
1 Introduction

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A handbook of sustainable development

The demand that countries pursue policies aimed at achieving ‘sustainable development’ or ‘sustainability’ has become a clarion call for many over the past two decades. A number of key events can lay claim to establishing this principle in the policy landscape. Among these are the publication of the Brundtland Report (WCED, 1987), the Earth Summit in 1992 and, more recently, the World Summit in 2002. Yet a moment’s reflection makes it clear that formidable challenges confront policy makers who have publicly stated their commitment to the goal of sustainable development, not least in determining what it is exactly they have signed up to. To this end, a huge amount of literature has been generated and, as we near the twentieth anniversary of the seminal Brundtland Report, it seems timely to provide an account of the considerable progress that has been made in fleshing out these issues. This is the primary purpose of the current volume.

We undertake this task with just a little trepidation. Some might argue that, as sustainable development appears to be such a complex concept, bringing disparate contributions together under one umbrella – moreover in the form of a ‘handbook’ – is a fool’s errand. Others might argue that, while such an account is worthwhile, we have made important omissions. Mindful of both points, we offer the following response. We agree it would be quite wrong to claim there is a unified theory of sustainable development. Indeed, it became clear very early on that interest in sustainable development was drawn from a broad church. For example, the Brundtland Report viewed sustainable development as serving many different (and possibly competing) goals: economic development, a better environment and a particular concern for human well-being both now and in the future. In fact, the debate has become far broader since then. We have deliberately sought to reflect this diversity rather than impose a narrow and rigid (but ultimately misleading) interpretation of the issues. While we do not claim to have been exhaustive, we are confident nonetheless there is a comprehensive and coherent story about sustainable development permeating this volume. It is the objective of this introductory chapter to summarize what we understand this story to be.

Sustainable development: what does it mean and how is it to be achieved?

We begin by asking whether sustainable development can be defined in relatively succinct terms. A number of definitions can be found in the contributions to this volume. Several authors cite the famous Brundtland Report definition – ‘development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs’ (WCED, 1987, p. 43). Some have adopted this definition or offered a slight change in emphasis. Others have added further requirements or provisos about particular actions that meeting this stated goal might necessitate. At the heart of each definition is a common concern about the way in which the fruits of development are shared across generations. Such distributive concerns have a distinctly philosophical flavour, so it is appropriate that this volume begins with Bryan Norton’s critical discussion of the ethical dimension underpinning sustainable development (Chapter 2). For Norton, an understanding of the ethics of sustainable development is essentially an anthropocentric endeavour. In other words, what is of interest is human well-being and how to sustain that well-being over time. Tension occurs when there is, in Norton’s words, ‘competition’ between the well-being of, or opportunities faced by, current and future people. Much of this volume is concerned with the reasons why such tensions might arise and how they might be resolved. Recognition of the responsibility that present generations have over impacts on the future – the basic tenet of sustainability – is best served, Norton argues, by an avowedly pragmatic philosophy based on learning about which novel rules for managing the resource base can be made to work in practice (rather than rely on an abstract ethical theory).

On the basis that there exists a broadly accepted ethical position that we, as the current generation, have obligations to the future, it follows we should ask what these are and whether current behaviour is consistent with making good on these duties. Addressing these issues requires that we seek to understand the means available to society to generate future well-being or opportunities, namely its resources or resource base. This resource base, as Giovanni Ruta and Kirk Hamilton set out in Chapter 3, consists of an array of stocks of wealth. It includes produced capital and human resources as well as natural resources (such as energy resources, land and biological resources) and environmental resources (such as clean air and water). The terminology here, from economics, is that these latter resources can be thought of as assets; part of natural wealth or capital. The ‘capital approach’ has now become ubiquitous in much of the sustainability literature and can be traced back to seminal contributions such as Pearce et al. (1989). There are at least two reasons for the widespread use of this approach. First, it has an intuitive appeal, insofar as entreaties to manage

these resources sensibly chime with popular notions of ‘not eating into one’s capital’ or ‘not selling the family silver’. Second, while this capital or wealth-based approach has proven useful in working out core theoretical notions of sustainability, it also leads to some specific and insightful analytical implications. For example, Ruta and Hamilton discuss a recent study by the World Bank (2006), which provides estimates of, and policy implications relating to, a range of components of natural wealth across countries.

To reiterate, a core element of sustainability is the appropriate management of a broadly construed portfolio of capital and wealth, including natural and environmental resources, by the current generation. Although the capital approach does not require particular assumptions to be made about the relative importance of different assets, such speculation is inevitable. Indeed, it is the source of one of the great sustainability debates, the answer to which in no small part determines the likely extent of sacrifice required by the present generation in adjusting and adapting behaviour. Understandably this debate, characterized in terms of whether development should be weakly sustainable or strongly sustainable,¹ cuts across a number of chapters in this volume. For *weak sustainability*, there is no special place for the environment as such. Put another way, it is the ‘overall’ portfolio of wealth bequeathed to the future that matters. As long as the real value of this portfolio is held constant it matters little that its constituent parts change over the development path. *Strong sustainability*, by contrast, requires that the environment is accorded explicit and special protection. There are a number of variants on this position. Most generally, it requires that ‘natural wealth’ should (in some way) be preserved intact through specific conservation rules. Strong sustainability should hence represent the greater policy challenge, because current human actions would be significantly more constrained (as certain development paths would be effectively ‘off-limits’).

The practical implication of this distinction is thus a matter of some importance. But, while a great deal of actual development policy seems to be implicitly predicated on weak sustainability,² within the academic literature there is arguably some consensus over the position that the ‘real’ world corresponds neither to one polar extreme nor the other. For example, Jeroen van den Bergh reminds us in Chapter 4 that the theory underlying weak sustainability was developed in the context of an economy dependent on a non-renewable resource such as oil. By following the ‘Hartwick’ rule (or sometimes the ‘Hartwick–Solow’ rule: Hartwick, 1977; Solow, 1986), sustainable development could be achieved by ‘covering off’ the liquidation of a finite resource with investment in other forms of wealth. The question being asked here is: are countries saving enough for the future? Later in this volume (Chapter 18) it is shown how for developing countries that are

highly dependent on exhaustible resources as a share of economic activity this focus can yield valuable predictions about development prospects. Can such (Hartwick) rules be extended across *all* natural wealth? The answer is that we simply do not know and so this argument would require an extraordinarily large leap of faith. At the same time, it seems overly cautious to claim *all* natural wealth must be conserved in its entirety. Not surprisingly, it is difficult in practice to find proponents for either extreme position.

In reality then there are likely to be far more complementarities between the two approaches than are commonly given credit.³ At least three lines of reasoning are worth bearing in mind with regards to this point. In any given year about 10–30 countries are not saving enough to cover their depletion of natural resources in the World Bank savings database.⁴ So even by a so-called weak sustainability criterion a clear signal is provided that a very real problem for the development prospects of these countries exists. Second, so long as it is not being argued that all natural assets must be conserved (and typically it is not) then there is a guiding role for key insights from both approaches (Pearce et al., 1996). For example, more moderate interpretations of strong sustainability tend to argue there are certain *critical* resources that are both crucial for human development and have no substitutes. That is, not all of nature is critical. For those critical assets which absolutely must be conserved (at some level), some (physical) indication is clearly needed about the extent of conservation. However, we would still need to know whether (or not) enough is being saved for the future and this will entail assessing changes in total wealth including what is happening to the ‘rest’ of nature that is deemed to be ‘usable’. Third, as argued in a later chapter (Chapter 18), central to stronger notions of sustainability is the sense that development paths will take countries dangerously close to (or beyond) important environmental thresholds. Yet even though a savings analysis (often thought to be synonymous with weaker approaches) might be reckoned to have little to say here, a more considered response would be that relevance depends not on the existence of thresholds but on the nature or character of that threshold. While this is very much a technical detail, which roughly speaking depends on whether the harmful impacts on approaching a threshold are knowable or entail a ‘nasty surprise’, its practical implications are no less important for that.⁵

There is a challenging research agenda here: that is, how much of nature ‘should’ be conserved and how many (and what type of) threshold problems are there in practice? Central to this challenge is the conviction that the notion of a critical resource provides the basis for consensus in an otherwise seemingly intractable debate between weak and strong approaches. Hence, much of the middle-ground in discussions about sustainable

development could well centre on identifying critical assets, understanding how they function and managing these resources accordingly. In other words, the conflict between weak and strong sustainability would largely dissolve if it could be determined which assets were critical. Unfortunately, the problem with this otherwise pragmatic standpoint is that there exists considerable uncertainty about which natural assets are critical. Hence there is corresponding uncertainty about the location of this middle-ground.

Recourse to evidence would be one clear way through this impasse. However, those who over a decade ago (for example Pearce et al., 1994) expected a body of empirical evidence to emerge on the issue of substitutability might be disappointed by progress. Most welcome then is recent work (World Bank, 2006, discussed in Chapter 3) that has built on earlier contributions such as Berndt and Field (1981) in quantifying the degree of substitutability between commercial natural resources and other forms of wealth. While this provides valuable information on the ability to maintain economic production in the face of declining natural resource stocks, it is unlikely that such direct evidence will be as straightforward to uncover for broader classes of natural assets affecting human well-being directly or perhaps indirectly (as subtle and intangible inputs to production). This is simply a reflection of the complexity of understanding the physical world in which we live. However, there are signs of progress in understanding the implications of, say, ecological processes for human well-being. For example, more than any other single school of thought, ecological economics has been explicitly premised on exactly this objective. Moreover, as van den Bergh notes in Chapter 4, the challenge of sustainable development has evolved to occupy a central place in an otherwise eclectic array of policy concerns and analytical perspectives.

Chapter 5 offers a prominent illustration of this advance in the knowledge of ecological systems. Neil Adger outlines how progress in understanding the concept of resilience has contributed to this process. As Adger explains, resilience is central to sustaining ecosystem functions in the face of external pressures and perturbations. Unsurprisingly, complexities abound. Early speculation about the relationship between diversity and resilience (for example Common and Perrings, 1992) has given way to insights with less straightforward implications for conservation management. However, the central message broadly persists that a loss of resilience is a threat to sustainability, and resilience – and thus the future provision of ecosystem services – is being compromised by unrelenting human pressure on the environment. As an illustration, Adger notes that this negative process is epitomized by the ongoing diminution of the world's living coral reefs. The reward for human development of policies that preserve or

enhance resilience – perhaps at some reference level – is a more stable environment for continued use of ecological services.

The broad thrust of policy decision-rules intended to deal with threats to sustainable development, in a world with critical resources, is explored in detail by Alan Randall in Chapter 6. In the spirit of our earlier discussion of the ‘middle-ground’, his is a two-tier approach involving a combination of safe minimum standards (SMS) for critical resources and standard cost–benefit rules (markets augmented by public policies that pass cost–benefit tests). With regard to the latter, Randall situates this economic approach within a broad array of considerations: cost–benefit thinking subject to moral constraints rather than allowing the economist’s notion of (social) efficiency to trump all else. Thus threats to sustainability, perhaps brought about by the likely loss of a critical resource, could justify a strict conservation rule (although this can be overridden if its costs are ‘intolerable’). There is no single or unifying rationale for observing SMS. Instead, Randall presents a simple but compelling case that it is an approach that commands broad consensus. As such, this is a testable criterion, which is clearly a desirable attribute for making costly but uncertain decisions in democratic societies.

Intergenerational equity: discounting, population and technological change

In the SMS framework previously discussed, cost–benefit analysis (CBA) has a place unless there is a sustainability threat. One reason for this demarcation is that such threats might be characterized by a combination of uncertainty and possibly (irreversible) large losses in well-being. Nor is CBA well-equipped to deal with contemporary environmental problems which are characterized by impacts that could be felt 100 to 200 years from now (and beyond). That is, conventional ways of discounting future costs and benefits in economic appraisal typically give very low weight to these distant concerns. Such observations about the ‘tyranny of discounting’ draw on long-standing concerns. In Chapter 7, Cameron Hepburn brings us up-to-date with the discounting debate, noting interesting developments that reassert the relevance of cost–benefit approaches in understanding the social worth of policies affecting the far-off future. Thus, while Hepburn outlines a number of alternative approaches to discounting (which go beyond overly simple prescriptions not to discount at all), just as interesting are recent developments in the theory and practice of discounting, which provide powerful arguments for using *declining* discount rates to appraise public policies with impacts in the distant future. While this introduces well-known problems into decision-making, these disadvantages must be weighed carefully against the advantages of making economic appraisals more sensitive to preferences for environmental outcomes in the far-off future.

In many countries and for the world as a whole, any development path must sustain well-being or opportunities over a considerably larger population than currently prevails. In turn, population growth may further threaten sustainability as human populations place added pressure on natural assets. In Chapter 8, Geoffrey McNicoll sets out this integral part of the sustainable development story, which itself has roots in historical debates about the relationship between population and development. Recent interventions have, in McNicoll's view, generated more heat than light, focusing on elusive (and perhaps even futile) questions about 'how many people the world can support' and arriving at extreme prognoses whereby population levels can increase without limit (for example Simon, 1981) or resource constraints result in dramatic population collapse or collapse in living standards (for example Meadows et al., 1972). McNicoll shows that, away from such extreme debate, there is a wealth of useful analyses, which neither dismisses the possibility that population change increases pressure on natural assets nor blithely assumes this relationship can be straightforwardly disentangled from other factors. Indeed, the population–environment nexus is unlikely to be carved in stone. As with so many other issues in the sustainable development area, it is mediated to a large extent by institutions and policy regimes. Put another way, bad policies or poor institutional arrangements can exacerbate the environmental impacts of population pressure. A key question then is what is the appropriate balance of policy between, on the one hand, interventions aiming to influence migration and fertility decisions directly and, on the other hand, efforts to create or strengthen institutions?

Against concern about the consequences of population growth lie questions about the ability of technological change to deliver sustainable development. McNicoll reminds us that analogous questions have been an active source of debate in the economic growth literature. Such issues are obviously highly relevant to concerns about sustainability, for the claim that current behaviour is unsustainable implies possibly strong judgements about how well-being or opportunities will be generated in the (far-off) future. Historical examples abound where similar concerns about impending sustainability threats have been rendered obsolete by technological advances. Moreover, as Chapter 8 points out, much of modern growth theory has been predicated on the primacy of technological change in driving economic development. A timely reminder of the relevance of these discussions was made by Weitzman and Löfgren (1997). They presented the theory and illustrative calculations (for the US) behind the claim that even a moderate but predictable flow of technological change might mean that, not only would such productivity advances play a significant role in determining prospects for sustainable development, this could play the decisive role.

The proposition that technological change can be relied on to take care of the future is somewhat out of kilter with the more cautious approach generally advocated by those concerned about sustainable development. The substance of this caution stems from two main considerations. First, contemporary sustainability threats often relate to the loss of natural assets that are tangibly different to those referred to in any number of reassuring historical examples. Ultimately, history will prove the protagonists in such debates right or wrong but, in terms of decision-making in the here and now, there is mounting suspicion that losses of critical assets could entail substantial losses in well-being comparable or greater in magnitude to those increases attributable to technological improvements. Until practical data exist to evaluate this claim directly, fundamental questions relate to how decision-making should proceed in light of uncertainty. Second, a reliable stream of technological improvement requires a policy climate conducive to innovation effort (Aghion and Howitt, 1998). This is an important point, because new knowledge must be created. One primary way of doing so is through inputs to the research and development (R&D) sector, but this is a costly process influenced by a variety of incentives.⁶

The second point has prompted researchers to seek a deeper understanding not only of the process of knowledge creation but also of how new innovations diffuse into production (and consumption) processes. In terms of sustainability, there is particular concern about the direction of technological change. That is, it could be argued innovation has shown a long-term tendency towards greener technologies that drive the material or energy intensity of economic production downwards (see also Chapter 15). Does it follow that this decoupling is simply a spontaneous by-product of innovative activity? In Chapter 9, Timothy Foxon outlines explanations of how innovations come on-stream and how cleaner technologies in particular are adopted. There are important lessons to be learned from, in effect, 'backward engineering' the actual adoption of new technologies and so understanding the technical and economic circumstances under which change occurred. In doing so, examples are uncovered of existing technologies that have become 'locked-in', even though possibly 'superior' technologies exist. Understanding the reasons for such phenomena is also important. A prominent environmental example is the pervasiveness of carbon-based technologies in modern economies. Proponents of the lock-in notion argue that both economic processes and policy institutions, which otherwise might be harnessed to foster change, can become constrained to serving the status quo. International experience appears to be varied.

Sustainable development is concerned with development prospects along a path stretching into the far-off future. It is entirely plausible, and indeed to be expected, that technological change will intervene to change the

nature of this path. This issue therefore merits serious consideration in discussions about threats to sustainability. Yet, neither should it be used to 'stop the conversation' about obligations of the current generation to the future. While technological change might alter the nature of these obligations, challenging questions arise from consideration of what policy regimes can best harness innovation as one means of sustaining development.

Intragenerational equity and the social dimension

Sustainable development has always been about more than just a sophisticated articulation of concern for future generations. Another prominent theme has been intragenerational equity, that is, the distribution of income, environmental burdens and other relevant factors within the currently existing generation. This tradition owes much to the Brundtland Commission, for which concern about future generations was only part of the story: concern for poverty in the present generation was also important, indeed for the WCED arguably the highest priority. Explanations vary as to why present generation inequities might make development unsustainable. Perhaps it is a logical consequence of concern for *intergenerational* equity (for example Solow, 1992). Others have put forward mechanisms whereby a development path is unsustainable, because there are disparities in well-being or opportunities *within* the current generation. A few have simply asserted that greater intragenerational equity is intrinsically desirable and by hook or by crook must be relevant to sustainable development. All of this suggests policy makers follow a more specific requirement to prohibit not only current development that comes at the expense of the future, but also increases in current well-being that further broaden the gap between, say, rich and poor. Three chapters in this volume outline the case for integrating intragenerational equity within the sustainable development story.

In Chapter 10, Geoffrey Heal and Bengt Kriström assess recent efforts by economists to build current distributive considerations into analyses of sustainable development. What this involves is moving beyond highly aggregated assessments of whether the current generation is overusing its resource base. Heal and Kriström attribute this to a welcome resurgence in economic interest around distributive issues in cost–benefit analysis and policy appraisal more generally. Given that an important element of any sustainable development strategy will be strengthening environmental policies, Kriström uses these public policy interventions to illustrate frameworks for analysing distributive impacts. This raises an array of interesting issues. First, there are questions surrounding how best to understand and quantify distributive impacts across households, firms and so on within, say, the national economy. Second, there are questions regarding the main

lessons emerging from this analysis. For Heal and Kriström, the key message is that environmental policy creates winners and losers.⁷ While there is mixed evidence about the socioeconomic characteristics of those who fall in each category, the fact remains that those charged with designing and implementing environmental and sustainable development policies cannot escape making hard choices. In order to ensure that such policies are socially acceptable, identifying the potential obstacles that undesirable distributive impacts represent is crucial.

In Chapter 11, Julian Agyeman reminds us that concern for social justice in the here and now has always been at the heart of the environmental justice movement. Indeed, it is arguable that some of the credit for the recent emergence of *environmental* equity concerns in economic analysis (for example Serret and Johnstone, 2005) must go to this movement. It began as a grassroots campaign, originating outside of (and sometimes in opposition to) the mainstream environmental movement in the US. In this respect, it has evolved in parallel rather than together with the sustainable development debate. However, as Agyeman notes, environmental justice proponents have identified much in common with the sustainability agenda. Emphasis is placed on the burden of pollution and how that burden is distributed across communities with different socio-economic characteristics. Within the US, particular interest has surrounded the incidence of these environmental inequities by ethnic origin. In each example the implication is that an unequal distribution of some environmental burden along a socio-economic axis is unjust. In turn, policy should strive for a more equal distribution, although how this might be achieved depends on a proper understanding of the dynamic process whereby environmental burdens and risks are assigned (see also Chapter 10).

International disparities – in terms, say, of how global environmental burdens are distributed – might also be characterized as environmental justice problems. Another perspective which relates the link between (especially international) disparities in living standards and differences in human ‘vulnerability’ to environmental and other stresses has rapidly become part of the vocabulary of sustainable development as noted in Chapter 12 by Neil Adger and Alexandra Winkels. For example, there is concern about how vulnerable certain groups are when exposed to climate-related risks. The emphasis on vulnerability predicts that those living in chronic poverty, without access to the resources necessary to live a decent life, are those least able to cope or adapt. In this context, links are forged with key contributions from the poverty literature, notably the writings of Amartya Sen (1981, 1984). Since the social pillar of sustainability plausibly demands we work to minimize poverty worldwide, Adger and Winkels argue the vulnerability perspective constitutes a valuable analytical tool, offering a

multidimensional explanation of how the distribution of resources in society presses those least fortunate into unsustainable livelihoods and vice versa. In this way, not only is vulnerability reduction a legitimate sustainable development goal, because it is instrumental in reducing poverty, it can also contribute to fostering sustainable livelihoods among those sections of society least capable of pursuing them. All other things being equal, this could contribute to the attainment of sustainable development goals society-wide.

Growth, consumption and natural wealth

An important connection between recent attempts to understand the determinants of poor economic performance and the measurement of sustainability is the finding of a negative and significant relationship between natural resource abundance and economic growth. This is the so-called ‘resource curse hypothesis’ or ‘paradox of plenty’. It is a paradox, because common sense suggests resource-rich countries have distinct long-term economic advantages over (otherwise similar) resource-poor countries. As Richard Auty shows in Chapter 13, the fact that a large number of countries in the former category appear not to have benefited in this way has led to considerable effort being expended in seeking to understand why the resource curse arises and, more importantly, whether it can be avoided. Perhaps the most convincing of recent arguments are those which focus on the political economy of resource-rich countries. As Auty points out, there is likely to be a vicious circle at work here. Resource windfalls, for example, encourage rent-seeking among interest groups and permit governments to prolong ‘bad’ policies. While notable examples of sound resource management do exist, transforming countries that habitually dissipate resource rents is far from easy.

Another important node for research into the economic, social and environmental performance of developing countries is the classical process of structural change, whereby the importance of the (rural) primary sector in a national economy decreases at the expense of the (urban) manufacturing and service sectors. As Ramón López explains in Chapter 14, structural change has been a pervasive trend in modern economic development, be it in countries that have performed well over the past few decades (for example in Far East Asia) or in countries that have failed to satisfy development expectations (for example many Latin American and sub-Saharan African countries). López thus draws a distinction between structural change with positive outcomes – in terms of decreasing pressure on natural assets and increasing living standards – and structural change with negative outcomes, whereby the rural poor simply become the urban poor. Hence the understanding of how ‘benign structural change’ comes about

as opposed to 'perverse structural change' has an important role to play in fostering sustainability in developing countries. López argues that, while benign structural change is 'pulled along' by labour demand from the increasingly productive urban non-primary sector, perverse structural change is pushed by the depletion and degradation of rural natural assets and/or by the disenfranchisement of the rural poor. The rural labour force migrates to urban areas as a consequence, but in many cases the necessary investment and productivity improvements in the non-primary sector have yet to be made. Crucially, López portrays the latter process as the result of policy failure, itself the result of an institutional bias against the rural poor. In this respect, the similarities with Chapter 13 could not be clearer.

Among certain schools of thought, it is almost an article of faith that economic growth results in greater resource use and environmental degradation. Yet cross-country empirical studies in the early 1990s seemingly showed that, for certain pollutants, as the economy grows, so environmental quality first deteriorates, but then actually improves. This is the so-called Environmental Kuznets Curve (EKC). Matthew Cole, in Chapter 15, reviews the evidence from EKC studies for local and global pollutants. While these studies have seen their fair share of criticism on a variety of grounds, Cole notes that recent developments in the literature have sought to provide a more thorough explanation of the process of economic change driving the EKC (where it exists). At least two interesting implications emerge. First, a combination of environmental effects accompany economic growth that work in opposite directions. Certain effects diminish environmental quality (for example scale effects) while other effects enhance it (for example technical effects). Second, initial conclusions that countries might simply grow out of their environmental problems were – as many had suspected – far too simplistic. The environment-growth paths described by EKCs often reflect policies which, even if facilitated by rising incomes, do not arise automatically.

Raising consumption is one objective of development policy around the world. For a large number of countries, where poverty is widespread, this is a necessity. In wealthier countries, in some quarters, there has been a fair degree of soul-searching about the desirability of progress driven by ever-increasing consumption. For example, where the environmental effects of growth appear to be less than benign (for example carbon dioxide emissions), there is arguably a clear mandate for the study of how consumption can be made 'sustainable' or at least to have less damaging by-products. Tim Jackson takes up this task in Chapter 16. In fact, the consequences of consumption practices for sustainable development are not confined to environmental effects, as the consumption choices we make affect social equity and well-being more broadly. Despite the potentially fundamental

questions such a focus could raise, Jackson explains that much of the recent sustainable consumption literature, especially (and without any great surprise) at the political level, has shied away from them, restricting itself to an incremental shift in consumption towards 'greener' products. Yet Jackson argues this reticence might constitute a missed opportunity. Not only does it conflate the issues of production and consumption, the inability to engage with *how much* we consume in absolute terms runs the risk of ignoring scale effects. He asks: what is the true purpose of consumption? In doing so, he outlines a number of theories as to why ever-increasing material consumption may actually be something of a social pathology. All this leaves a question mark over the degree to which much of this consumption is actually making people in the world's richest nations any happier. While such accounts pose tremendous challenges to established theories – sustainable development theories included – there are a number of useful and immediate policy implications, not least the futility of naive appeals to 'stop consuming so much'.

Progress in measuring sustainable development

Consumption, economic growth and environmental degradation impact sustainable development in complex and often apparently contradictory ways. The question is: how do we know whether overall we are on a sustainable development path? If the rhetoric of policy makers committed to sustainable development is to be judged against the reality of performance, then the means must be found to measure and monitor sustainable development. Put another way, in the absence of such information we cannot even broach the question of whether development is sustainable. A number of chapters in this volume examine a variety of proposals that respond to this measurement challenge. Broadly speaking, they fall into one of two camps. First, there are those approaches seeking to adjust or extend the existing economic or national accounts to better reflect resource depletion and environmental degradation. These activities are typically labelled 'green national accounting' or 'resource and environmental accounting'. Second, there are approaches that have sought to construct (sometimes highly aggregated) physical environmental indicators. Common to both approaches is the overarching conviction that development cannot be sustainable if policy makers continue to rely on the same narrow set of economic indicators used to guide the short-term management of the macroeconomy, most notably Gross Domestic Product (GDP). Chapters 17 and 18 draw on the activities of two international organizations with a key role to play in the pursuit of sustainable development: the United Nations and the World Bank. The approaches taken by both institutions fall within the ambit of green national accounting, but there are important

contrasts in terms of methods and emphasis, most notably about whether we need an analogously powerful accounting aggregate or indicator to rival GDP.

Glenn-Marie Lange provides a critical appraisal, in Chapter 17, of the United Nations System of Environmental and Economic Accounting (SEEA) (UN et al., 2003). This system is designed as an adjunct to – not a replacement for – the conventional System of National Accounts. Clearly, this falls short of the more radical plea to overhaul the national accounts. It takes the more conservative (but in all likelihood correct) view that satellite accounts best permit experimentation and nurture of novel and worthwhile proposals, without compromising uses associated with the conventional accounting framework. In terms of uptake across countries, the SEEA appears to have been a qualified success. Lange reports that a number of countries (but by no means all) have been busy in the implementation of a wide range of accounting activities based on this framework. This includes asset accounts (natural resource balances), flow accounts for materials, energy and pollution, environmental protection expenditures and, finally, green alternatives to GDP. In other respects, Lange offers cause for both optimism and pessimism. On the one hand, a number of countries are increasingly exploring the policy implications of resource and environmental accounts. This is a welcome development. In the past, there was a suspicion that many official green accounting programmes were initiated with very little discussion of end-uses (Hamilton et al., 1994). As Lange shows, the strength of a number of accounting activities covered by the SEEA framework lies precisely in the detailed policy questions they can address. On the other hand, the SEEA provides little leadership on the major debates about competing methods, particularly with regard to the valuation of resource stocks and their depletion and degradation. This embedded ambiguity could well limit the uptake of these frameworks and necessitate a search for leadership elsewhere.

By contrast, Kirk Hamilton and Katharine Bolt describe the singular approach taken by the World Bank in adopting genuine saving (or adjusted net saving) as its primary indicator of sustainability (Chapter 18). As described in this chapter, postponing consumption (for example by saving out of income or through investing in human resources) boosts a country's (genuine) saving rate, while (net) depletion of natural assets (for example mining or harvesting commercial natural resources or emitting pollutants such as carbon dioxide and particulate matter) shrinks it. Sustainability requires that countries avoid negative genuine saving rates at the very least. As Hamilton and Bolt note, the proposition that we should be interested in saving rates (and changes in wealth per capita in the presence of population growth), as one important piece of the puzzle for measuring

sustainable development, has survived rigorous scrutiny by economic growth theorists. Scrutiny outside the economic domain has identified genuine saving's commitment to *weak* sustainability, which, in line with our previous discussion, may be insufficiently demanding where critical natural assets are concerned. Even if the analysis is confined to weak sustainability, empirical findings to date suggest many countries find it hard to achieve positive genuine saving. Moreover, Hamilton and Bolt note that empirical evidence suggests that genuine saving is a reasonably strong predictor of future consumption. In other words, this indicator can provide important signals for policy. As reported in Chapter 18, had countries such as Venezuela and Nigeria followed the standard Hartwick rule or maintained genuine saving at some modest and constant rate, they would be considerably better off than is actually the case.

Beyond the province of green national accounting, a wide array of indicators has been proposed. Efforts to measure sustainable economic well-being led to the construction of an Index of Sustainable Economic Welfare (ISEW: Daly et al., 1989), also known by various names, including the Genuine Progress Indicator (GPI: Cobb et al., 1995). The ISEW aims to provide a 'better' measure of current and future well-being than GDP. Although this aim is shared with the environmental and resource accounting literature, the two traditions engage little beyond this.⁸ In Chapter 19, Clive Hamilton notes that many ISEW studies claim striking findings to the effect that the measured level of well-being increases at first (from its level in the initial study year; typically 1950), before declining at some point (usually around the 1970s or 1980s), sometimes steeply. At face value, this indicates that, while well-being per capita initially rose, it has been declining for some time, in some cases precipitously. Thus ISEW studies can be viewed as a bold attempt to construct national welfare accounts in a world where relevant shadow prices assume that environmental change is very costly indeed. ISEW/GPI studies thus appear to reveal *dis*-saving on a massive and unsustainable scale. While there are substantial suspicions, discussed by Clive Hamilton, that the findings of these studies are largely an artefact of the particular methods used by practitioners, it is interesting to note the burgeoning 'mainstream' respectability of the notion that people living in modern advanced economies are no more happy despite evidence of economic progress (especially in the literature on happiness and its determinants: see, for example, Layard, 2005).

Numerous indicators purporting to measure sustainability now exist. Indeed, to cover all of these would command a volume in itself. This is in marked contrast to the early 1990s, when there was growing recognition of the need to monitor progress towards sustainability goals, but few practical indicators existed. Put this way, considerable progress has been made in

constructing practical indicators over the past 10 years or so. The genuine saving and ISEW/GPI indicators are but two examples. In Chapter 20, Ian Moffatt outlines and assesses three further indicators, in this case focusing on physical environmental pressures: material flows, environmental space and ecological footprints. In fact, the search for sustainability indicators has become something of a mini-industry in the literature on sustainable development. So too has criticism of these indicators. Much of this criticism needs to be taken in context: it is often the case that an indicator is useful in one domain and less useful in another. For example, there is no doubting the success of ecological footprints as a rhetorical device. The analogy of a footprint – describing how biophysical limits might nominally bind on economic activity – graphically illustrates the notion of ‘living beyond our means’. Whether decision-makers should base policy directly on this information is another matter. By contrast, resource and environmental accounting, described in Chapter 17, can be extremely useful in guiding policy but it is unlikely to interest, much less excite, a broader audience. Other indicators might be made more useful if methodological problems (or, in some cases, errors) can be addressed. Take the case of ‘material flows’: highly aggregated indicators of the mass of material dragged through the economic system and the residuals that are the by-products of this activity. It is hard to take anything positive from an indicator that simply adds, say, tonnes of residuals together regardless of the harm those materials cause in the receptor environment. However, once one starts distinguishing between more and less harmful materials, in a meaningful way, then material flow accounting could represent a more useful measurement tool.

How then might policy makers make sense of the array of sustainability indicators now available? A reasonable expectation is that, over time, many of these indicators will wither on the vine. It is to be hoped that those that survive this process are the most useful, and proper scrutiny of indicators is one way in which this outcome can be achieved. This search for measures of sustainable development is unlikely to result in one indicator able to ‘out-compete’ all rivals. It is not credible that a single indicator is able to describe all relevant aspects of the development path. Thus, a better picture of whether countries are developing sustainably will require a judicious mix of indicators. With regard to the indicators that might be included in this portfolio, that crucial debate is still in its infancy.

Sustainable development at different scales

Such is the apparent appeal of sustainable development, the term ‘sustainable’ is now prefixed to numerous and disparate policy objectives. Within the academic literature, it has been variously asked how regions, local

districts (for example cities), economic sectors and corporations can be 'sustainable'. Much of this makes eminent sense even if sustainable development were solely a macro-goal, as there would be legitimate questions about how, for example, the households and corporations that comprise this society might contribute to the macro-objective. Yet, as the authors of a number of chapters in this volume demonstrate, adopting these more disaggregated approaches to understanding sustainable development might also yield additional insights.

The quest for local or urban sustainability has been understood not just as a contribution to some broader societal objective, but also as an agenda in its own right. As Yvonne Rydin explains in Chapter 21, much of the impetus for this was supplied by Agenda 21 in 1992, which provided a powerful focus for interest in local sustainability. This local perspective has led to ambitious policy aims. For example, it has been argued that, as 'global' environmental problems have their roots in ultimately local behaviour, this places an onus on tackling such problems at local levels. While this does not diminish the need for international co-operation to sustain meaningful outcomes on global problems such as climate change (where each locality's contribution, in isolation, is to say the least marginal: see Chapter 24), an intriguing example, cited by Rydin, shows how co-ordinated efforts across US cities have sought to bypass federal government reticence over climate change mitigation. One interpretation of this could be that policy makers at local tiers of decision-making provide a better reflection of their citizens' preferences than at higher tiers, the latter perhaps being all too influenced by various interest groups and special pleading. In a related vein, a distinctive feature of the local sustainability agenda has been the identification of an enhanced role for meaningful public participation in (local) decision-making.

At first blush, the idea that a particular economic sector should be 'sustainable' might be treated with derision. The economic fortunes of most sectors can be expected to 'wax and wane' over plausible development paths. Indeed, sectors such as mining clearly involve inherently unsustainable activities, although this does not in itself remove the justification for such projects. Whether there is a justification for sustaining particular sectors depends on the sector in question and what is meant by 'sustainable'. For example, some would argue the entire notion of sustaining a sector 'in perpetuity' makes little sense. Rather it is the contribution of that sector to sustainable development in some wider sense that is of real interest. However, as Clement Tisdell points out in Chapter 22, both perspectives are likely to be relevant in the case of agriculture. It is highly desirable for the *global* agricultural system to be sustainable in terms of fulfilling the nutritional needs of the world's population both now and in the future.

Certain countries may well place a premium on food security and this might further motivate concerns about sustainable agriculture within nations. While, as Tisdell notes, concern over food production failing to keep pace with demand is hardly new, contemporary issues have added some novel twists to the story. Thus it may be that the resource base on which future agricultural productivity depends is being 'homogenized', with a reliance on ever higher yielding but ultimately less resilient genetic materials (see also Chapter 5). While this drive towards uniformity in agricultural systems serves to increase food output, it might well come at the expense of sustainability.

An increasing number of corporate entities have affirmed their apparent support for sustainability through, for example, the medium of dedicated environmental or (increasingly) sustainability reports. However, Rob Gray and Jan Bebbington argue forcefully in Chapter 23 that the notion of corporate sustainability might not be as helpful as it first appears. Indeed, they argue that there is a danger this term has been captured by those in the corporate world who seek to dress up almost any action as being somehow commensurate with pursuing sustainability. At the very least, this suggests the need for a rigorous evaluation of corporate environmental or sustainability reports in the same way that corporate financial accounts are scrutinized and verified. Taking a step back, it would be a surprise (albeit a pleasant one) if, merely by shining a light on corporate activities, a sufficient number of these entities would spontaneously fall in line with society's broader environmental or sustainable development objectives. Pressures to produce reports (even those that are a true and fair reflection of environmental performance) are unlikely to change incentives sufficiently. In other words, such actions are highly unlikely to be an adequate substitute for environmental and sustainable development policy.

The international dimension

A characteristic of many natural assets that cannot be ignored is that they are not just shared across generations but also across national boundaries. The list is large and includes 'open access' resources over which there is no ownership (for example the global atmosphere and the oceans) as well as those resources owned by a sovereign state that nevertheless provide ecological services across borders (for example forests and biological resources). Inevitably, better management of these assets necessitates that hugely complex issues of international co-operation are successfully brokered. In Chapter 24, Camilla Bretteville Froyn provides compelling arguments, drawn from applications of game theory and public choice theory, that agreement between countries on managing international environmental resources cannot be presumed and that actual co-operation will

almost always be circumvented by what is within the art of the – politically – possible. This does not imply meaningful and sustainable agreement is unattainable, but, in the absence of strong and credible international governance, a number of rather exacting conditions must be fulfilled. Among these conditions is the balancing of distributive considerations, both in terms of dividing the gains from co-operation among parties and in terms of the outcomes of internal conflicts among likely winners and losers within each negotiating country. Perhaps the single major challenge is to re-orientate perceptions and incentives such that co-operation is unanimously seen as the best way forward in the face of competing domestic and international interests.

Given the undoubted and growing influence of international trade on the fortunes of the world economy and its constituent countries and regions, it was always likely that issues surrounding the impact of trade on the environment and sustainable development would loom large. Indeed, few issues have been so controversial, a point that is reflected in the range of extreme positions held. For some, trade and globalization are inherently unsustainable, arguably an unhelpful approach to what is essentially an empirical question.⁹ At the other extreme lie those who argue unfettered trade can serve many goals (economic, environmental and so on), thus being of universal benefit. In Chapter 25, Kevin Gallagher provides an overview of some of these controversies and, in doing so, outlines an array of candidate pathways whereby trade either benefits or harms the economy and environment. Interestingly, the empirical evidence continues to be mixed. In fact, recent studies have sought to make sense of this apparently frustrating finding, observing that trade openness is far from the only determinant of development prospects and that the direction and extent of its impact is inextricably linked to other policy variables (such as the strength of domestic environmental policy). However, a further concern that arises is whether the understandable desire of the World Trade Organization (WTO) to remove trade barriers in the guise of environmental protection punishes ‘bad’ and ‘good’ environmental actions in equal measure. Similarly, anxiety surrounds the prospect that international environmental agreements containing trade restrictions will fall foul of WTO rules, which is somewhat ironic given that, in certain prominent cases, these provisions have arguably been crucial in sustaining a meaningful agreement (Barrett, 2003). While these concerns have yet to manifest themselves in practice, a number of commentators have called for a counterweight World Environmental Organization.

In Chapter 26, John Vogler traces the recent historical evolution of international forums that have helped shape the contemporary politics of sustainable development. He charts the shift in this political debate from a

primary emphasis on environmental issues at the 1972 Stockholm Conference, through a shared focus on environmental, social and economic development at the Rio de Janeiro Earth Summit in 1992, to arguably a primary emphasis on poverty alleviation at the Johannesburg World Summit in 2002. This does not necessarily mean environmental protection has been effectively sidelined, of interest mainly in its capacity to alleviate poverty. Rather, it would appear that what began as a call to protect the environment in the service of human development has become a more specific call to *prioritize* improvements in the well-being of the very worst-off now and in the future. It is likely, of course, that this change in emphasis will result in different environmental priorities (see also Chapter 11). Vogler draws the general conclusion that the principle of sustainable development has become firmly embedded in the international political system. However, he argues this offers cause for both 'hope' and 'despair'. On the one hand, it is clear from any analysis that regional and national self-interest has played a major role in the international politics of sustainable development, often throwing up more obstacles than opportunities. On the other hand, the 'institutionalization' of sustainable development – through which it has acquired a momentum all of its own – might help to shape and alter national perspectives of self-interest, thus facilitating deeper agreement and action than might otherwise have prevailed.

A major source of friction in international discussions on sustainable development surrounds the question of whether the programme requires additional and substantial financing. Accepting this is the case, there is doubt over whether the necessary international transfer of funds will be forthcoming. However, it would be quite wrong to abandon all hope that this challenge can be met, as argued by the late David Pearce in Chapter 27. Given David's important and influential contributions to the understanding of sustainable development, it is fitting that we leave him the last word in this volume. Towards what sadly turned out to be the end of his life, David became interested in how the substantial financial flows that need to be levered to secure sustainable development can be motivated by eminently sensible economic arguments. His source of inspiration, as outlined in Chapter 27, was the notion of a Coasian bargain (Coase, 1960), whereby a 'polluter' has a property right underpinning their current (unsustainable) behaviour – perhaps because a threatened biological resource is sovereign property – such that it is in the interests of the 'sufferer' (or beneficiary of conservation) to pay the polluter to change their behaviour. As the chapter points out, overcoming well-known obstacles to these Coasian bargains remains a challenge, but if these can be navigated then it motivates possibly substantial financial flows linked to payments for environmental services: so-called market creation initiatives. The current vernacular is that these

created markets can be ‘pro-poor’, thus ticking two boxes *vis-à-vis* concern about sustainable development. Similarly, the development of novel financial instruments to deal with environmental threats – such as climate-related risks – offers at least a cautious note of optimism to the effect that financial expertise can be harnessed to deliver sustainable development.

Concluding remarks

Almost two decades after the publication of the Brundtland Report (WCED, 1987), the debate on what is sustainable development, how to measure progress towards it and how to put sustainable development into practice has come a remarkably long way. This volume is in many ways an exercise in account-taking of what has been achieved, on which aspects consensus has emerged and what remaining challenges lie ahead. Much more is known now than 20 years ago, and there is general agreement on a great deal of the fundamentals of sustainable development. That said, as this volume illustrates, there are many areas of continued disagreement. This suggests that there is much more to be learned and that the study of sustainable development will continue to be a thriving area of research. To reiterate the sentiments we outlined at the outset of this chapter, while this volume cannot, and indeed could not feasibly, do justice to all aspects of sustainable development, we believe that the contributors have covered a wide range of the most important topics in this expansive field. Our hope is that readers will enjoy these excellent contributions as much as we have in the course of assembling this volume.

Notes

1. While there is some debate about when exactly this terminology entered the literature, the main ideas can be found in Pearce et al. (1989), as well as Daly (1994).
2. The intellectual case for this position is set out in, for example, Solow (1992) as well as Chapter 3 of this volume.
3. Thanks are due to Kirk Hamilton for helpful discussion relating to these points.
4. These countries thus have a ‘negative genuine saving rate’: this concept is explained in more detail later in this chapter.
5. Hamilton and Bolt (in Chapter 18) note that if we are facing a threshold problem, then the saving analysis will signal unsustainability as long as the marginal damage curve is smooth as the threshold is approached. So if the threshold is one arising from clearing forest land, what this means is that as the forested area declines to the critical or threshold amount, arbitrarily large losses in well-being are associated with deforestation of a further hectare. However, if the marginal damage curve is kinked and becomes vertical at the threshold, then the saving analysis does not forewarn us of a problem. In the forest example, this means that while all seems well before the threshold, an unpleasant surprise awaits around the corner if deforestation continues.
6. For some countries it is possible to adopt existing, more advanced and perhaps cleaner technologies from more technologically advanced countries (see, for a recent discussion, Perkins and Neumayer, 2005).
7. While at the margins so-called ‘win–win’ options may exist, the pervasiveness of these easy options can be seriously questioned.

8. It is notable that genuine saving approaches have been concerned as much with fleshing out the theoretical properties of the link between saving and sustainability as with practical issues about measurement. By contrast, for example, the ISEW and other similar approaches have been measurement-driven with little reference to theory. Clearly, measurement is a pressing aim given that current systems of economic indicators do not clearly signal that an economy is on or off an unsustainable path. However, there is also a critically important role for conceptual work which formally examines the properties of indicators and their measurement, not just on optimal development paths but also, more importantly, for 'real world' economies which diverge substantially from optimality (see, for example, Dasgupta and Mäler, 2000).
9. Chapter 20 notes that prominent indicators have been produced which rest heavily on this assumption.

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