term “sustainable development” or “sustainability”, and the two columns in the table.

The divisions shown in Table 1 are meant to be suggestive, not definitive. They have something in common with earlier typologies, particularly those derived from O’Riordan’s (1981) distinction between ecocentric and technocentric approaches (cf. Pepper, 1996) though the focus here is more on the nature of

³ As Hays (1987) has pointed out, these concerns had their roots in debates over local environmental quality in the fields of waste management and urban improvement. Such issues found a new form of expression in the pollution and resource depletion debates of the 1960s.

⁴ The debate was expressed in terms of the famous IPAT equation, developed by Ehrlich and Holdren (1971). For a more extensive and nuanced discussion of the IPAT discussions, see Dietz and Rosa (1994).

Table 1
Forms of environmentalist response

	Technical fix	Value change
Natural area management	Conservation (utilitarian)	Preservation (romantic)
Pollution and resources	Technology (collective policies)	Lifestyles (individual values)
Preferred language	Sustainable development	Sustainability

the proposed response than the value positions (anthropocentric vs. biocentric) involved.

It is in this context that the concept of sustainable development was articulated. And it too had diverse roots. While concepts such as maximum sustained yield had been common in the resource extraction literature for some time, a broader and more socially oriented concept of sustainability had been introduced by Brown (1981) to convey the need to look beyond short-term environmental consequences and face up to the institutional changes required to create a society that would be able to stay indefinitely within environmental limits. This approach also characterized the World Conservation Strategy (IUCN/UNEP/WWF/FAO/UNESCO, 1980), which concentrated on the ecological conditions that must be met if those limits were not to be surpassed.⁵

⁵ In fact the trajectory of the World Conservation Strategy argument represents a particularly interesting case. In its 1981 version the WCS was almost entirely focused on ecological issues, though its three basic principles (sustainable resource use, maintenance of biotic diversity, and preservation of life support systems) did cut across the crude divide I have constructed here between wilderness and renewable resource harvesting issues, on the one hand, and pollution, population and non-renewable resource extraction, on the other. By the time the second WCS was published in 1991 (IUCN/UNEP/WWF, 1991), the focus had shifted significantly toward organizations and institutional questions, or the human dimensions of the problem. The Brundtland report was published in between these two WCS reports. In a similar way, the International Geosphere–Biosphere Program of the International Council of Scientific Unions was established in 1984, while the Human Dimensions of Global Environmental Change Program was first proposed in 1988 at a meeting sponsored by the International Federation of Institutes of Advanced Study, the UN University and UNESCO. In all of these cases, the first impulse was derived from, and based on, the natural sciences, while the subsequent development broadened both the institutional and substantive focus to incorporate a more problem-drive, human-centered approach.

However, the work of the UN Commission on Environment and Development (the Brundtland Commission) led in a rather different direction, focused more on socio-political and distributional issues and also less inclined to argue for drastic changes in behavior and priorities. In keeping with its mandate to look at both environment and development issues, the Commission focussed a good deal of attention on social and economic conditions in developing countries, and their connection to environmental degradation.

The result was a report that was a curious combination of radical and reformist elements (World Commission on Environment and Development, 1987). The radical aspect emerged from the explicit linkage made between environment and development issues. The report argued that the problems addressed by these two sets of issues are entwined to the point that ecological sustainability cannot be achieved if the problem of poverty is not successfully addressed around the world. The radical implications of trying to act on this suggestion can hardly be over-stated. Essentially the Brundtland report argued for integrating the vast and complex issue of environmental deterioration with the equally vast and complex issue of human development and poverty, and suggested that both had to be resolved simultaneously and in a mutually reinforcing way.

The reformist element had to do with the strongly human-centered nature of the Brundtland report, which led to the suggestion that the solution to both over- and under-consumption, and thus the answer to environmental concerns, lay in promoting more, not less, human development, albeit development that was sensitive to environmental concerns. In a formulation that was to become notorious, the Brundtland Commission called for a “5–10-fold” increase in gross world industrial activity over the next century to meet the needs of the poor.

Of course these two aspects of the Brundtland report are closely linked. If under-development is threatening the global environment and human welfare, then more development is clearly required. If, however, as Brundtland also argued, over-development is an equal threat, then more of the same kind of development is just as clearly not the answer. The answer, therefore, must lie in a new form of ‘sustainable’ development, defined as development which

“meets the needs of current generations without compromising the ability of future generation to meet their own needs” (World Commission on Environment and Development, 1987, p. 23).

The interesting thing about this dichotomy between the reformist and radical impulses in the Brundtland report is that both of these impulses exist on the ‘pragmatic’ side of the technology/individual responsibility axis described above. As suggested in Table 1, there is no emphasis on spiritual values, or individual responsibility in the Brundtland report. Rather the focus is on collective institutional responses, efficiency gains, and social responsibility. Like the conservationists, Brundtland embodies an anthropocentric approach focussing on human needs. And like the “Commoner” side of the Ehrlich–Commoner debate, the Brundtland report calls for great improvements in technology and efficiency. As a result, as suggested in Table 1, both the reformist and the radical sides of the Brundtland arguments embody this pragmatic collectivist approach, which is quite different than the much more individualistic and personal ‘sustainability’ approach typical, for example, of much North American environmentalism.⁶

It is this particularly complex intellectual history that underlies the reactions to the concept of sustainable development since 1987. We turn now to the criticisms that have been mounted against the concept.

4. Concerns and criticisms

From the beginning of the emergence into prominence of the term sustainable development, skepticism was expressed by many in the environmental community. Much of the criticism centered on the argument presented in the Brundtland report that global economic product would have to increase 5–10-fold in order for sustainable development to be achieved. This was greeted with cries of incredulity and horror by an environmental movement weaned on Kenneth

Boulding’s and Herman Daly’s arguments about the need for a steady-state economy (Boulding, 1966; Daly, 1973, 1980), for a more recent statement, see Daly and Cobb (1994). Another basis of concern to environmentalists and researchers who had been involved in extensive arguments and confrontations with government and industry was the alacrity with which the rhetoric of sustainable development was picked up by government and industry and used in ways that seemed to many to move in the opposite direction. A particular concern here was the way in which the “development” side of the sustainable development argument was being equated with economic growth.

In 1991, as opinion polls from around the world were reporting an unprecedented level of public concern for the environment, and as preparations for the Earth Summit in 1992 were gathering steam, a critique of the concept of sustainable development was published in a NGO publication, *Probe Post* (Gibson, 1991). In that article Gibson noted three bases of concern about the concept: it was vague; it would attract hypocrites and it was likely to foster delusions. Twelve years later, it may be useful to return to those three concerns, and see how the issues expressed in that typology have played out since that time. In each case, I will begin with a brief discussion of the nature of each concern, and then try to evaluate how that concern relates to more recent developments.

4.1. Vagueness: what is sustainable development?

One of the most striking characteristics of the term sustainable development is that it means so many different things to so many different people and organizations. The literature is rife with different attempts to define the term (see Mebratu, 1998; Pezzoli, 1997 for overviews) and debates have erupted between those who prefer the three pillars approach (emphasizing the social, ecological and economic dimensions of sustainable development), or a more dualistic typology (emphasizing the relationship between humanity and nature), or others (see discussion in Gibson, 2002).

Given these difficulties, it is perhaps not surprising that different conceptions of the meaning of sustainable development and sustainability tend rather to reflect the political and philosophical position of those

⁶ It is interesting to speculate whether these factors of focus and scale help to explain the much more receptive response in parts of Europe to Agenda 21, a classically Brundtlandesque program, than is typical in North America. In terms of its rhetoric at least, Western European environmentalism seems much more collectivist than in North America.

proposing the definition more than any unambiguous scientific view (Mebratu, 1998).

All this being said, however, it remains to ask whether this lack of definitional precision is a serious problem. Certainly it can add confusion to the political and academic debates around the term, and indeed contribute to the other problems discussed below. Yet it is worth pointing out that there can be some advantages to leaving it somewhat open just exactly what is meant by the term sustainable development. Diplomats are familiar with the need to leave key terms undefined in negotiation processes and in much the same way the term sustainable development may profit from what might be called constructive ambiguity. Certainly the plethora of competing definitions in the literature suggests that any attempt to define the concept precisely, even if it were possible, would have the effect of excluding those whose views were not expressed in that definition.

Arguably, it makes sense for definitions, perhaps many of them, to emerge from attempts at implementing sustainable development, rather than having definitional rigor imposed from the outset. While intellectually frustrating from the point of view of science, this may be the appropriate approach in the messy world of the politics and policies of sustainable development. In other words, the lack of definitional precision of the term sustainable development may represent an important political opportunity.

4.2. *Hypocrisy: fake greenery*

A related but perhaps more serious issue has to do with the way sustainable development language is being used to promote what may be unsustainable activities. The basic concern here has to do with what might be called cosmetic environmentalism on the part of both government and business, prompted by the rise of public concern over environmental and social issues.

Of course the problem of cosmetic environmentalism is made possible in part by the vagueness discussed above, which permits many different claims of sustainable practice to be made. Yet it operates at a somewhat different level. The issue here is not so much how sustainable development is defined in principle as how it is measured in practice. The question is whether such specific measurements emerge better out of agreement on the principles of

sustainable development or out of a more chaotic process of learning by doing.

Again, it is instructive to consider this issue in the light of developments over the last decade. The charge of hypocrisy or cosmetic environmentalism brings to the forefront the question of measurement. How can we evaluate the claim that a particular product is “green”, “environmentally benign” or “socially responsible”? What criteria should be used to weigh such claims? How does one measure and compare, say, habitat destruction versus greenhouse gas emissions, or either against unfair labor practices in developing countries?

The past decade has witnessed a virtual explosion in attempts to grapple with these issues. At the most aggregate level this has led to a huge literature in indicators of social and ecological sustainability, and myriad attempts to apply such indicators in various jurisdictions. But probably the greatest impact has been in the area of sustainability standards and certification for products and services. There has been a substantial movement from uncertified labeling of individual products by firms acting alone to the emergence of an increasingly organized industry for certification and standard-setting that embraces partnerships between industry, academia and mainline NGOs. More and more industries are following in the footsteps of the chemical and forestry industries in adopting certification regimes and actively investing in their development, often in partnership with the very organizations that they have been fighting with for decades.

It is important to recognize that the effects of these standards are to some degree independent of the intentions of the industries adopting them. In a perhaps ironic twist, it turns out that, having been forced by public pressure to adopt standards of environmental performance or social responsibility, the private sector has found that the credibility of those standards, and thus any competitive advantage they create, are greatly enhanced by adopting processes of measurement and certification that are transparent, open, subject to credible expert review, and that involve NGO participation.

Of course these developments do not by themselves guarantee that environmentally or socially benign practices will be followed. Yet they represent a remarkable development over quite a short period of time. It is hard to imagine that any transition to a more

sustainable society would be possible without the progress in labeling, standards and certification that have been induced by concerns over green hypocrisy.

4.3. *Delusions (1): sustainable development as an oxymoron*

The most serious level of concern about the concept of sustainable development is that it fosters delusions. Here I want to distinguish between two ways in which that can be true. The first is the question of whether the concept of sustainable development makes sense in principle, even in its present vague form.

To put it in terms of the Brundtland formula, is it possible to increase world industrial output by 5–10-fold in a way that is environmentally sustainable? This is of course a reformulation of the old physical limits to growth debate. A whole suite of environmental scientists is on record as suggesting that these limits are real, and proximate.⁷ If so, then that would seem to make nonsense of the view that global industrial output could expand many-fold.

While in its original formulation the limits to growth argument had entirely to do with biophysical limits and the physical scale of human activity, there also exists a somewhat different version of that argument that focuses more on what might be called the social limits to growth. First raised by Hirsch (1976) in the context of the scarcity of what he called “positional goods”, the idea that there may be social, political and institutional constraints on traditional forms of economic development also connects to a long history in literatures critical of the political, social and distributional impacts of industrialization. It suggests that we may run up against the social consequences of the Western model of development before we reach any ecological limits.

What is common to both the biophysical and social arguments about constraints on economic growth is the view that continuation of current trends is ultimately unsustainable. This concern is less easy to respond to than the concerns over vagueness and hypocrisy. This is because there exists great uncer-

tainty about the nature and nearness of either ecological or social limits to growth and the degree to which these can be affected by political or social changes and/or technological change. That being said, there is an empirical dimension to this question. It is partly a matter of demonstration whether significant changes in matter and energy throughput, on the one hand, and social and political decision making, on the other, could allow continued economic development without unsustainable social and ecological impacts.

On the biophysical front, the past decade has witnessed an explosive growth in concepts such as eco-efficiency, dematerialization, design for environment, industrial ecology, and biomimicry, and a much more limited set of examples in practice (Allenby and Richards, 1994; Benyus, 1997; Hawken et al., 1999; von Weizsacker et al., 1997; World Business Council for Sustainable Development and United Nations Environment Program, 1998). What these arguments have in common is a view that, by learning from highly efficient natural processes, which have evolved elegant and resource-efficient solutions to producing life under a wide variety of circumstances over billions of years, we can design industrial systems that will use a fraction of the matter and energy throughput require to produce the same products in conventional industrial processes. Building on the second law efficiency analyses of the late 1970s and early 1980s, there has emerged a wide array of principles and practices that are intended to reap the benefits of this efficiency revolution.⁸

Of course, those who argue strongly for the existence of biophysical limits, and proponents for what has been called ‘strong sustainability’⁹ would

⁸ For a recent discussion of the promise and perils of industrial ecology arguments, see Robinson and Mendis (in press), and the other chapters in that volume.

⁹ The distinction between strong and weak sustainability was coined by Pearce et al. (1989). Proponents of weak sustainability argue that all forms of ‘natural capital’ are commensurable with and can be substituted for by human-made capital, thus the goal should be to maintain total capital stocks, while advocates of strong sustainability argue that some natural capital stocks are incommensurable and non-substitutable, and thus must be maintained independently of the growth of other forms of capital. For an exchange on these issues see the articles by Beckerman, Daly, Jacobs, Skolimowski and Common in *Environmental Values* 3–5 (1994–1996).

⁷ For an example, see the May, 2000 statement of 61 Academies of Science around the world entitled “Transition to Sustainability: The Contribution of Science and Technology” (<http://interacademies.net/intracad/tokyo2000.nsf/all/home>).

reply that such gains merely postpone the inevitable collapse.

Responses have been slower to emerge on the social side of the limits arguments. However, during the 1990s, partly in response to successful and well-publicized opposition to particular corporate activities such as clear-cutting forests in Western Canada, disposing of oil rigs, trade in toxic chemicals, or support for military regimes in developing countries, there emerged a growing movement focussing on issues of corporate social responsibility. In a similar way to industrial ecology and eco-efficiency, corporate social responsibility, and a general concern with stakeholder participation in corporate decisionmaking, has spawned a set of activities, journals, training seminars and policies in boardrooms around the world. While it is much too early to say whether this trend will continue, or have a significant impact on corporate behavior, the social dimensions of corporate activity have at least been put on the agenda.

Perhaps the only unambiguous conclusion that can be reached about biophysical or social limits to growth is that whether approaches based on eco-efficiency and corporate social responsibility are sufficient or not, they are necessary steps towards a more sustainable world. From the point of view of biophysical or social limits to growth, the paths to sustainability and sustainable development do not immediately diverge.

4.4. Delusions (2): pursuing the wrong agenda

While concerns over the viability of continued economic growth cut to the heart of debates over sustainable development, an even more fundamental problem exists. Does the concept of sustainable development distract us from the real problems and potential solutions by focussing our attention on the wrong issues? Independent of the partly empirical question of whether limits are being exceeded, this concern suggests that the concept of sustainable development may simply be taking us in the wrong direction.

This concern takes two forms, depending on whether one's concerns are primarily biophysical or social. Moreover, the problem is tied up with the two underlying strains of the environmental argument described earlier.

From the point of view of biophysical concern, the key problem is that the sustainable development position is ultimately a purely anthropocentric one. As noted earlier, both the more radical and the more reformist formulations of the sustainable development position exist on the pragmatic side of the debates in the environmental literature between those arguing for fundamental value and behavioral change and those who focus on the development of technology and on institutional reform. In the end, these underlying debates turn on a difference between a primarily utilitarian focus on human well-being and a more spiritually-oriented focus on our relation with the natural world. Like the conservationist and efficiency-oriented strains in the environmental literature, the rhetoric of sustainable development is about achieving sustainability for human purposes and ultimately conveys faith in the ability of humans to solve environmental and social problems through the application of reason.

However, from the point of view of those adopting a non-anthropocentric or biocentric position on the appropriate relationship between humanity and nature, this means that the sustainable development argument simply misses the point. What is needed, this argument runs, is a new ethic; a new set of values; and a new way of relating to the natural world. In the words of David Suzuki, because we are so dependent on natural systems, “we must learn to regard the planet as sacred” (Suzuki and McConnell, 1997).

On the social side, similar concerns exist. The concern here is that sustainable development is seen as innately reformist, mostly avoiding questions of power, exploitation, even redistribution. The need for more fundamental social and political change is simply ignored. Instead, critics argue, proponents of sustainable development offer an incrementalist agenda that does not challenge any existing entrenched powers or privileges. In this sense the mantra of sustainable development distracts us from the real social and political changes that are required to improve human well-being, especially of the poor, in any significant way. This argument finds current expression in the anti-globalization movement around the world (Klein, 2000) which in turn is related to a larger critique of the political and economic characteristics of modern Western culture (Margalit and Buruma, 2002).

So even if sustainable development were not a contradiction in terms, even if significant growth in economic activity were possible without running up against ecological or socio-political limits, this perspective suggests that this would not be desirable since it would be at the expense of the kind of relationship with nature, and other people, that we need to create a truly sustainable society.¹⁰ Sustainable development, on this view, is a classic case of a technological fix, which will perpetuate the underlying disease by treating only the symptoms.

This is perhaps the most fundamental critique of the concept of sustainable development and it is the one least susceptible to resolution. It calls into question the whole trajectory of industrial society and poses the question of whether an entirely different path could be taken. At this point, this critique often joins hands with an essentially romantic sensibility that conceives of Nature as a moral and spiritual force, and posits an alternative biocentric ethic, and accompanying radical shift in attitudes, individual behavior and politics, or else with a radical social argument, that critiques the current neoliberal economic order and proposes an alternative political economy. In terms of the language of Table 1, this amounts to critiquing the concept of sustainable development from the viewpoint of sustainability.

If we look at developments over the past decade with regard to this issue, it is hard to see any clear pattern. In the academic world, there has been further development and refinement of, and even some communication between, such fields as deep ecology, social ecology, ecofeminism, green politics, and non-anthropocentric environmental ethics. New strains of thought have merged on issues such as anti-globalization, complex adaptive systems analysis or business and sustainability. However, no clear overall position or argument seems to have emerged from these developments.

With regard to action in the world, the picture is equally unclear. On the one hand, progress has been slow in achieving sustainable development goals. And the upsurge of political support for environmental causes characteristic of the early 1990s seems to have subsided. Certainly the general intellectual climate in industrialized countries has become more supportive of business and hostile to government intervention over this period. Economic globalization proceeds apace, and governments seem ever less able or willing to take strong positions on environmental or social issues.

On the other hand, evidence of growing unhappiness with the mantra of conventional development is also prevalent. As mentioned above, the anti-globalization movement, represents a visible form of resistance to “business as usual” politics and economic decision-making, which may signal a shift in the debate from a focus on explicitly environmental or even social causes to a more generalized critique of some of the characteristics of modern industrialized society (Klein, 2000). And there is an upsurge of sustainable development activities on the parts of business, NGOs and local governments in some parts of the world.

Perhaps all that can be said is that while there is evidence of new conceptual and practical developments in the area of sustainable development, it is not clear whether such developments can become significant enough to challenge the powerful contrary trends in indicators such as energy use, emissions, land appropriation, poverty, militarism and breakdown in governance systems. The question of whether a more fundamental transformation in underlying values and attitudes is required to create such substantial change remains an open one.

5. The lessons

So where does this leave us? Are sustainable development, or sustainability, hopelessly confused, or fatally compromised, concepts, or do they offer some hope of helping us navigate the stormy seas of unsustainable social and environmental practices? As a step towards answering this question, what follows is an attempt to draw out some of the specific lessons of preceding sections of this paper. A basic principle

¹⁰ Note, however, that the biophysical and socio-political arguments outlined in this section of the paper are not themselves always happy bedfellows. The tension between the more socially minded and more biophysically-oriented activist arguments has been remarked upon by many writers since the 1980s. See, for example Redclift (1987). It also is the primary basis of an earlier debate between the deep ecologists and social ecologists (see Bookchin, 1991; Eckersley, 1988; Tokar, 1988).

adopted here is that the issues on both sides of **Table 1** need to be included. This suggests a shift from the language of sustainable development to a more inclusive language that includes the issues on the right-hand side of the figure. To that end, this paper will use the term sustainability to describe this broader approach. This is also consistent with a growing shift even in government and private sector publications towards the use of the term sustainability. However, this should be understood to be an inclusive use of the term sustainability, which includes the issues on both sides of that table.

5.1. Sustainability must be an integrative concept, across fields, sectors and scales

If sustainability is to mean anything, it must act as an integrating concept. In particular, it is clear that the social dimensions of sustainability must be integrated with the biophysical dimensions. This is the central message of the Brundtland report and it is no less compelling now than in 1987. Developments over the intervening period have made it clear just how difficult this will be. But it is also increasingly obvious that solutions that address only environmental, only social or only economic concerns are radically insufficient. What is needed is a form of transdisciplinary thinking that focuses on the connections among fields as much as on the contents of those fields; that involves the development of new concepts, methods and tools that are integrative and synthetic, not disciplinary and analytic; and that actively creates synergy, not just summation.

In addition to integrating across fields, sustainability must also be integrated across sectors or interests. It is clear that governments alone have neither the will nor the capability to accomplish sustainability on their own. The private sector, as the chief engine of economic activity on the planet, and a major source of creativity, innovation and entrepreneurship, must be involved in trying to achieve sustainability. And their activities must also be supplemented by the monitoring, questioning and alternative service delivery roles of an active NGO sector.

Yet the combination of government and business is insufficient. Without at least the tacit support of civil society, even government, industry and the NGO sector acting together cannot get us there. Without

a political constituency for change, a market for different products and consumption patterns, and social acceptance of both the public policy and the private sector actions needed to accomplish these goals, no fundamental changes in behavior or practice are possible.

And this broad partnership must also involve the active participation of the research and teaching community. In virtually every area of sustainability, more research, and better-trained citizens, are needed. While not every researcher and teacher can or should be focussed on these issues, there is a need for the academy to focus its attention more strongly on developing the knowledge, tools and training required to address the challenge of sustainability.¹¹

A final dimension of integration has to do with the various scales of analysis and action. Clearly the very concept of sustainability is predicated on a need to think across temporal scales. And both the social and ecological dimensions of the term bring to the fore the need for spatial integration. The disciplinary division of knowledge in the university system means that many cross-scalar issues get lost in the ‘white spaces’ between disciplines. The concept of sustainability may have a role in helping to bridge some of those gaps.

5.2. Beyond concepts to action

While there will continue to be need for conceptual, theoretical and methodological development related to sustainability, the fundamental nature of the divisions illustrated in **Table 1** means that there will not develop a single coherent conceptual approach to sustainability. Nor, as suggested above, is such an approach necessary. Instead what are needed are new forms of social learning (Robinson, 2003), which allow sustainability approaches to be hammered out in diverse socio-political and environmental circumstances. While conceptual refinement will always occur, the acid test will be the way things play out

¹¹ I have argued elsewhere that the need for new forms of interdisciplinarity and partnership with the community require some major changes in institutional organization at the university, having to do, for example with relations with the outside community and also with internal reward systems. See <http://www.oldadm.ubc.ca/apac/memo.htm>.

in the streets. There is an inevitably experimental, and experiential, nature to sustainability.

5.3. *Technical fixes are necessary but not sufficient*

Given the extent of environmental deterioration and human misery around the world, we should actively pursue improvements in the efficiency and social and environmental impacts of delivering goods and services (i.e. focus on the issues raised by the left-hand side of Table 1). If the optimists are right, we can reduce by up to an order of magnitude the negative impacts of achieving a particular level of material well-being. That offers the potential, at the margin, of increasing material well-being without increasing negative environmental impacts. Moreover, designing human systems to be more in accord with ecological principles is consistent with the development of an environmental ethic of the kind called for by many environmentalists. In fact, the more serious the problems of unsustainability, the more we need to reduce negative environmental impacts per unit of economic activity.

However, even if the more optimistic views of the potential for approaches like industrial ecology, dematerialization, eco-efficiency, biomimicry and others turn out to be correct, these approaches will not themselves represent a sufficient response to the challenge of sustainability, even in the short-term. This is because achieving reductions in the environmental impacts of economic activity does not necessarily translate into improvements in the quality of life for all. It is easy to imagine cases where the gains from such approaches are appropriated disproportionately by those who already are well-off, leaving those at the bottom of the socio-economic pyramid as badly, or worse, off as before. Evidence for the likelihood of such outcomes can be seen in the “enclave economies” and affluent gated communities of today.

And of course, deferring the arrival of limits does not make those limits non-existent. For both of these reasons, if sustainability is to contribute to a better life for all, then it will be necessary to go beyond technical fixes and begin to address profound issues of opportunity, distribution, material needs, consumption and empowerment. These questions, in turn raise important issues of social and political organization and governance. These issues are likely to be much more

intractable than those related to achieving improvements in eco-efficiency.

5.4. *The social constructions of sustainability*

We have seen that differences in views about the meaning and value of sustainability are rooted partly in different philosophical and moral conceptions of the appropriate way to conceive of the relationship between humanity and nature. This means that what can and should be done to achieve a sustainable society is not fundamentally a scientific or technical issue. And this in turn has important implications for the way we conceive of the role of science, and indeed expertise in general, in addressing these dilemmas.

In this way, the sustainability debate connects to a larger set of issues about science and knowledge in modern society. In common with virtually every discipline in the social sciences and humanities, debates over sustainability span a spectrum between an empirically based view of science as, in the main, telling us true things about the real world, and a more skeptical, and relativistic perspective that argues that scientific understanding is, to some degree at least, socially constructed.¹²

Without engaging with this general debate here, I want to suggest that the tension between these two views must be addressed in any attempt to develop a viable sustainability strategy. In this connection, the distinction made by Newby (1993), between a more science-based and a more problem-based approach to sustainability may be a useful way to conceive of this issue. As argued elsewhere (Cohen et al., 1998), sustainability, unlike, say, climate change, is an inherently problem-driven rather than scientific, concept.

Of course, good scientific analysis is crucial to addressing the problems of unsustainability. We need to tap our best current understanding of how complex ecological, social and economic systems interact, and what the likely implications of various forms of action are. However, in the end, sustainability is ultimately an issue of human behavior, and negotiation over

¹² For a general discussion of the emergence of this debate in Western culture, see Tamas (1991). For an extended discussion of the distinction between a ‘descriptive’ and an ‘interpretive’ approach to social science and how that relates to climate change issues, see Jasanoff and Wynne (1998); Rayner and Malone (1988).

preferred futures, under conditions of deep contingency and uncertainty. It is an inherently normative concept, rooted in real world problems and very different sets of values and moral judgements. And science itself is not entirely neutral with respect to some of these issues. Three conclusions follow. First, scientific analysis can inform, but not resolve the basic questions posed by the concept of sustainability. Second, scientific analysis itself embeds important value judgements and social commitments that themselves must be open for examination and discussion. Finally, other forms of knowledge (e.g. traditional environmental knowledge, various forms of lay understandings of risk) have important things to contribute to the sustainability discussion.

5.5. *Engaging the community*

A particular aspect of the human dimensions of sustainability that deserves special mention is the need to develop methods of deliberation and decision making that actively engage the relevant interests and communities in thinking through and deciding upon the kind of future they want to try and create. We have seen that there is a wide diversity of viewpoints as to what sustainability is and entails. And I have argued that there is constructive ambiguity in keeping open some of these issues. The other side of that coin is that there is a need to develop processes that make use of that constructiveness, that allow diversity to be expressed without creating paralysis.

This is particularly the case where there exist fundamentally different views about questions of value and meaning. We have seen that underlying many of the debates in the sustainability field are a series of deep-lying questions about the purpose and meaning of human life and its relationship to the natural world. These are profoundly moral and political issues, which require thoughtful deliberation and collective resolution. And on those issues, the principles of democracy imply that every citizen has equal expertise.

The most fundamental political question that is raised by the debates in the sustainability field is how serious the problems are. Are problems of ecological or socio-economic unsustainability minor bumps on the road to a better future for all, or are they evidence of the need for fundamental transformation in society? Is the goal reform or revolu-

tion?¹³ This question can only meaningfully be answered I think as part of an incremental process of collective decision making that is based on, but not determined by, expert knowledge; that is open to multiple perspectives but not paralyzed by them; that allows for, and reinforces, social learning and changes in views over time; and that is provisional but concrete.

Achieving the forms of social engagement implied by these reflections raises a whole host of difficult methodological and conceptual issues, including questions related to where and how to combine lay and expert forms of understanding, the relative roles of researchers and community participants, and the distinction between research and advocacy (Robinson and Tansey, 2002). These are issues we need to come to grips with if we are serious about creating new partnerships between the academy and the various communities within which it exists.

6. An application

Over the past 25 years, a number of researchers have been working on articulating an approach to sustainability that embodies some of these lessons. The intellectual trajectory of this approach is represented by a series of papers and books that outline a vision of sustainability that is problem-centered, and that integrates social, economic and environmental dimensions.¹⁴ The methodological trajectory is expressed in a series of “soft energy path” and “sustainable society” scenario analysis projects that build on earlier arguments about futures analysis and alternative energy paths.¹⁵

This work suggests that sustainability may usefully be thought of in two dimensions. The substantive

¹³ This is the central question in a fourth year undergraduate course on the history of environmental thought that Bob Gibson and I have been teaching, originally together but now separately, for the past 15 or so years. For one version of that course, see http://www.sdri.ubc.ca/teaching_learning/formal_course_2001.cfm#3. I would like to thank many generations of thoughtful students for their help in thinking through some of these issues.

¹⁴ See Robinson et al. (1990); Robinson and Tinker (1997); Robinson et al. (1996); van Bers and Robinson (1996).

¹⁵ The projects are described in Bott et al. (1983); Robinson et al. (1996); Healey (1999). For the underlying methodological arguments, see especially Robinson (1982); Robinson (1988); Robinson (1990); Robinson (1991); Robinson (1992).

dimension indicates that sustainability requires the simultaneous reconciliation of three imperatives.

- The ecological imperative is to stay within the biophysical carrying capacity of the planet,
- the economic imperative is to provide an adequate material standard of living of all, and
- the social imperative is to provide systems of governance that propagate the values that people want to live by (Robinson and Tinker, 1997).

It is suggested that this might be accomplished by a twin strategy of dematerialization (reducing matter/energy throughput per unit of economic activity) and what we call “resocialization” (increasing human well-being per unit of economic activity).

An equally important dimension of sustainability is the procedural one. Here we can argue for the view that sustainability can usefully be thought of as the emergent property of a conversation about desired futures that is informed by some understanding of the ecological, social and economic consequences of different courses of action (Robinson, 2003; Robinson and Tansey, 2002). This view acknowledges the inherently normative and political nature of sustainability, the need for integration of different perspectives, and the recognition that sustainability is a process, not an end-state. It must be constructed through an essentially social process whereby scientific and other ‘expert’ information is combined with the values, preferences and beliefs of affected communities, to give rise to an emergent, ‘co-produced’ understanding of possibilities and preferred outcomes.

In keeping with these approaches to sustainability, we have been involved over the past 4 years in a research project, the Georgia Basin Futures Project, which is intended to involve residents of the Georgia Basin region of Canada in thinking through some of these issues and in exploring the dimensions of desirable futures for the region (Tansey et al., 2002). Through the development and use of extremely user-friendly modeling tools, and working in very close partnership with 17 private, public and NGO sector organizations, we are combining expert knowledge, as embedded in the modeling system, with public values, attitudes, beliefs and preferences in the generation of new forms of understanding about what types of future choices, and trade-offs, are

acceptable or unacceptable to different individuals and groups. We are studying these forms of interaction and trying to reach conclusions about whether they are a fruitful way to engage communities in thinking through such questions.¹⁶

The approach to sustainability outlined here is only one of many possible ways to respond to the issues raised in this paper. However, it does illustrate that it is possible to combine the lessons described here in programs of research and community engagement.

7. Sustainability: squaring the circle?

In this paper, I have tried to suggest that the concept of sustainability is fruitful in two related ways. First, it provides a focus for a series of concerns that go to the heart of the interconnected debates over environmental, social and economic conditions. These concerns are important and addressing them directly is a condition for useful progress. The debate over the concept and practice of sustainability brings those concerns to the surface in a particularly pointed way.

Second, I have tried to suggest that it is possible to conceive of sustainability in a way that is sensitive to these concerns, and even offers some useful avenues forward in addressing them. Key to this argument is the view that sustainability should not be conceived of as a single concept, or even as a consistent set of concepts. Rather it is more usefully thought of as an approach or process of community-based thinking that indicates we need to integrate environmental, social and economic issues in a long-term perspective, while remaining open to fundamental differences about the way that is to be accomplished and even the ultimate purposes involved.

Such a formulation may seem so open and flexible that it is vacuous. But I believe it is not. A brief return to the metaphor with which this paper opened may help to show why.

I began this paper by suggesting that, as long ago as ancient Greece, the concept of squaring the circle was used as a metaphor for an impossible task,

¹⁶ A full description of our project, and its various publications and Working Papers to date, can be found at <http://www.basinfutures.net>.

because it involves trying to reconcile two essentially incommensurable quantities. I think it is fair to say that the history of the debates over sustainability illustrates exactly that kind of incommensurability.

On the one hand, there exists a view that says that the fundamental problems of unsustainability are technological and economic, that massive improvements in human welfare and environmental conditions are available through efficiency improvements and technological change, if we can only unleash the innovative spirit of the business sector and get our policies and decisions to move in the direction of sustainability. On the other hand, there is the view that sustainable development is at best self-contradictory, and at worst a false veneer of sustainability on a deeply unsustainable path towards increased growth, and undesirable environmental and social impacts, which can only be avoided through a fundamental value change at the individual level. Ultimately these two views, and their myriad variants, are based on incommensurable views on moral, political and epistemological issues.

In the end, the mathematical problem of squaring the circle was solved by the recognition that, using the techniques of planar geometry, no solution was possible. Instead, new tools that transcended these limitations were required.

I would argue that the equivalent development in the field of sustainability is the recognition that multiple conflicting views of sustainability exist and cannot be reconciled in terms of each other. In other words, no single approach will, or indeed should be, seen as the correct one. This is not a matter of finding out what the truth of sustainability is by more sophisticated applications of expert understanding (the compass and ruler). Instead we are inescapably involved in a world in which there exist multiple conflicting values, moral positions and belief systems that speak to the issue of sustainability. While it is crucial to identify points of empirical disagreement and to resolve those with better research and analysis, the ultimate question are not susceptible to empirical confirmation or disconfirmation. What is needed, therefore, is a process by which these views can be expressed and evaluated, ultimately as a political act for any given community or jurisdiction.

The power of the concept of sustainability, then, lies precisely in the degree to which it brings to the

surface these contradictions and provides a kind of discursive playing field in which they can be debated. This in turn encourages the development of new modes of public consultation and involvement intended to allow multiple views to be expressed and debated. And new developments in information and communication technology offer the potential of engaging various communities in exploring alternative futures in new and exciting ways.

This is not to say that sustainability is the inevitable happy outcome of encouraging conversations among stakeholders, nor is it to ignore deep structural issues having to do with power, control, material interest, and access to resources. But it is to suggest that sustainability is necessarily a political act, not a scientific concept.

Sustainability, on this view, is not a set of future conditions of society that will allow us to achieve the three imperatives listed above, or something like them. It is not even a process of moving toward some predetermined view of what that would entail. Instead sustainability is itself the emergent property of a conversation about what kind of world we collectively want to live in now and in the future. The problem of squaring the sustainability circle will not be resolved by new research, better science, and teaching people to understand the true nature of the problems, desirable as these may be. Instead, the way forward involves the development of new forms of partnership, and new tools for creating political dialogue, that frame the problems as questions of political choice, given uncertainly and constraints; that renounce the goal of precise and unambiguous definition and knowledge; and that involve many more people in the conversation.

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