

Introduction

M.A. Mohamed Salih

Progress towards sustainable development has been agonizingly slow, raising questions as to whether the struggle for sustainability of the environment and its life support capacity are destined to be lost.¹ Ominously, negative environmental trends have not reversed in any satisfactory manner and in some cases the trends are worsening rather than improving. Climate change typifies these growing negative trends owing to its integrative nature and the intractable problems it is most likely to generate without adoption of prudent adaptation and mitigation measures. In this respect, the evidence available suggests that climate change is contrived to pose formidable challenges to two mutually reinforcing global agendas: sustainable development and poverty reduction.

Obviously, climate change impacts would have discernable consequences for states and people's ability to pursue long term environmentally sustainable development, including the quest for social justice and equity among and between generations. Several publications also reveal that climate change is most likely to make the poor poorer and the more vulnerable less capable of coping with the consequences of environmental degradation. Should bleak scenarios of rising global temperatures beyond tolerable capacities occur, the poor will become less capable of pursuing long term sustainable livelihood strategies in favour of immediate short term survival tactics, thus jeopardizing sustainable development. Likewise an increase in energy consumption for industry, residential areas and the transport sector will be significant as population, urbanization and industrialization grow in both the advanced industrial and the developing countries. Moreover it is likely that climate change will influence the pattern of change in energy consumption, which could have significant effects on CO₂ emissions (IPCC 2007a, pp. 488–9).

In this volume, there is a general realization that the global context of sustainable development has changed significantly since its inception during the late 1970s. As a result, the structural relationship linking climate change, sustainable development and poverty reduction has changed and should be explained and analysed within the new global context dominated

by an ascendant globalization. At least five factors distinguish the present global context of sustainable development from the time of its initial conception.

1. Increase in environmental consciousness and the consolidation of the multilateral sustainable development institutions, public and movements. This has ushered in a dramatic increase in the numbers, diversity and quality of environmental actors and institutions as major players in environment and development efforts at the local, regional, national and global levels.
2. Mutually reinforcing and structurally linked fate of climate change, sustainable development and poverty reduction, whereby failure in one is most likely to undermine the other two
3. Climate change policies are also part of sustainable development, with its linkages to poverty reduction interventions presently conceived and implemented under a new global context of development dominated by considerable reliance on fossil fuels, increased demand for materials and commodities, the information and communication technology (ICT) revolution, economic liberalization and free trade accompanied by significant progress in the triple heritage of democratic governance, human rights and the rule of law.
4. Unprecedented global economic growth during the last two decades, which witnessed India and China rise, along with the reemergence of other Asian and Latin American countries, from the economic crisis of the late 1990s with considerable contribution to the global economy.
5. Emergent economies' formidable demand for commodities, raw materials, food, minerals and energy in order to sustain their accelerated industrialization and a fast growing population, with altered consumption habits and patterns. There are also increasing demands and efforts to harness alternative energy sources, dematerialization and contemplation of innovative concepts such as ecological cities and new generation environmental technologies.

The post 1990s global context of sustainable development is also the context of a renewed poverty reduction effort under the aegis of the Millennium Development Goals (MDGs). Notably, the Johannesburg (2002) World Summit on Sustainable Development mandate was to develop policy-instruments for implementing already agreed upon global commitments, particularly those made in Rio in 1992 and the more recent MDGs. In other words, the Johannesburg Conference was not an attempt to revisit sustainable development's original objectives as envisaged a few decades

ago, but to serve as a contributor to the MDGs. In a sense, an explicit linkage with poverty reduction added an extra dimension to the complex relationships involving climate, among other environmental problems. Below are four examples of MDG goals:

1. Integrate the principles of sustainable development into country policies and programmes and reverse loss of environmental resources;
2. Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss;
3. Reduce by half the proportion of people without sustainable access to safe drinking water and basic sanitation; and
4. Achieve significant improvement in the lives of at least 100 million slum dwellers, by 2020 (UN Millennium Declaration 2000).

The Johannesburg Declaration (2002) was conceived within the confines of the new context of sustainable development as influenced by globalization, the liberalization of trade and the triple heritage of democratic governance, human rights and the rule of law. More than any other global environmental problems, climate change has taken centre stage in global public policy, traversing many environmental, developmental and trade issues pertaining to economic growth and the quality of life of the rich and the poor. In other words, one can view climate change and its consequences as metaphors for development failure coupled with the slow pace in implementing a sustainable development agenda during the last 30 years.²

Reflecting on the current democratic dispensation, command and control environmental policies reminiscent of the nondemocratic policy development and implementation during the Cold War was replaced by more democratic and largely participatory processes involving states and an array of nonstate actors.³ Elinor Ostrom offers, in this volume, federal systems of common-pool resource governance as an alternative to centralized and individualized command and control blueprints. Ostrom, after reviewing studies of polycentric governance systems in metropolitan areas and on the management of common-pool resources, argues that providing and producing public goods and common-pool resources require different institutions to open, competitive markets or highly centralized governmental institutions. Ameliorating Opschoor's (2004) work in this field, Ostrom recognizes that for such an understanding to prevail there is need for analytical approaches consistent with a public sector that encourages human development at multiple institutional levels: local, regional, national and international. Ostrom explored a number of research themes – creativity in producing collectively, public goods and common-pool resources. Various actors, both in the rural and urban

environments and at multilayer levels and governance arrangements, adopted some of these innovative approaches. In case study after case study, Ostrom challenges the universal relevance of the view that local actors are individualistic self-interest seekers and blind to the interests of the collective. Ostrom laments that in thinking about the production of public goods and common-pool resources, researchers and policymakers alike should design principles (that define the boundaries of a resource system; proportional equivalence, collective choice arrangements, endogenous monitoring, graduate sanctions; minimal recognition of rights; and nested enterprises) rather than blueprints. Principles rather than blueprints have proven to offer genuinely innovative methods for engaging this enduring aspect of human behaviour linking environmental resources and collective welfare.

Turner and Fisher (in this volume) propose alternative ecosystem service approaches sensitive to social capital, collective-action capacity and the environmental, social and material needs of the most vulnerable in society. Turner and Fisher reorient ecosystem service approaches, originally developed to strengthen the link between well functioning ecosystems and the flow of economic benefits these systems generate, on a long term basis, and their use for poverty alleviation and human well being. The authors critically and creatively assessed and articulated the role of ecosystem approach (ESapp) for the achievement of the twin objectives of conservation and human development and its apparent relevance to the current debate on how to achieve the MDGs. Turner and Fisher have succinctly examined three key research issues that an ESapp must accommodate: 1. marginal changes in landscapes or seascapes; 2. apply the precautionary principle; and 3. capture ecosystem service benefits such that realizable welfare gains flow to people. With these caveats in mind, the implications of ESapp as a tool for informing policy implementation as to whether the poor really do gain in PES schemes. There is also the need to recognize that if PES programmes proliferate, there will be a macroeconomic impact on a national scale in the form of higher food prices, labour and land costs, indirectly conditioning the livelihoods of the poor. However some other caveats are important, including land to be set aside to ensure service provisions are only likely to benefit the poor if they themselves own the land and if the land is characterized as low grade agricultural land but not high grade ecosystem services land. There are also possibilities for tapping into social stocks as an alternative or supplementary approach to ecosystem service maintenance. Institutional arrangements and transaction costs will play a significant role in whether poor people gain from PES schemes. On the whole, conclude Turner and Fisher, ESapp would serve

as a policy instrument for analysing and synthesizing relevant knowledge and provide mechanisms for capturing the benefits that flow from healthy ecosystems and their services. However the challenges that an ESapp approach can overcome remain formidable. It requires a careful consideration of time, space and context, the need to *set* for the least advantaged groups in the current generations, and the long run *opportunities set* across generational time. Not to underestimate the potency of collective-action both within PES schemes and as an alternative approach, acknowledging that the incorporation of ecosystem service assessments into policy and development contexts should go some way towards internalizing costs.

Clearly resource management systems and approaches to ecosystem service generation and distribution, according to Ostrom, and Turner and Fisher are influenced by the institutional instruments devised to ensure that they enhance the well being of the many and not the few. This is more so under democratic conditions that respect polycentricity and cultivate people's inner strength and capabilities.

CLIMATE CHANGE, DEVELOPMENT AND POVERTY REDUCTION

The current state of knowledge about climate change and its consequences tells us that:

observational evidence from all continents and most oceans shows that many natural systems are being affected by regional climate change, particularly temperature rise; a global assessment of data since 1970 has shown that it is likely that anthropogenic warming has had a discernible influence on many physical and biological systems; impacts due to climate change will vary regionally but aggregated and discounted to the present, they are very likely to impose net annual costs which will increase over time as global temperatures increase (IPCC 2007a, p. 25).

Beyond changes in temperature, which impact physical and biological systems, are the social costs of climate change superimposed on the present vulnerabilities that therefore affect the poor and vulnerable most. Climate change means severely reduced precipitation in some regions thus further reducing access to drinking water, health and nutrition by threatening food security and in countries whose economies are dependent on agriculture, the macroeconomic cost of climate change will certainly be high. It is important to understand the intensity of the negative human development impacts of climate change on the poor, in conjunction with the 2007

Human Development Report (HDR) of the United Nations Development Programme (UNDP). It reports that, 'there are around 1 billion people in the World living on less than USD 1 a day, with the number increasing to 2.6 billion (or 40 per cent of the World population) people living on less than USD 2 a day' (UNDP 2007, pp. V, 25). Noting that the majority of the poor live in rural areas and depend on natural capital for their livelihood, apparently, the environment and development agendas in developing countries are not separable from the negative impacts of climate change.

In this volume, a number of chapters address the thorny relationship linking climate change, development and poverty reduction. For example, Fortman attempts to connect the economics of sustainability with the politics of security by examining these relationships in respect to major reconceptualization of the meaning and applications of environmental security in a multilayered framework that explores the local, regional and global processes that contrived to contribute to the environmental crisis. An important element of Fortman's chapter is his concern with the distribution of risk, which is, by necessity, about the distribution of justice, involving the major contention that markets are rational and could, therefore, be expected to ensure justice without state intervention or that free trade behind closed borders works equally for the poor and the rich? The challenge to global public provisioning projects such as the MDGs is how to combine the noble endeavour of feeding the poor and vulnerable populations, while preserving the natural resource base and the environment, responding to environmental crises, global poverty and exclusion.

Gupta's commentary on the relationship between climate change, development policies in the industrially and affluent North and the impoverished South bears the hallmark of the challenges climate change poses for development policy and practice. Gupta's chapter offers an expansive and substantive commentary on these issues. She commences with the following pertinent questions: How logical is it to link climate change to development aid? And, what can climate change assistance learn from the history of development aid? Gupta approaches these two questions as follows: First, she provides the reader with very useful background information on the evolution of climate change, funding and aid discourses, before moving to address the two questions. Gupta's conclusion is startling. Although it makes good practical sense to link climate change policy-instruments with existing development aid measures, it will remain politically sensitive, as the South will view this as retracting from the original commitment the developed countries made to them. She purports, until and unless new and additional resources from the North are available to the South, the packaging and evaluation of development aid needs should be substantially increased.

Three contributions (Spoor, Darkoh and Khayesi, and Murshed) are illustrative of Gupta's thesis on the synergetic effects linking spatializing development and environmental discourses in the context of global restructuring. Darkoh and Khayesi's chapter, for example, finds inspiration in recent geographic research on spatializing development and environment discourses. They focus on sustainable development and globalization and show that spaces (connoting the broader definition of environment as our surroundings) are central to understanding the consequences of development and globalization on sustainable development. Darkoh and Khayesi's concern is primarily with development and globalization where environmental resources and their respective goods and services are very limited. Examining the dialectical relationships between environment, sustainable development and globalization in a space sensitive analysis, they offer an integrated assessment. Their chapter yields profound insights into how different societal forces operate to produce and oppose the production of spaces along with related socioeconomic configurations. The chapter provides a few examples of how the complex interaction and processes lead to sustainable development and globalization may be spatialized, thus projecting a real life synthesis of their consequences on human existence. The implications of this chapter for the pertinent findings of Turner and Fisher, Dietz and Gupta are far reaching. Compounding sustainability challenges are factors not immediately obvious in a linear or singular explanation of the environmental crisis and its potential remedies and policy subscriptions.

Spoor's contribution articulates the role of cotton production in Central Eurasia, which contributes to the already harsh livelihood conditions, rural poverty and environmental degradation. Spoor argues that despite robust overall economic growth in this region, poverty in rural areas has not declined as rapidly as in urban areas. This has created an imbalance emanating from extensive state intervention in agricultural production, marketing and processing, as well as a lack of palpable support for individual agriculture. However, despite dire conditions for the poor and negative environmental impacts, Spoor observes that cotton is particularly profitable for the processing and trading sector in the supply chain. It benefits state officials involved in the regulatory framework, rather than the producers. Spoor notes that sustainable management of environmental resources such as land, water and forest does not have the priority. Inadequate irrigation and drainage practices and decaying infrastructure contribute to environmental degradation, begging for urgent action to modernize the institutional frameworks of cotton production, marketing, as well as irrigation and drainage infrastructure among other better environmental management measures.

Even if the policy context of sustainable development is ripe and implementation is relatively successful, environmental resources have often been arenas for conflict. In most cases, conflicts herald two processes that undermine livelihood and environmental sustainability: poverty and underdevelopment. Murshed critically explores two phenomena that have recently been utilized by political economists, political scientists and others to explain conflict onset – greed and grievance – over valuable natural resource rents, relative deprivation and the grievance it generates. Each within its own internal dynamics and the external environment, separately or combined, greed and grievance are potential explanations for the factors that fuel conflict. However, Murshed argues that the mere presence of greed or grievance alone is insufficient explanation for the outbreak of violent conflict, without, for instance, institutional breakdown such as the failure of the social contract between citizens and the state. It is ominous that environmental degradation and exploitation by corrupt governance and greedy elites enhances the degradation of the social contract – most likely in the context of poverty and growth failure.

Hartmann questions the efficacy of the current debate on what is framed as climate change security by arguing that whether violent conflict and mass migrations occur depends on so many other factors that it is far too simplistic to see climate change as a major cause or trigger. Moreover, she argues that such threat scenarios ignore the way many poorly resourced communities manage their affairs, without recourse to violence, and that violent conflict in the Global South is much more connected to resource abundance (rich oil and mineral reserves, valuable timber and diamonds, to name a few) than resource scarcity as such. Power structures, that determine whether conflict over resources turns violent or not, motivate any relationship between climate change and conflict, according to Hartmann. In her view, the linkage between environment and security is reminiscent of the neoMalthusian environmental security discourses of the 1980s and 1990s. This line of reasoning, laments Hartmann, not only profoundly naturalizes political conflicts, but also casts poor people as victims-turned-villains.

The contribution to explaining the onset of resource conflicts (Murshed) and the critique of climate change as a natural cause of security (Hartmann) are in the environment development nexus and are illustrative of the stark contrasts of the sustainability questions posed under abject poverty and affluence. The struggle for sustainability is being waged under various governance arrangements and processes: democratic or authoritarian. The worst of these are violent conflicts, the subject matter of Murshed's theoretical and empirical contribution, which undermine long term sustainability and progress towards poverty reduction.

Ecological Cities

Environmental transformations due to urbanization and industrialization imply environmental health related to or because of exposure to large scale change of the scale and nature of biological pathogens, chemical and physical hazards and psychosocial stressors. According to Satterthwaite, this change can be positive for human health (such as water and sanitation systems that greatly reduce human contact with biological pathogens) or negative (such as inadequate drainage in settlements providing new breeding grounds for disease vectors); for instance, in many tropical areas, mosquitoes are the vectors for malaria or dengue fever (Satterthwaite 1997). Another aspect of large urban environments is their ecological footprints, meaning that they place higher demands on nature, not only from their surroundings and from national natural capital, but also globally, which includes air pollution and greenhouse effects (Wackernagel *et al.* 2006; McManus and Haughton 2006; Newman 2006; Satterthwaite 1997).

Increasingly the alternative sought to negative elements of urban environmental change is the establishment of ecological cities, a concept popularized by environmentalists and policymakers as a potential solution to urban environmental hazards.

Interpreting Kenworthy's (2006) ten dimensions for sustainable city development in developing countries, van Dijk develops an analytical framework that can possibly be used to meet the challenges of determining whether certain such initiatives qualify for the ecological city praxis (or theory of practice). He engages ecological city initiatives developed by the Chinese government in response to the myriad of environmental problems emanating from rapid rural–urban migration, urbanization and industrialization. These initiatives include alternative building techniques and materials, drinking water treatment and sanitation methods. The chapter is inspired by the Switch project (Sustainable Water Improves Tomorrow's Cities' Health) that aims at a paradigm shift in urban water management, with the main purpose of making water treatment more sustainable, reducing risks such as water related diseases, droughts and flooding. It explores whether the Chinese Government's efforts will contribute to a broader thinking, building the ecological city of the future. While at the city level, the emergence of ecological neighbourhoods is leading to individual initiatives capable of triggering new markets and incentives. The chapter grapples with the question of whether the Chinese (and others) ecological cities' initiatives are precursors of future developments inspired by more ecological urban water systems or a very different, more integrated approach to a number of related environmental issues. Conservation and sustainable use of environmental resources in ecological cities can benefit from the debate

on dematerialization and efficient use of materials necessary for the production and reproduction of urban life and modern human settlements, as van den Bergh and associates illustrate as depicted in the following section of this introduction.

Digital Dematerialization

Dematerialization is the shift in consumption and production in favour of less material-intensive products and services, using advanced technology and recycling to boost efficiency in material use. The emphasis on consumption and production patterns underlines the intricate relationship between economic growth, consumption, poverty, inequality and the environment. Dematerialization also implies the need for new and more efficient technologies put in service for sustainable development through New Generation Environmental Technologies (NGETs). NGETs support a new approach to environmental protection, which raises important questions for both private industry and government policymakers. Can such technologies enable widespread decoupling of environmental impact from economic growth? Or will they remain confined to isolated pockets of success? If the former is indeed possible, what steps must government and the private sector take to bring NGETs to their full potential? Over the past decade, the governments have pursued a variety of programmes to explore the development of these new approaches (Lempert *et al.* 2003, p. 3).

Van den Bergh and associates take up this theme in respect to digital dematerialization asking similar questions and building on their earlier work. For example, Ayres and van den Bergh proposed an alternative approach to modelling growth with the environment that meets the needs of information for current debates, involving at least two modifications of conventional growth theory.

First, to explain the growth of output, be it in monetary (income) or physical terms, it must reflect the existence of self-reinforcing feedback mechanisms or growth engines apart from population growth and the traditional savings–investment–capital accumulation mechanism. Second, a modified growth theory should explicitly reflect the fact that important (i.e. scarce) factors of production in economics can and do change over time. When non-renewable natural resources were perceived as available without limit (i.e. not scarce), they could be formally regarded as intermediate products of scarce labor and scarce produced capital (Ayres and van den Bergh 2005, p. 97).

Ayres and associates underpin the major challenges confronting alternative development from a digital dematerialization that could assist social and natural scientists and policymakers' efforts to to have a better

understanding of sustainable economic growth that uses materials efficiently.⁴ Van Dijk's assessment of ecological cities development is followed by van den Bergh and associates chapter on 'Digital dematerialization'. Clearly, their chapter is inspired by Professor Hans Opschoor's research on material-product chains. Their aim is to develop a framework for understanding the total, direct and indirect, impact of ICT on materials use. After identifying the economic mechanisms involved (price, income and information effects; substitution, sectoral change, changing preferences and economic growth), van den Bergh and associates take into account the material and energy intensive production of ICT equipment. The questions they raise are important. If the implementation of ICT technology can contribute to increases in the productivity of production factors, such as labour, capital and natural resources, the logical question in the context of environmental studies, then, is whether improved resource productivity implies beneficial impacts on material and energy use, and indirectly a reduced pressure of economic activities on the environment. The overall assessment here is that while ICT contributes to dematerialization at the micro level, this does not necessarily lead to absolute dematerialization at the macro level of the economy. The authors offer at least two compelling factors to explain this anomaly: 1. Various economic mechanisms come into play when changes associated with implementation of ICT occur at the micro level thus neglecting the production of ICT itself, which apparently also uses many diverse materials and energy sources. 2. Efficiency gains, in terms of material and energy use in production and consumption, incorporate ICT production costs and, consequently, contribute to the decline of commodities. Together with information technology, according to the authors, effects and interaction between related markets may stimulate consumption, new preferences, activities and consumption patterns.

Whether digital dematerialization is a panacea for material conservation or not, van den Bergh and associates' overall assessment is sombre as there is no reason for optimism about the material saving net effects of widespread use of ICT in economic production, goods and services. However, they also provide sufficient evidence to suggest that there is potentially a guarded optimism for a better understanding of environmental challenges and benefits associated with NGETs.

Biofuels Versus Food

Among the challenges confronting the sustainable development and environment agenda is the current increasing interest in biofuels; described by Mol as 'fuels that are directly derived from biological sources'. According to Mol, sources that lead to specific products in biofuel production are

classified into four groups; of these, the first two are in common use while the latter two are still experimental.

1. Cereals, grains, sugar crops and other starches that can be fermented fairly easily to produce bioethanol, and can be used in their pure state or blended with fuels;
2. Oilseed crops, such as sunflower, rapeseeds, soya, palm and *Jatropha* that can be converted into methyl esters (biodiesel) and blended with conventional diesel or burnt as pure biodiesel;
3. Cellulosic materials, including grasses, trees and various waste products from crops and wood processing facilities as well as municipal solid waste that can be converted into a newer generation of bioethanol (via enzymatic breakdown or acid hydrolysis, followed by fermentation); and
4. New biodiesel technologies, such as the Fischer-Tropsch process that synthesizes diesel fuels from different biomasses (such as organic waste material) via gasification (Mol 2007, p. 298).

Biofuels such as bioethanol and methyl esters are renewable, considered environmentally friendly, potentially less hazardous and can, therefore, provide cleaner energy.⁵ These fuels entered the climate change debate as potential alternatives to fossil fuels and as an important energy source at a time of high food and energy prices. However, the volatility of the World Economy, blamed partly on high oil prices overshadows the polemic between climate and food security, epistemic communities, policymakers and activists.⁶ On the other hand, Plieninger and Bens lament, first generation biofuels (such as grain ethanol or rapeseed-based biodiesel) overwhelmingly take the form of energy crops. In most cases these are grown on fertile soils, where direct competition between food and fuel production arises (2008, p. 273). Conservationists are also worried about the prospect that the production of biofuels could undermine conservation efforts by claiming lands originally set aside for conservation. Biofuels challenge ideas preoccupied with conservation such as tree planting as an antideforestation, soil and water conservation measure as well as for the promotion of sustainable fuel-wood production and energy saving stoves for rural households in developing countries.

Rob Vos, recognizing that food prices surged in recent years, food security is under threat in many poor countries and more than 100 million people may have fallen into extreme poverty because of the recent food price hikes alone, articulates the debate on the biofuel versus food subtheme. Rising food prices coincided with rising energy prices and a growing sense of energy insecurity. The rising food prices have resulted

from a number of factors enacted on both the supply and demand side of food markets. There has been a relative neglect of agriculture, especially in developing countries, over several decades and productivity growth has fallen well short of demand for food. More recently weakening financial markets, rising oil prices and concerns about energy security in developed countries caused further upward pressure on food prices, especially for basic grains. It is amid these agricultural policy deficits, argues Vos, that biofuel production (from basic grains, sugar and oil seed crops) expanded strongly, thanks to generous subsidies in developed countries. However this has occurred at the cost of land use for food production for human consumption and with very limited impact on improving energy security or mitigating climate change through the use of this source of *clean* energy. Vos purports that, under the prevailing technologies, biofuel subsidies are not cost effective, from an economic or environmental perspective. Because of the impact on food prices, they are also undesirable from a humanitarian perspective and hence require reconsideration, along with a new approach towards food production in developing countries.

CONCLUSIONS

The overall structure of the book consists of at least five subthemes directly or indirectly addressing the challenges of sustainable development failure and subsequent escalation of climate change as it pertains to poverty reduction. Emergent issues such as digital dematerialization, ecological cities and concrete proposals for ecological services and distribution explicit in climate change form a substantive crosscutting issue within the new global context of sustainable development.

1. *Analyse common-pool resource management and ecological service principles and policies within the current debate on democratic governance, with an added emphasis on the need to include the poor.* The contributors, situated within the debate on environmental democratic governance, articulate the need for respect of diversity in environmental management and ecoservice approaches and policies. These contributions offer alternative approaches for natural environmental resource management based on polyarchy, the recognition of multiplicity and context-based democratic governance.
2. *Repositioning the debate on climate change injustice to one of sustainable development's most enduring legacies (that is justice between and among generations).* Some contributions to this volume are concerned with climate change injustices resulting from the prevailing international

political economy and law of environmental management, articulating the current debate on right-based approaches from a climate change perspective. In particular, the contributors delineate the normative and practical dilemmas of unequal distribution of impacts, unequal responsibility for the cause of climate change, unequal costs incurred by poor and rich, and for mitigation and adaptation between and among generations.

3. *Revisiting, elaborating and deepening the environment and development debate.* The approach of this subtheme makes reference to a range of perspectives from: (a) Environment and development policymaking in the North in respect to climate change. (b) Comparing and contrasting development and environmental policy approaches and emphasis, within a rapidly changing context of development. (c) The need to identify what parts of nature are sustainable and what parts could be forsaken in the bid to balance developmental and climate change effects on humanspace and ecospace. (d) Conflicts over environmental resources and distributional justice cannot be explained by greed and grievance alone or in isolation from other social justice concerns. A synthesis of the greed and grievance hypothesis along with its relationship to a failing social contract, provide a complete and more comprehensive understanding of the causes of the onset of resource conflicts or cooperation among diverse resource users. (e) An explanation and analysis of climate change and the conflicts surrounding it not as natural phenomena but as a social problem that generates conflicts of interests far beyond the simple fulfilment of the neoMalthusian prophecy.
4. *Exploring the most recent sustainable development alternatives, their pros and cons, particularly, digital dematerialization, ecological cities and the controversy surrounding the debate on biofuels versus food.* Although digital dematerialization may (or may not) contribute to efficient production or ecological cities, it may (or may not) provide better-built living environments. The real challenge is, how to create conditions where such new responses to environmental degradation also benefit the poor and duly contribute to poverty reduction. Do the ecological footprints of ecological cities differ from any other cities, knowing that, generally, cities are densely populated and consumption is concentrated thus generating impacts that traverse the cities and their nation's geographic boundaries? Cities are also spaces that magnify the digital divide. Hence uneven benefits of digital dematerialization together with possible unequal distribution of potential negative environmental change impact climate change.
5. *Examining the complex relations involving climate change and its implications for two major global agendas: sustainable development*

and poverty reduction This is a major subtheme running throughout the book; dealing with climate change, sustainable development and poverty reduction simultaneously; climate change and sustainable development, or the contribution of climate change to processes that could possibly undermine poverty reduction.

Climate change challenges to sustainable development and poverty reduction are different from those prevalent during the 1980s and 1990s. While during the 1980s and 1990s, research on sustainable development tended to negate economic growth under the limits to the growth hypothesis or to treat it as a poverty reduction misfit has given way to a new dominant paradigm, it considers economic growth a prerequisite for poverty reduction and a positive contributor to better standards of living. Others, of course, continue to treat economic growth as an instrument for wealth generation, accumulation and concentration that can hardly benefit the poor even if better environmental conditions are maintained and higher growth rates are achieved.

In a sense, the contributors to this volume maintain some continuity and build on the accumulated knowledge and major concerns that prompted the call for sustainable development more than 30 years ago. Collectively, we ask whether a balance between economic growth (or the quality of growth) and the increase (or decrease) in the social and environmental cost of production, including, for example, trade offs between consumption and pollution, is possible. As the contributors have illustrated, the answers to these questions and their consequences for society are not only economic, but also social (poverty, inter and intragenerational equity) and political (resource competition, conflicts and a shrinking environmental space).

The question that the contributors to this volume have not dealt with, due to limited space available in this volume, is the evidence of how climate change impacts would look should the alternative proposals provided here, such as better ecological services delivery, decentralization, polycentricity, ecological distribution justice, ecological cities and digital dematerialization, pose indirect contingent limits on global environmental sustainability? An important allied question is whether these alternatives provide sufficient trade offs to justify their efficacy and subsequent adoption as policy measures towards sustainability. Certainly, this requires another volume specifically devoted to answering the question, under what specific global economic and environmental policy conditions and instruments will the alternative policy responses articulated in this volume suited to climate change abatement, sustainable development achievement and poverty reduction be possible?

NOTES

1. Beckerman 2003; IPCC 2007; Brown 2007; UNDP 2007; among others.
2. World Summit on Sustainable Development 2002. Johannesburg Plan of Implementation and Johannesburg Declaration on Sustainable Development
3. WTO 1999 Report prepared by International Institute for Sustainable Development on the WTO, trade and environment.
4. For example, Wernick *et al.* (2001) and UNDP (1998) Human Development Report on Consumption in the case of developing countries or the philosophical debate between Feigl (1962) and Hansen (1962) and its contemporary relevance for most of the major literature on industrially advanced countries.
5. McLaughlin and Walsh 1998; Pimentel and Patzek 2005, 2006; Mol 2007; Crutzen *et al.* 2007; Plieninger and Bens 2008, among others.
6. According to IMF Chief Economist Simon Johnson, the slowdown in the world economy can be attributed to the slow growth of the US economy, volatile oil, high food prices, fluctuating financial markets and continued inflation.