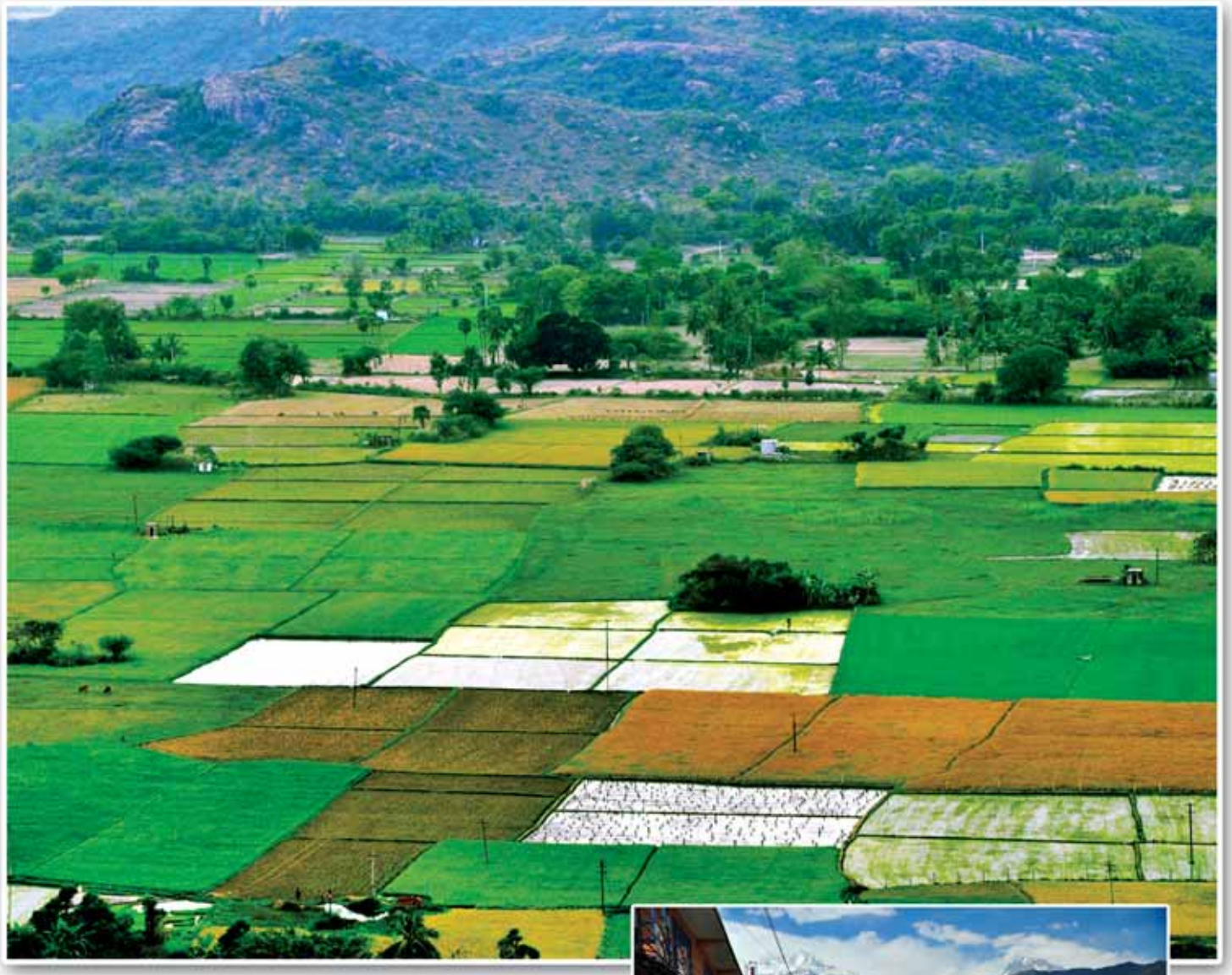
DISCUSSION PAPER

Green Economy in South Asia

challenges and opportunities



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Acronyms and abbreviations

APEC	Asia–Pacific Economic Cooperation
CDM	Clean Development Mechanism
CO_2	Carbon di-oxide
EG	Environmental goods
EGS	Environmental goods and services
EPP	Environmentally preferable products
ESCAP	Economic and Social Commission for Asia and the Pacific
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross domestic product
GHG	Greenhouse gas
IFC	International Finance Corporation
MSME	Micro, small and medium enterprises
NAMA	Nationally appropriate mitigation action
NAPCC	National Action Plan on Climate Change
NMEEE	National Mission on Enhanced Energy Efficiency
OECD	Organisation for Economic Co-operation and Development
PAT	Perform, Achieve and Trade
PES	Payment for environmental services
R&D	Research and development
REC	Renewable Energy Certificate
REDD	Reducing Emissions from Deforestation and Forest Degradation
SAARC	South Asian Association for Regional Cooperation
SDGs	SAARC Development Goals
SHS	Solar home systems
SSWA	South and South-West Asia
TERI	The Energy and Resources Institute
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change

Contents

Executive summary

The United Nations Environment Programme (UNEP) defines a "green economy" as one "that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities". It makes a tantalizing claim that "a green economy grows faster than a brown economy over time, while maintaining and restoring natural capital". Rising oil prices, the financial crisis of 2008, and the ever growing debate around global ecological crises, including climate change, can be seen as key triggers for the pursuit of green growth worldwide.

The Rio+20 Conference has triggered renewed interest and emphasis on potential pathways to achieving green economy outcomes in both developed and developing countries. Its outcome document states that a green economy "should contribute to eradicating poverty as well as sustained economic growth, enhancing social inclusion, improving human welfare and creating opportunities for employment and decent work for all, while maintaining the healthy functioning of the Earth's ecosystems." It further mentions that each country—whether developed or developing—can choose an appropriate approach, with respect to a green economy, which is in accordance with its respective national sustainable development plans, strategies and priorities. The expectation is that it will be politically more feasible to introduce domestic policies that will help in the development and deployment of technologies to reduce emissions and improve resource use efficiency. This will create competitive advantages in the economy and result in market opportunities for such technologies.

The stalemate in international negotiations on adopting a global agreement on climate change has shifted the focus to ongoing national level green growth strategies and their possible scaling up through regional cooperation. In the case of South Asia, although developing countries in the region have contributed only a meagre share of the historic global greenhouse gas emissions, the region is emerging as a notable contributor in recent times. On average, emissions have risen at about 3.3 percent annually since 1990—more rapidly than in any other region except the Middle East. Except in Afghanistan, the per capita emission of energy-related carbon di-oxide is projected to increase by two to six folds between 2005 and 2030.

For a significant deviation to happen from this future emissions scenario, South Asian countries need to switch to cleaner alternatives away from coal and petroleum. A technology-led approach aimed at market competitiveness, which has worked in countries like South Korea and Germany, may not be entirely appropriate in South Asia. Any roadmap for a switch to a green economy in South Asia cannot ignore the forms of exclusion and vulnerabilities that currently characterize the socio-economic context of the region.

The core argument of this paper is that South Asia needs to conceptualize a green economy that is relevant to the

current socio-economic trends in the region. The focus has to be on inclusion and resilience, which has important implications for the choice of technology and the design of public policy. South Asian countries would need to move on a path which would promote high human development with a low environment-related footprint.

South Asia would need both technological and human capacity to not follow a development trajectory like the developed world has done, where high human development is accompanied by higher carbon emissions. There can be several pathways to this transition depending on how the post-2015 international scenario develops. Climate change cooperation and the post-2015 development agenda, including the Sustainable Development Goals, can vary, especially with reference to technology transfer and financial flows from developed to developing nations. At one level, an effective approach would require regional cooperation on capacity development, in which green economy outcomes are treated as a regional public good and, at another level, collective bargaining with the North is necessary for easier access to clean technologies. Thus, the approach to a green economy in South Asia is as much a socio-cultural challenge at the country level, as that of the political leadership at the regional level.

This paper argues in favour of an approach that has growth-oriented climate investment and social inclusion at its core. It presents a roadmap to a green economy in South Asia where interventions are categorized under: i) priority programmatic interventions that can contribute to an inclusive green economy; ii) strategies for mainstreaming green growth in macro-economic development policy and planning; iii) upscaling of policy and technology innovations; and iv) regional cooperation. The challenge, however, would be to have the roadmap implemented in an integrated manner accompanied by equitable benefit-sharing arrangements at the institutional level. The constraints arise primarily because of inadequate stakeholder awareness and engagement in the transition process, which makes the approach to a green economy in South Asia as much a socio-cultural challenge at the country level, as that of the political leadership at the regional level.

Chapter 1

Introduction

The term "green economy" has multiple definitions[1] and is still evolving as an operational concept. The Outcome Document of the United Nations Conference on Sustainable Development held in Rio in June 2012—popularly known as the Rio+20 Conference—articulates that a green economy "should contribute to eradicating poverty as well as sustained economic growth, enhancing social inclusion, improving human welfare and creating opportunities for employment and decent work for all, while maintaining the healthy functioning of the Earth's ecosystems."[2] Rising oil prices, the financial crisis of 2008, and the ever growing debate around global ecological crises, including climate change, can be seen as key triggers for the pursuit of green growth.

A report released by UNEP prior to the Rio+20 Conference made the tantalizing claim that "a green economy grows faster than a brown economy over time, while maintaining and restoring natural capital" (UNEP 2011). This claim was based on a comparison of future growth rates generated from a simulation model for alternative scenarios; however, critics have since pointed out the inadequacies of the methodology (Victor and Jackson 2012). A key criticism is that the model does not differentiate among geographic regions or between rich and poor nations. In its submission to the Rio+20 deliberations, the Third World Network observes, "while parts of the UN system such as ESCAP has facilitated Member States in arriving at some common understanding of Green Growth, its details and operationalization remain unclear to most governments"[3]. Hoffman (2011) also cautions that a green growth approach could be reductionist and could result in avoiding the fundamental changes that are required to address global environmental issues like climate change.

Looking at green growth from a different perspective, a report brought out the same year by the United Nations (UN) Secretary-General's High-Level Panel on Global Sustainability[4] states that green growth is a "potential engine for sustainable development" but would need to be "tailored for different countries, localities or regions based on their needs and situation and complemented with social protection to ensure inclusivity and stability". The Rio+20 Outcome Document also mentions that each country can choose an appropriate approach, with respect to a green economy, which is in accordance with its respective national sustainable development plans, strategies and priorities.

Rising oil prices, the financial crisis of 2008, and the ever growing debate around global ecological crises, including climate change, can be seen as key triggers for the pursuit of green growth.

The failure of the international process to craft an effective global agreement on climate change has also led to the promotion of green growth as an alternative path, or as a bridge to comprehensive global participation on climate action (Sterner and Damon 2011). The expectation is that in both developed and developing countries it will be politically more feasible[5] to introduce domestic policies that will help in the development and deployment of technologies to reduce emissions and improve re-

source use efficiency. This will create competitive advantages in the economy and result in market opportunities for such technologies. Hence, there will be a greater self-motivation to introduce such policies. Through this approach, as Ban et al. (2008) argue, "we can be sure that developed and developing countries alike contribute to the cause of fighting global warming, each in their own way and without compromising every nation's right to development and the economic well-being of its citizens." Again, such conceptualization and justification of green growth tends to overlook the point that climate change in the future is projected to have significantly adverse impacts on developing countries, which typically have low adaptive capacity. A recent Asian Development Bank study on the magnitude of climate change impacts on developing countries in South Asia provides an estimate of gross domestic product (GDP) loss to the extent of 1.8 percent per year by 2050, which progressively increases to 8.8 percent by 2100, if no additional measures are taken to tackle climate change (ADB 2013). Clearly, adaptation would be the key priority for these countries, and any conceptualization of green growth strategies would need to factor in this aspect.

Developing countries in South Asia have contributed only a meagre share of the historic global GHG emissions, but they are emerging as notable contributors in recent times.

The growing alignment of the green growth concept with that of "low carbon development pathways" since the 2009 Copenhagen summit on climate change is reflected in the "co-benefits" approach adopted by developing countries towards reducing greenhouse gas (GHG) emissions (Janicke 2012). Although developing countries in South Asia have contributed only a meagre share of the historic global GHG emissions, the region is emerging as a notable contributor in recent times. On average, emissions have risen at about 3.3 percent annually since 1990—more rapidly than in any other region except the Middle East (World Bank 2012a). Across South Asian countries (excluding Afghanistan), the per capita emission of energy-related carbon di-oxide (CO_2) is projected to increase by two to six folds between 2005 and 2030 (ADB 2013). For a significant deviation to happen from this future emissions scenario, South Asian countries would require a switch to cleaner alternatives in their use of high carbon energy resources like coal and petroleum. A technology-led approach aimed at market competitiveness, which has worked in countries like South Korea and Germany, may not be entirely appropriate for wholesale application in the region considering the various forms of deprivation and exclusion prevalent in all the countries.

Addressing the challenges of economic growth, development and poverty alleviation remains a key priority for national governments in South Asian countries. These concerns are likely to remain dominant over the next couple of decades. Hence, any large-scale public investment programme on green growth would call for a strong validation of its poverty alleviation potential. There is a conceptualization of "green jobs" being generated through deployment of low carbon and resource efficient technology, but evidence of how significant this outcome is has yet to be established. In South Asia, green growth strategies are much more contextualized when they are framed in terms of vulnerability reduction and poverty alleviation. In fact, the concept of "green growth" has its origins in the Asia and Pacific Region where it was adopted by 52 governments and other stakeholders at the 2005 Ministerial Conference on Environment and Development in Asia and the Pacific. The Conference agreed, "…that long-term, effective poverty reduction that ensured improved quality of life would require that the natural environment be protected. Environmentally sustainable economic growth or Green Growth approaches were therefore necessary. Only through such approaches, which balanced the three pillars of sustainable development, could the region address priorities and commitments relating to poverty reduction, and to environmental sustainability, as expressed by the Millennium Development Goals". In a na-

tional context, in India, for instance, the Thirteenth Finance Commission defines green growth as involving, "rethinking growth strategies with regard to their impact(s) on environmental sustainability and the environmental resources available to poor and vulnerable groups".

The core argument of this paper is that South Asia needs to conceptualize a green economy that is relevant to the current socio-economic trends in the region. The focus has to be on inclusion and resilience, which has important implications for the choice of technology and the design of public policy. The following sections elaborate on this argument: Section II explains the theory underlying the green economy concept and lists some unresolved issues in the context of developing countries; Section III presents the key development and environmental challenges in South Asia that would need to be taken care of by any proposed pathway to a green economy; Section IV identifies major constraints that green growth strategies would need to overcome; Section V explores some possible components of a roadmap in this regard; and Section VI provides a conclusion to the concept adopted in the paper.

Chapter 2

Theoretical considerations

At the core of the green economy concept[6] is the viewpoint that nature should be treated as a form of capital because of the diverse services that it generates. Freeman et al. (1973), for instance, "view the environment as an asset or a kind of nonreproducible capital good that produces a stream of various services for man. Services are tangible (such as flows of water or minerals), or functional (such as the removal, dispersion, storage, and degradation of wastes or residuals), or intangible (such as a scenic view)". More recently, the Millennium Ecosystem Assessment has provided an ecosystem-based approach to natural resource management that recognizes biodiversity, water and natural capital as important livelihood assets upon which human well-being is dependent through a range of provisioning, regulating, cultural and supporting ecosystem services (MEA 2005). There is evidence to establish that poor people are the most affected by the loss of ecosystem services, and that ecological fragility tends to aggravate the vulnerability of the poor.

The term green economy has been linked to the resource management paradigm of development[7] (Colby 1991), which is based on economizing ecology and interdependence between environment and development. In the narrow anthropocentric characterization of nature-society interaction, nature's dual role involves acting as a source of consumptive and productive inputs for the satisfaction of human wants and also a "sink" for wastes generated in the process. Human wants tend to multiply with population growth and increased affluence. These in turn increase the demand for environmental inputs and this expansion in economic activities simultaneously leads to increased waste generation. When the rates of utilization of nature's sources and sinks consistently exceed the rates of their regeneration or assimilation, respectively, the "stock" of natural capital starts getting adversely affected, which, if not redressed through appropriate policy intervention, can lead to ecological scarcity and constrain development[8]. This, as Barbier and Markandya (2013) point out, is the economy-environment trade-off in terms of natural capital being sacrificed for accumulating man-made capital.

Given the presence of an economy-environment trade-off, the currently dominant economic approach to the green economy requires an economic valuation of the full costs and benefits of environmental impacts arising out of a chosen development pathway. Economic valuation is identified as the key to getting the prices right for environmental goods and services that may be getting increasingly scarce. If there are well-functioning markets for certain kinds of environmental goods and services, appropriate price signals would serve not only to modify consumer behavior but also to provide incentives for producers to invest in efficiency improvements through technology change.[9] And, if markets fail, there is the possibility of government intervention for getting the prices right through Pigovian taxes and subsidies, and tradable permits.[10] Growth in income and

There is evidence to establish that poor people are the most affected by the loss of ecosystem services, and that ecological fragility tends to aggravate the vulnerability of the poor.

employment is driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services (Garnaut 2008). During financial crises, the idea of "green stimulus packages" becomes popular that allows large-scale public investments to kick-start a green economy.

The alternative approach, owing its concepts to ecological economics, views the green economy as a major social transformation (Kosoy et al. 2012) that requires a fundamental shift in social values, lifestyles and economic governance to arrest the drivers of loss and degradation in ecosystems and ecosystem services. Technology-based solutions, it is argued, cannot fix the problem of biodiversity loss and degradation of other critical ecosystem services. Economic planning would need to couple socio-economic and ecological systems to take cross-sectoral linkages into consideration. The transition to a sustainable low-carbon economy may be viewed as a multi-level (micro-meso-macro) co-evolution of ecosystems, technologies, institutions, business strategies and user practices (Foxon 2011).

In the absence of international cooperation on technology transfer, developing countries may have to bear significant macroeconomic costs if they attempt the transition to a green economy.

In both these approaches, some major conceptual issues arise when we introduce developing country challenges, such as socio-economic inequalities, rural-urban divide, large informal sector, infrastructure deficit and so on. Most developing countries are low carbon economies, with large sections of their population dependent on provisioning flows from natural resource systems for subsistence and livelihood security. In such contexts, social inclusion and economic empowerment of the poor have to be at the core of any development pathway. Available theories have little to suggest on this issue, apart from the argument that proper economic valuation and accounting of natural capital will ensure that the situation of the poor are not further worsened owing to environmental degradation/depletion. However, as Kadekodi (2013) points out, distributive justice will not automatically result from economic valuation of ecosystem services in the absence of appropriate regulatory mechanisms for empowering traditional users or producers of ecosystem services. Spash (2012) argues against a pure monetary valuation and market-based approach that can result in the environment being replaced by growth, jobs, capital investment and wealth accumulation. Moreover, on the accounting front, there are some difficult, long-standing conceptual and measurement issues (Schmalensee 2012), which are made more complicated in the case of developing countries in the presence of significant information asymmetry in society and the lack of appropriate monitoring mechanisms.

The second major issue that arises when we talk of a green economy for developing countries is related to their access to low carbon or resource efficient technology. Such technology is generally costlier and is mostly available in rich industrialized nations. Although the United Nations Framework Convention on Climate Change (UNFCCC) requires the developed countries to transfer low carbon technology to developing countries[11], there is little progress owing to the apprehension of the former that such sharing of intellectual capital would lead to a loss of competitive advantage in international trade. Beyond postulating negotiated outcomes, current approaches to the green economy are yet to resolve this wicked problem satisfactorily. Consequently, "technological innovation and deployment in the climate regime is fragmented and mostly bottom up"(Sagar and Khosla 2014)

In the absence of international cooperation on technology transfer, developing countries may have to bear significant macroeconomic costs if they attempt the transition to a green economy on their own. Macroeconomic costs arise when investments are redistributed from more productive uses to less productive uses, thereby generating a lower level

of output (Carraro et al. 2012). Empirical estimates of investment needs for a green economy transition by developing countries are largely missing, but it is easy to anticipate that such estimates would be extremely sensitive to the outcomes of global collective action on climate change, biodiversity, etc. Thus, national policies are inextricably linked to global regimes, which make the pathways to a green economy a scale-dependent issue.

The third major issue pertains to institutional capabilities in developing countries, which would be required for a transition to a green economy. Even if we assume that developing countries overcome the access issue related to clean technology, they are faced with the challenge of managing the uncertainties inherent to technology-led transition in their socio-economic systems.

The above discussion has an obvious relevance to countries in South Asia. The co-evolutionary framework's five interlinked components—ecosystems, technologies, institutions, business strategies and user practices—provide a useful starting point for the present study, although we do not attempt to apply the framework in an analytical sense. The emphasis is on regional cooperation.

Chapter 3

Development and the environment in South Asia

There is considerable diversity among South Asian countries in terms of human and natural resource endowment, size and composition of economy and institutional arrangements for governance. Table 3.1 presents some indicators in this regard. While India may have a dominating presence in the region owing to its geographic size and population strength, in terms of per capita income and human development indicators, it compares poorly with Bhutan, Maldives

Table 3.1 Select indicators of heterogeneity among SAARC countries

	AFG	BGD	BHU	IND	MDV	NPL	PAK	LKA
Demography								
Population (million), 2011	35	151	0.7	1,242	0.3	31	177	21
Population density (persons per square km), 2010	53	1,142	19	412	1,053	209	225	329
Urban population (%), 2010	23	29	36	30	41	19	36	14
Economy								
Per capita GDP (US$), 2011	576	735	2,288	1,488	6,405	619	1,194	2,835
Cereal production (million metric tons), 2010	6	51	0.1	235	0.00014	8	34	5
Food imports (% of merchandise imports), 2010	14	22*	11	4	22	14	13	15
Services value added (% of GDP), 2011	48***	53	38**	56	82***	47	53	58
International tourism receipts (% of total exports), 2010	-	0.5	-	4	75	24	4	10
Natural resources								
Coastline (km)	0	3,306	0	17,181	2,002	0	2,599	2,825
Renewable internal fresh water resources per capita (cubic metres), 2009	1,645	714	109,295	1,197	96	6,734	323	2,582
Natural disasters								
Weather-related disasters (2000–2011)	63	84	3	188	1	29	62	26
Deaths due to weather-related disasters (2000–2011)	3,673	9,453	212	22,572	0	2,299	6,238	491

High end of range Low end of range

**2008; **2009; ***2010*

Note: AFG–Afghanistan; BGD–Bangladesh; BHU–Bhutan; IND–India; MDV–Maldives; NPL–Nepal; PAK–Pakistan; LKA–Sri Lanka.

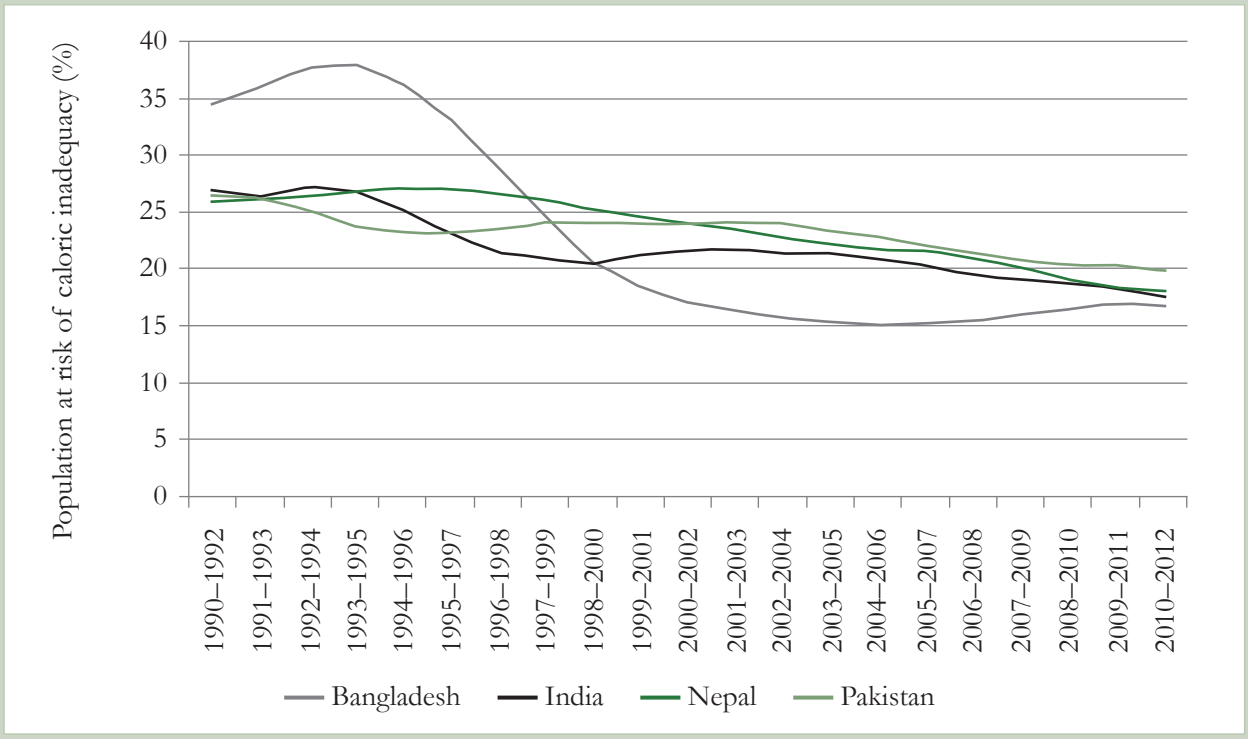
Sources: World Development Indicators (2011), UNDP (2011), World Resources Institute, EM-DAT International Disaster Database.

and Sri Lanka. There is mismatch on a large scale when it comes to natural resource endowment. For instance, per capita fresh water availability in Bhutan is more than a thousand times of that in Maldives. On the "brown" side, India far outstripped its neighbours in 2000 by accounting for 73.4 percent of total GHG emissions in the region (World Bank 2009; Moinuddin 2012).

However, the cross-country diversity is much less apparent when one considers the development-environment relationship in the region, in terms of resource dependent livelihoods and vulnerability to environmental stress and shocks. It is well established that the poor have a high degree of dependence on natural resource systems for their livelihood, and with over 40 per cent of the world's poor, South Asia is estimated to have the highest concentration of poverty and hunger in the world (World Bank 2008). The trends presented in Figure 3.1 clearly establish that while the incidence of hunger (measured using Food and Agriculture Organization of the United Nations' (FAO) data) as the percentage of population at risk of caloric inadequacy) in South Asia may have been consistently declining over the past couple of decades, it still remains at high levels within countries like Bangladesh, India, Nepal and Pakistan. More importantly, the poor in these countries spend 65 to 75 percent of their income on food[12], which is likely to be a major source of vulnerability for these people, especially in the context of climate change and its anticipated adverse impacts on agriculture and other ecosystems.

The other major commonality across countries in South Asia is a high degree of exclusion. These countries are going through significant socio-economic transformation owing to rapid economic growth and increasing urbanization. At the same time, there is growing economic inequality and differentiation within society in terms of access to goods and services that are important for quality of life. Table 3.2 (next page) presents

Figure 3.1 Prevalence of hunger in South Asia



Source: FAOSTAT.

Table 3.2 Exclusion in South Asia

Country	Poverty				Inequality		Access to electricity	
	Year	Headcount at US$1.25/day (1)	Headcount at US$ 2/day (2)	% increase in (2) over (1)	Gini Coef-ficient	Year	%	Year
Bangladesh	2010	43.3	76.5	77	32.1	2010	53	2012
Bhutan	2007	10.2	29.8	192	38.1	2008	85.5	2012
India	2010	32.7	68.7	110	33.4	2005	66.3	2009
Nepal	2010	24.8	57.3	131	32.8	2010	43.6	2009
Pakistan	2008	21	60.2	187	30	2008	62.4	2009

Source: UNESCAP (2013).

some indicators in this regard. The large increase in the headcount statistics of poor people, when the threshold value is shifted from US$1.25 per day to US$2 per day, implies a major concentration of poverty marginally above subsistence levels of existence. This population would be extremely vulnerable to the risk of income fluctuations. Even a slight dip in income flows can push them below subsistence level. Similarly, another telling indicator of exclusion relates to access to clean energy. About 30 percent of South Asia's population (constituting about 450 million) still lacks access to electricity[13] (IEA 2011).

Table 3.3 presents the GDP and employment growth in South Asia for the decade from 2000 to 2009. India's growth performance clearly stands out, but what is striking is the low rate of net employment growth—less than a fifth of the rate of GDP growth—during the same period. This implies that India's rapid economic growth has contributed little to job creation and has therefore not been inclusive. With the country projected to be the most populated country in the world by 2025, there is growing pressure on policy makers to ensure inclusive growth.

The other paradox is that while agriculture's share in GDP in most South Asian countries has fallen over time, its contribution to total employment continues to remain very high. Moreover, employment in agriculture in all South Asian countries is largely informal. A World Bank report on employment in South Asia provides country-wise estimates of informal employment in both agriculture and non-agriculture sectors that point to a very high degree of exclusion of workers from labour market regulations (World Bank 2012b).[14] Such exclusion is likely to increase the vulnerability of workers, especially female workers, to exploitative practices leading to deprivation and poverty.

Along with rapid economic growth, South Asian countries have been experiencing significant social transitions. Urbanization has been a significant phenomenon in the region with the urban population growing at an average annual rate of 2.8 percent during 1990–2005, which is markedly higher than the region's average population growth rate of 1.9 percent per year for the corresponding period (World Bank 2007, cited in ESPASSA report). Table 3.4 (next page) shows that close to 50 percent of South Asia's population will be living in urban areas by 2040. Migration from rural ar-

Migration from rural areas, largely induced by livelihood-related "push" and "pull" factors, has emerged as a key pressure on urban infrastructure in all countries of the region.

Table 3.3 GDP and employment growth (2000–2009)

Country	GDP growth (%)	Employment growth (%)
Bangladesh	5.8	3.3
Bhutan	6.8	-
India	8.4	1.9
Nepal	4.0	-
Pakistan	4.7	3.1
Sri Lanka	5.2	1.9
South Asia median	5.5	2.5

Source: Gu and Prasad (2011).

Table 3.4 Urban population in South Asia

Country	1950		2010		2040		Last 60 years	Next 30 years
	Urban population (million)	% of total population	Urban population (million)	% of total population	Urban population (million)	% of total population	Additional urban population (million)	Additional urban population (million)
Bangladesh	2	4.3	47	28.1	116	48.7	45	69
India	62	17.3	367	30.1	764	47.8	305	397
Nepal	0.2	2.7	5	18.2	18	38.2	5	13
Pakistan	7	17.5	64	37	153	56.9	57	89
Sri Lanka	1	15.3	2.9	15.1	5.4	27.2	2	2.5
Total	72	15.8	486	30.3	1,056	48.6	414	571

Source: UN (2007), cited in Mohan (2011).

eas, largely induced by livelihood-related "push" and "pull" factors, has emerged as a key pressure on urban infrastructure in all countries of the region.

Another significant social transition in South Asia is the rise of the "middle class". For example, changes in the Indian society have led to transformation in the consumption patterns and lifestyles. This impacts the resource consumption patterns. The middle class with their discretionary consumption trends will create increased demand for industrial products, transportation equipment, automobiles, medical equipment, telecommunications, etc. that will then increase the demand for different resources. With growing demand, India has changed from being a net exporter to a net importer, with import growths dominated by fossil fuels and metals. Based on recent calculations by The Energy and Resources Institute (TERI), India's total material demand is estimated to increase from its current levels of two billion tonnes to more than four billion tonnes by 2030 under a GDP growth rate assumption of 8 percent. The demand for materials would further increase to almost 10 billion tons by 2050 if India grows annually at a rate of 6 percent.

The driving forces of economic growth in South Asia have significantly eroded the natural capital of the region.

There is enough evidence to establish that the driving forces of economic growth in South Asia have significantly eroded the natural capital of the region (Alauddin 2004; Imhoff et al. 2004; Dasgupta 2007). A recently conducted regional situation analysis of the state of ecosystems and ecosystem services in the Indo-Hindu Kush region (ESPASSA 2008) points out that the environmental costs of high and non-inclusive growth patterns in the region continue to be largely unaccounted for in conventional development planning and resource allocation.

Chapter 4

Constraints to green growth in South Asia

Commercial energy consumption in South Asia is largely in the form of coal and petroleum (Table 4.1). India alone accounts for 91 percent of the consumption of coal and petroleum in the region, followed by Pakistan (6.6 percent), Bangladesh (1.4 percent) and Sri Lanka (1.2 percent). A low carbon transformation at the regional level for South Asia clearly requires a significant scaling down of India's dependence on these two high carbon fuel sources.

As things stand now, despite India's ambitious plan to increase solar energy capacity in the country, coal is most likely to remain the dominant source of energy for India over the next couple of decades. In fact, India's energy needs, and consequently its consumption of coal and petroleum, is likely to increase further in the near future, since policy making is likely to stay focused on generating high economic growth rates and on meeting the material aspirations of the ever-expanding base of urban population in the country.

Apart from India, other South Asian countries that are dominantly dependent on coal and petroleum for meeting their commercial energy needs are Maldives (100 percent petroleum), Sri Lanka (82 percent petroleum), Nepal (70 percent coal and petroleum), and Pakistan (48 percent coal and petroleum). It has been pointed out that Pakistan and Afghanistan have the opportunity of tapping the vast potential of natural gas in Iran and the Central Asian countries for low-carbon-intensity energy generation (Moinuddin 2012). Bhutan, Nepal and Pakistan have significant untapped hydropower potential, which, in theory, can transform the energy situation of the Hindu-Kush region through cross-border trade. However, there are serious trust issues at the political level among these countries that would need to be overcome to make a region-wide hydro-based clean energy transformation happen. With trust and cooperation among countries, significant scale economies can also be realized from such large-scale energy infrastructure. An example in this

India's energy needs, and consequently its consumption of coal and petroleum, is likely to increase further in the near future, since it is likely to stay focused on generating high economic growth rates.

Table 4.1 Commercial energy consumption in South Asia (%)

Country	Coal	Petroleum	Natural gas	Hydro	Nuclear	Other
Bangladesh	1	31	66	2	0	0
Bhutan	7	13	0	80	0	0
India	55	32	7	5	2	0
Maldives	0	100	0	0	0	0
Nepal	15	55	0	31	0	1
Pakistan	5	43	41	10	1	0
Sri Lanka	0	82	0	17	0	0
All	46	34	12	6	1	0.3

Source: UNEP et al . (2010).

Table 4.2 Gross domestic expenditure on research & development

	Business enterprise	Government	Higher education
India (2007)	33.92	61.68	4.40
Nepal (2010)	0.00	100.00	0.00
Pakistan (2011)	74.70	25.30	0.00
Sri Lanka (2010)	43.75	44.75	11.49

Source: UNESCO Institute for Statistics.

regard is the 114-megawatt Dagachhu hydropower project in Bhutan, which was registered in 2010 as the first cross-border hydropower project under the Clean Development Mechanism (CDM). According to the ADB (2013), the project is expected to reduce GHG emissions by about 50,000 tons per year, mainly through power exports to India. Bhutan also benefits by generating additional revenue from the CDM.

Ensuring coherent national innovation systems that address economic, social and environmental sustainability concerns remains a challenge in South Asia.

At the country level, the major determinant of financial investment in renewable energy and energy efficiency (termed "climate investments", e.g. in World Bank (2013)) is the existing policy regime. Given the scale of transformation required to switch to low-carbon development pathways, the major emitters among South Asian countries—India, Pakistan and Bangladesh—would need a significant mobilization of private sector investment. This calls for clear incentive-based public policy signals to business and technology providers, removal of barriers to investment, such as inadequate infrastructure capacity, and an overall regulatory environment that is supportive, transparent, and predictable.

Another major issue that needs to be addressed in South Asia is the need to develop a robust research and development (R&D) infrastructure. The gross domestic expenditure on research and development as a percentage of GDP in South Asian countries is very low, not only when compared to countries like Japan, the United States and Germany but also when compared to countries like China and Brazil. As can be seen in Table 4.2, very little R&D is done in the higher education sector. Government R&D still plays a major role. What is more, in countries like Japan, the United States, Germany and China, business enterprise sectors play a major role. An analysis of environment technologies related patent data also shows that as compared to the Organisation for Economic Co-operation and Development (OECD) countries, technological innovation in non-OECD countries has been around addressing immediate needs like local environment management and energy. Also, developing countries have not been able to invest in developing technologies to gain their competitive advantage in different sectors (Kedia and Anand 2013). Studies indicate that South Asian countries have a low research and development (R&D) base and a low level of innovation capabilities as compared to developed countries. Ensuring coherent national innovation systems that address economic, social and environmental sustainability concerns remains a challenge in South Asia.

Obviously, South Asian countries have a lot of ground to cover on all these critical enabling aspects on the public policy front. However, as countries steer their policies towards promoting green growth, the cost of renewable energy and its impact on overall sustainable development often hold them back. The levelized cost of energy for many renewable energy technologies is currently higher than existing energy prices, though in various settings renewable energy is already economically competitive. The added complication comes from the large size of the informal economy in these countries as already discussed.

Chapter 5

A roadmap to a green economy in South Asia

The design of a roadmap to a green economy in South Asia needs to take into account the individual country contexts, along with issues that are common to all or some of the countries in the region. The focus will have to be on inclusion and resilience. There is a strong case for cross-country cooperation on a regional scale to reap the synergies of green growth, and it is important for the South Asian Association for Regional Cooperation (SAARC) regional centres to be empowered and enabled to play a lead role in this regard.

5.1. Green can be inclusive: Priority areas for programmatic interventions in South Asia

Decentralizing energy solutions

The International Energy Agency emphasizes that access to energy is "an indispensable element of sustainable human development". More specifically, access to electricity in rural areas is linked to increased productivity in economic activities, improvement in the delivery of health and education, greater

Table 5.1 Roadmap to a green economy in South Asia

Intervention	Strategies
Green can be inclusive: Priority areas for programmatic intervention	• Decentralizing energy solutions • Improving infrastructure for clean water and sanitation • Strengthening food security, farm productivity and value chains • Sustainable tourism
Mainstreaming green growth strategies in macro-economic development policy and planning	• Accounting for natural capital • Strengthening international support mechanisms
Addressing "up-scaling" challenge	• Promoting energy efficiency and renewable energy technologies • Greening micro, small and medium enterprises • Managing urban transitions • Bringing in the corporate sector
Regional cooperation: A must for harnessing synergies	• Having a regional policy response on adaptation to climate change impacts • Promoting intra-regional trade in environmental goods and services • Strengthening regional networks for skill development and knowledge sharing • Promoting technology innovations, institutions and governance

public safety, and women's empowerment. According to IEA (2011), of the 1.3 billion people in the world that did not have access to electricity in 2009, 675 million lived in Asian developing countries compared to 585 million people in sub-Saharan Africa. Similarly, of the 2.7 billion people worldwide that did not have access to clean cooking energies, 1.9 billion people lived in Asian developing countries compared to 653 million people in sub-Saharan Africa. The major barriers to providing rural electrification in South Asia are typically high supply costs, low purchasing power, geographical remoteness, and capacity constraints in the overall system.

Of late, renewable energy-based decentralized energy options have been adopted as a viable solution to address the energy access challenge in an effective and efficient manner, alongside the centralized grid-based systems (Narula et al. 2012). Varying forms of renewable energy technologies are being utilized in the region to do so.

Given the inequitable renewable energy resource distribution among South Asian countries, their technological focus differ in tune with resource availability and technical knowledge.

Given the inequitable renewable energy resource distribution among countries of the region, technological focus of the countries differ in tune with resource availability and technical knowledge. For instance, Sri Lanka and Nepal have extensively used micro/mini-hydro systems (usually in the range of 50 kW to 3 MW) as decentralized electrification options, while India has relied on micro-hydro systems to some extent as an off-grid technology option primarily in the hilly regions of Arunachal Pradesh, Sikkim, Himachal Pradesh and Uttarakhand. Biomass gasifier based off-grid projects, within the range of 10 kW to 500 kW, have largely been confined to India, with some limited application in Sri Lanka. Of late, solar systems have emerged as a prioritized option for almost all the countries in the region, especially in India, Nepal and Bangladesh. Solar has been used either at an individual household level, e.g., solar home systems (SHS) or solar lanterns, or at the community level, e.g. mini-grids.

In addition to resource availability, the choice of any specific renewable energy technology is driven by country-specific policy initiatives. As Table 5.2 (next page) illustrates, there are considerable variations in policy approach of South Asian countries in promoting renewable energy for off-grid electrification. However, a common shortcoming of the existing off-grid options in the region is the focus on lighting, often through SHS, thereby neglecting agricultural power needs and productive use of energy for rural development (Bhattacharya 2013). A cross-sector policy focus on renewables-based decentralized energy solutions is the need of the hour, especially in the context of climate change. Previous experience with cross-sectoral efforts to address the water-energy-food nexus points to the need for adopting a systems approach that addresses the links between technologies, policies and markets (Dupar and Oates 2012).

Improving infrastructure for clean water and sanitation

An important aspect of social inclusion is access to clean water and sanitation. Countries in South Asia continue to struggle with issues around infrastructure related to improved sanitation and safe water sources (Table 5.3, next page). According to the World Health Organization and United Nations Children's Fund, open defecation rates are the highest in Asia (WHO and UNICEF 2013). There is also prevalence of significant rural-urban disparity on this indicator. Improving infrastructure in sanitation and drinking water needs a strong engagement with local government bodies, backed by information, education and communication activities. For example, India has the Total Sanitation Programme and *Swajaldhara,* which are interventions designed for rural areas.

Focusing on food security, farm productivity and value chains

Agriculture in South Asia is critical for at least three reasons: i) it provides food

Table 5.2 Country-specific policy thrusts in promoting renewable energy

Country	Policy initiative(s)	Electrification goal(s)
Bangladesh	Renewable Energy Policy of Bangladesh, 2008 approved.	Electricity for all by 2020
Bhutan	The Energy Policy Act created a renewable energy division under the Department of Energy. Economic Development Policy of Bhutan aims at developing a National Renewable Energy Policy in the 10th Five Year Plan.	Electricity to all households by 2013.
India	India does not have a separate renewable energy policy per se. Various initiatives, however, such as Renewable Energy Portfolio Schemes (RPS), Renewable Energy Certificates (RECs) and National Green Funds have been introduced from time to time to mainstream renewable energy development. Renewable energy as a means of off-grid electrification has also been included as part of the Electricity Act, 2003, the National Electrification Policy, 2005, and the Rural Electrification Policy (REP), 2006. The Jawaharlal Nehru National Solar Mission was launched in 2009 as one of the eight Missions under the National Action Plan on Climate Change (NAPCC), to boost the solar energy sector in the country.	All households to be electrified by 2017.
Maldives	No renewable energy policy. However, Maldives has announced that it will be carbon neutral by 2020 through a large-scale use of renewable energy.	Provide all citizens access to reliable and sustainable energy services. No specific time limit.
Nepal	No comprehensive renewable energy policy, but several policy measures initiated to promote alternative energy technologies and systems.	Electricity access to all by 2027.
Pakistan	Approved the Policy for Development of Renewable Energy for Power Generation, 2008 in January 2007 and further revised in 2011.	No specific goal(s).
Sri Lanka	The National Energy policy has sections devoted to development of renewable energy resources in the country.	85% households to be provided access through grid and 8% through off-grid by 2015.

Source: TERI Compilation.

Table 5.3 Access to improved water source and sanitation

		Improved water sources (% of population)			Improved sanitation (% of population)		
Country	**Year**	**Urban**	**Rural**	**Total**	**Urban**	**Rural**	**Total**
Afghanistan	2000	36.29	18.46	22.13	32.12	20.86	23.18
	2010	80.93	49.85	57.08	44.34	23.01	27.97
Bangladesh	2000	86.11	77.30	79.38	54.78	42.38	45.30
	2010	85.35	81.94	82.89	55.26	53.40	53.92
Bhutan	2000	98.89	81.75	86.11	65.62	29.51	38.69
	2010	99.65	94.41	96.23	73.04	29.35	44.56
India	2000	92.35	76.13	80.62	54.43	14.39	25.47
	2010	95.95	88.28	90.66	59.25	23.02	34.23
Nepal	2000	93.79	74.91	77.45	42.90	17.44	20.86
	2010	91.39	85.74	86.68	49.45	31.06	34.12
Pakistan	2000	95.54	84.71	88.30	71.99	20.25	37.40
	2010	95.73	88.59	91.15	71.84	33.61	47.33

Source: www.wssinfo.org

security to a large and growing population; ii) it provides employment and livelihood to a majority of the regional workforce; and iii) an average household in the region still spends more than half of its expenditure on food. Even if the sector's contribution to national GDPs in the region is progressively declining, it remains central to development planning. Any discussion on transformation to a green economy has to give the agriculture sector a priority consideration.

A research, covering a 25-year duration in developing countries, has shown that one percent growth in agriculture is at least two to three times more effective in reducing poverty than the same growth coming from non-agriculture sector. In China, it was 3.5 times more effective and in the case of Latin American countries, including Brazil, it was 2.7 times more effective (World Development Report 2008).

The biggest challenge to increasing agriculture production is perhaps going to come from water scarcity, emanating from likely increased frequency and intensity of droughts.

As per the FAO, there are at least four pillars of food security: i) availability of ample food supplies; ii) economic access to food; iii) food and nutrition, often dubbed as absorption issues including issues of food safety; and iv) stability of food systems, more so in the wake of climate change. To ensure availability of ample food supplies, South Asian countries need to ensure that they generate or have access to the best agri-technologies in the world. The Green Revolution in India of the 1960s and 1970s was a result of the adoption of such technology coupled with price incentives. So was the revolution in the production of cotton, hybrid maize or *Pusa Basmati* in the 2000s. To replicate this revolution in other parts of South Asia, there has to be significant regional sharing of technology and transfer of knowledge.

The focus on technology and farm practices offers the opportunity to incorporate green growth strategies. Reductions in emissions intensity from the agriculture sector will have to be largely achieved through promotion of energy efficient systems, encouraging widespread adoption of sustainable farm practices and development and deployment of renewable energy-based technologies. There are ongoing efforts in India to develop a CDM protocol for aggregating diverse farm activities by smallholder farmers across agro-ecological zones and increasing benefit to farmers from international carbon markets (Negra 2013).

In addition to the deployment of productive technology, stable food systems require the creation of value chains (logistics, processing and modern retailing) for farm products which are in sync with the emerging demand patterns in the economy. Given the predominance of small farmers in the region, some "institutional engineering" (e.g. Farmer Producer Organizations, micro-credit-based cooperative farming, etc.) would be required to ensure scale economies and seamless coordination with large processors and modern retailers. Investment in value chains have the potential to contribute to the transformation towards a green economy in South Asia by improving market access of farmers, generating mitigation co-benefits, as in the case of renewable energy-based cold storage systems, and creating "green jobs".

The biggest challenge to increasing agriculture production is perhaps going to come from water scarcity, emanating from likely increased frequency and intensity of droughts. Per capita availability of water is falling and risks from climate change are on the increase. It is being acknowledged that a better understanding of the water-energy nexus in the context of climate change is essential to develop effective adaptation strategies and to avoid maladaptive responses. Research is required not only to better understand and quantify the water-energy nexus in specific development contexts under climate change[15], but also to identify decentralized technological innovations to improve the efficiency of resource use. This, in turn, would develop more effective policy instruments, better management practices and sustainable business models.

Making tourism sustainable

A recent report titled *Tourism in the Green Economy* (WTO and UNEP 2012) makes an economic case for investing in the greening of tourism. It also provides guidance on how to mobilise such investments. It highlights the tourism growth challenges including the sector's contribution to "global greenhouse gas (GHG) emissions, excessive water consumption compared with residential water use, discharge of untreated water, the generation of waste, the damage to local terrestrial and marine biodiversity and the threats to the survival of local cultures, built heritage and traditions." The report also sets out the opportunities for tourism development in contributing to green investment, employment creation and poverty reduction.

5.2. Mainstreaming green growth strategies in macro-economic development policy and planning

Accounting for natural capital

A critically important requirement for a green economy is appropriate measurement of social welfare. It is now well accepted that the GDP, generated from standard national income accounts, fails to adequately capture the economy-environment relationship. Recently, a high-level commission[16] was set up "to identify the limits of GDP as an indicator of economic performance and social progress". The task was to use a multiplicity of sustainability indicators, physical as well as monetary to recommend a measurement that can focus on consumption rather than income, that can highlight distributional aspects and is capable of capturing non-market activities (Stiglitz et al. 2011).

In this regard, some important initiatives have been taken by SAARC countries towards identifying more meaningful metrics of national wealth and well-being. The concept of Gross National Happiness adopted by Bhutan provides a measure that encompasses a range of traditional areas of social concern, such as living standards, health and education, along with less traditional factors, such as psychological well-being, culture, community vitality, and environmental diversity. India has set up an expert group to provide a roadmap for a Green National Accounts Framework and intends to report a more comprehensive GDP estimate by 2015. At a collective level, SAARC leaders have endorsed a set of 22 SAARC Development Goals (SDGs) as listed in Table 5.4 (next page).

For South Asia to move towards a green economy, SAARC member countries would need to have a consensus on common monitoring frameworks for human, natural and social capital. To begin with, a regional network of knowledge organizations can be established to develop the appropriate methodologies and tools for data generation on sustainability metrics.

Strengthening international support mechanisms

Livelihood activities at the local level are closely linked to natural resource systems in many parts of South Asia. Extractive behaviour by local communities often leads to depletion and/or degradation of natural resource systems. In this regard, payment for environmental services (PES) is an economic instrument that has the potential to incentivise local communities to modify their behaviour towards conservation. Additionally, PES schemes provide new and better sources of income to local communities. They can mobilize finance from non-local sources by opening the door to participate in markets for global environmental services, such as carbon sequestration. With the right institutional arrangements and governance mechanisms, PES scheme can be an important part of the green growth strategies being discussed for South Asia. At the international level, with the emergence of instruments like the CDM and the possibilities of Reducing Emissions from Deforestation and Forest Degradation (REDD) and

For South Asia to move towards a green economy, SAARC member countries would need to have a consensus on common monitoring frameworks for human, natural and social capital.

Table 5.4 SAARC Development Goals

Livelihood SDGs	
Goal 1	Eradication of hunger, poverty
Goal 2	Halve proportion of people in poverty by 2010
Goal 3	Ensure adequate nutrition and dietary improvement for the poor
Goal 4	Ensure a robust pro-poor growth process
Goal 5	Strengthen connectivity of poorer regions and of poor as social groups
Goal 6	Reduce social and institutional vulnerabilities of the poor, women and children
Goal 7	Ensure access to affordable justice
Goal 8	Ensure effective participation of poor and of women in anti-poverty policies and programmes
Health SDGs	
Goal 9	Maternal health
Goal 10	Child health
Goal 11	Affordable health-care
Goal 12	Improved hygiene and public health
Education SDGs	
Goal 13	Access to primary/communal school for all children, boys and girls
Goal 14	Completion of primary education cycle
Goal 15	Universal functional literacy
Goal 16	Quality education at primary, secondary and vocational levels
Environment SDGs	
Goal 17	Acceptable level of forest cover
Goal 18	Acceptable level of water and soil quality
Goal 19	Acceptable level of air quality
Goal 20	Conservation of biodiversity
Goal 21	Wetland conservation
Goal 22	Ban on dumping of hazardous waste, including radioactive waste

Source: ISACPA (2007).

REDD-plus mechanisms, carbon values of forests can get captured directly in the market or, alternatively, forest finance can get linked with the forest's carbon values.

CDM is one of the international support mechanisms that aim to reduce GHG emissions and promote sustainable development in developing countries. It is, however, a project-based mechanism. Nationally appropriate mitigation actions (NAMAs) are being conceptualized as a future mechanism, which will most likely be based on policy or programme, to incentivise/recognize national policies, plans and programmes that incorporate mitigation measures. NAMAs, hence, can be looked at as an opportunity that can catalyse green growth and development in developing countries.

The approach to developing GHG mitigation strategies is illustrated with reference to India. The Indian Planning Commission recently set up an expert group to develop a strategy for low carbon inclusive growth during the country's 12th Five Year Plan. The roadmap developed by the expert group provides a menu of options to reduce GHG emission intensity in critical sectors such as power, transport, industry, buildings and forestry. The report is premised on high growth projections, according to which an 8–9 percent GDP growth rate is required by 2020 to achieve India's developmental objectives. Two scenarios of emissions intensity reduction have been discussed, namely, i) "Determined Effort Scenario", under which the country could achieve 23–25 percent emission intensity reduction through vigorous pursuit of policies (current or planned) up to 2020 with continuous upgradation of technology and finance from both public and private sources, and ii) "Aggressive Effort Scenario" under which

the country could achieve 33–35 percent emissions intensity reduction through additional and scale-up efforts. In the latter scenario, adequate international support in terms of technology and finance will be required.

5.3. Addressing up-scaling challenges

Promoting energy efficiency and renewable energy technologies

Industrial Development Report 2011 of the United Nations Industrial Development Organization identifies Industrial Energy Efficiency as one of the most promising routes for sustainable industrial development worldwide and, in particular, in developing countries. It is estimated that today there is a 30–35 percent efficiency potential in industrial processes, which can be harnessed through appropriate incentive-based policy mechanisms. India's National Action Plan on Climate Change (NAPCC) has a strong thrust on promoting energy efficiency under the National Mission on Enhanced energy Efficiency (NMEEE). The Mission has adopted an innovative "Perform, Achieve and Trade (PAT)" mechanism. The PAT mechanism assigns energy efficiency improvement targets to the country's most energy-intensive industrial units. Industrial units that achieve savings in excess of their target will be provided the excess savings as Energy Savings Certificates. Units that under-perform can buy these certificates to meet their target compliance requirements.

Thus, NMEEE through PAT is expected to create a regulatory and policy regime to foster innovative and sustainable business models to unlock the market for energy efficiency. It is estimated that PAT could reduce India's CO_2 emissions by 25 million tonnes per year by 2014/15. That figure is relative to business-as-usual and is approximately 1.4 percent of the country's projected total annual CO_2 emissions in 2015 (GoI 2010; Dasgupta et al. 2014).

The REC Mechanism is another mechanism under the NAPCC which envisages renewable energy to constitute approximately 15 percent of India's energy mix in the next 10 years. The Electricity Act 2003, the policies framed under the Act and the NAPCC provide a roadmap for increasing the share of renewables in the total generation capacity in the country.

Given the burgeoning middle class in South Asia, the other area in which significant up-scaling can be achieved through appropriate policy incentives is in consumer-oriented low carbon technologies, such as energy efficient electrical appliances. India's Bureau of Energy Efficiency has launched a ratings-based programme, which provides a replicable model for others in the region. The challenge, however, is to overcome the low penetration rates of energy efficient mass market consumer appliances, owing to their significant cost differential with conventional models.

Given the burgeoning middle class in South Asia, an area in which significant up-scaling can be achieved through appropriate policy incentives is in consumer-oriented low carbon technologies.

Greening micro, small and medium enterprises

The micro, small and medium enterprises (MSME) sector in South Asian countries is important in terms of growth and development. In India, the MSME sector contributes nearly 8 percent to the country's GDP, 45 percent to manufacturing output and 40 percent to exports, and provides the largest share of employment after the agriculture sector.[17] In Pakistan, MSMEs contribute more than 30 percent to the country's GDP and 90 percent to the country's non-agricultural employment.[18] In Bangladesh, MSMEs contribute 25 percent to the country's GDP, 80 percent to industrial jobs, and 25 percent to the total labour force.[19]

According to Shinozaki (2012), the credit gap for MSMEs in South Asia accounted for US$30 billion to US$40 billion. Regarding the MSME sector, there is a need to build capacity of state-owned development finance institutions. These typically offer refinance facilities to commercial banks to extend credit to micro,

small and medium enterprises (SMEs). In India, for example, the Small Industries Development Bank of India aims to promote energy savings by supporting technology upgrading in the micro, small and medium-scale enterprises in India. On the international front, North-South bilateral cooperation is a means to promote models of technology cooperation that goes beyond the traditional "technology transfer regime". Institutions also exist to facilitate that. For example, the South Asia Enterprise Development Facility is managed by the International Finance Corporation (IFC), in partnership with the United Kingdom's Department for International Development and the Norwegian Agency for Development Co-operation. In 2010, IFC's Regional Committed Portfolios[20] in MSME financial institutions in South Asia was 6 percent of its total portfolio. This can be increased further.

Urbanization trends in South Asia present major opportunities for stimulating transformation to a green economy.

International cooperation at the bilateral level will include opportunities in new market mechanisms, such as the bilateral offset credit mechanism introduced by Japan. However, in the post-2015 development scenario, the increase in initiatives around South-South Cooperation is also expected to play an important role. Groups such as the G20, Asia–Pacific Economic Cooperation (APEC), and Association of Southeast Asian Nations have attached great importance to financial inclusion as a global policy agenda.

To ensure green growth in the MSME sector, financial institutions need strengthening. According to various[21] estimates, 33 percent of SMEs receive loans from banks in India, 32 percent in Bangladesh 7 percent in Pakistan. Simplification of procedures around rules and regulations along with information on provisions available on greening the MSME sector is required, for which a common platform becomes important. Capacity enhancement of micro-finance institutions that cater to climate vulnerable sectors, such as agriculture, is also important to build resilience in the South Asian region.

Managing urban transitions

Urbanization trends in South Asia present major opportunities for stimulating transformation to a green economy. One of the defining trends of recent decades has been the rise of Asian megacities. One billion people have been added to Asia's urban population in the last 30 years and 17 of the world's 25 densest cities are in Asia (of which three are in South Asia). To serve this urban population, the McKinsey Global Institute estimates that 600–900 million square meters of commercial and residential space will have to be built annually and 7,400 kilometres of metros and subways constructed, entailing an investment of about US$144 billion in India's Tier 1 and Tier 2 cities alone. In fact, across all major cities in South Asia, investment in urban infrastructure—in areas such as affordable public transport, housing, clean water and sanitation facilities, and urban land development—is waiting to be scaled up in a major way.

The benefits of good public transportation, green-rated buildings, efficient waste management, and so on are well acknowledged. Significant inclusion and environmental gains can be reaped by inducing a modal shift towards public and non-motorized transport in the cities of South Asia (Dubash et al. 2013).

Bringing in the corporate sector

For industry and business, the risks from climate change go well beyond the physical threat from climatic extremes such as floods and cyclones to infrastructure and material assets. In fact, financial risks arising out of policy responses at both international and national levels are likely to be much more severe and wide-ranging for companies that are slow to appreciate the evolving regulatory regimes in this regard. However, more than the risks, the potential economic opportunities are likely to play a critical role in shaping corporate leadership on climate change. At the global level, this is already happening to a certain extent. The more

progressive business organizations, recognizing the gains to be made in future green economies, are calling for decisive action from governments to bring about greater certainty in the policy environment for businesses[22].

Along with the potential economic opportunities, two major and defining trends of the opening decade in the present century would serve to convince the corporate sector of the need for leadership on climate change solutions. First, in many parts of the developing world, the flow of information and level of social awareness is dramatically increasing with access to information and communication technology and this is leading to the emergence of "knowledge societies". Second, the ever-strengthening process of global integration is playing the role of a game-changer for industry and business by re-defining issues such as market access, scale economies and technology transfer. The emergence of knowledge societies, in the specific context of heightened civil society concern about climate change, requires corporate strategizing on social responsibility to be in perfect tune with green values. In this regard, the process of global integration acts as a great enabler by facilitating the flow of knowledge, resources and technology. The reports of the Carbon Disclosure Project are instructive of the range and extent of sustainability efforts by companies as a response to increasing social concerns regarding environmental quality. Another indicator of climate entrepreneurship is the scale of venture capital funding in green energy technologies, which was steadily increasing till the economic downturn in most of the developed countries earlier this year[23].

5.4. Regional cooperation: A must for harnessing synergies

Having a regional policy response on adaptation to climate change impacts

Adaptation to climate change can be viewed as a regional public good. This brings about significant spill-over of transnational benefits resulting from planned adaptation measures taken by individual countries. However, planned adaptation to climate change impacts is going to be expensive. A study conducted by the World Bank in 2009 says that the cost of adaptation for developing countries would range between US$77–89 billion a year from 2010 to 2050. The estimate for South Asia is around US$17–18 billion, and India alone accounts for 70–74 percent of this estimate. Regional cooperation among SAARC member countries can possibly bring down the cost of planned adaptation. But, this needs to be established through proper economic analysis.

Regional cooperation for the provision of a regional public good can be complicated by the high level of heterogeneity among participating countries. Still, such cooperation is facilitated by the dependence on a "threatened but valuable resource", trust and a shared understanding of the situation and the autonomy to make rules (Varughese and Ostrom 2001). Initiatives to provide regional public goods should begin with a loosely integrated structure with low linkage costs (Sandler 1998). Pre-existing institutions can play a key role in fostering collective action in the presence of heterogeneity (Varughese and Ostrom 2001).

More than the risks, the potential economic opportunities are likely to play a critical role in shaping corporate leadership on climate change.

For SAARC countries, adaptation options would include the development of new crop varieties, afforestation, water demand management, provision of safe drinking water and sanitation, coastal defense design, disaster preparedness and early warning systems. In most cases, existing policy responses would require major reorientation. For instance, the focus of adaptation in the coastal regions must shift from post-disaster actions toward a more anticipatory integrative risk reduction measures that include environmental management, structural measures, protection of critical facilities, land-use planning, financial instruments and early warning systems. Similarly, for energy cooperation to happen in South

and South-West Asia (SSWA), there is a need for new forms of institutional arrangements at the regional level that would foster cross-country cooperation on sharing of knowledge, technology, skills, and resources (Box 5.1). SAARC has a number of regional institutions and initiatives (Table 5.5, next page), which can take forward the regional agenda on climate change adaptation.

Promoting intra-regional trade in environmental goods and services

An estimated cost of climate adaptation for South Asia is around US$17–18 billion, and India alone accounts for 70–74 percent of this estimate.

World Trade Organization negotiations on international trade liberalization and market access have rightly identified the potential of environmental goods and services[24](EGS) to create "triple win situations" beneficial to trade, environment and development (WTO 2005)[25]. The EGS industry increasingly includes goods associated with the generation of renewable energy and the low-carbon economy (Monkelbaan 2011). A supportive international trade regime on this front can certainly help developing economies in their transition to a green economy.

A preliminary analysis shows that India's net export in environmental goods (EGs) is increasing. But developing countries would experience greater gains if the definition of EG is broadened, not limiting to the lists of EGs in which only developed countries have interest. The existing lists prepared by the OECD and APEC favour developed countries, as most of the products which are listed in these categories are of export interest to developed countries. This is because the focus is mainly on environmental equipment, which basically consists of the end-of-the-pipe technology rather than the process. Most developing countries have export potential in environmentally preferable products (EPP) rather than in EGs. EPP includes any product with certain environmental benefits either at the stage of production or consumption[26].

Strengthening regional networks for skill development and knowledge sharing

Regional cooperation for a green economy would be in the form of joint R&D, multi-country demonstration projects, regional climate services for decision-makers, knowledge sharing and collaborative capacity building. The region's strength lies in a growing number of scientists, scholars and engineers as well as an existing network of knowledge institutions. What is required is strong political leadership in all countries to harness this potential and use it for effective evidence-based decision-making. Some areas that could be covered in knowledge sharing and capacity building include

Box 5.1 Possibilities for energy cooperation in the SSWA sub-region

- Collection and compilation of accurate energy data, particularly energy reserves and renewable energy potential in the sub-region.
- Cross-country investments and energy trade
- Building of adequate energy infrastructure in the form of power plants, transmission lines and pipelines.
- Creation of a knowledge repository for sharing of experiences in the domains of energy access, renewable energy development and energy efficiency.
- Collaborative clean technology research and development.
- Creation of a sub-regional clean energy fund.
- Strengthening of existing sub-regional frameworks
- Cooperation and institution of new, target-driven mechanisms focused on energy.

Source: UNESCAP (2013).

Table 5.5 History of regional cooperation in SAARC relevant to climate change

1989	SAARC Agricultural Information Centre (SAIC) established in Dhaka
1994	SAARC Documentation Centre (SDC) established in New Delhi
1995	SAARC Meteorology Research Centre (SMRC) established in Dhaka
1997	SAARC Plan of Action on Environment adopted
2004	SAARC Coastal Zone Management Centre (SCZMC) established in Male
2006	SAARC Energy Centre established in Islamabad
2006	SAIC upgraded to SAARC Agriculture Centre
2006	SAARC Disaster Management Centre (SDMC) established in New Delhi
2007	SAARC Comprehensive Framework on Disaster Management approved by 14th SAARC Summit
2007	SAARC Food Bank established
2008	SAARC Forestry Centre established in Bhutan
2008	SAARC Action Plan on Climate Change adopted by SAARC Ministerial Meeting on Climate Change in Dhaka
2008	SAARC roadmap prepared for Regional Cooperation on Climate Change Adaptation and Disaster Risk Reduction
2010	Thimphu Statement on Climate Change adopted at 16th SAARC Summit
2011	SAARC Agreement on Rapid Response to Natural Disasters signed

Source: Authors' compilation.

practices in innovation policy, planning and coordination processes, monitoring and evaluation, national and sub-national integration, preparing targets and baselines, prioritization of options and pathways, policy design, public and private collaboration, financing strategies and technologies, etc.[27]

Promoting technology innovations, institutions and governance

Generally, innovations are regarded as key determinants to long-term economic growth and development. In Schumpeter's view, fundamental breakthroughs of technology are the essence of the process and they affect the entire economy. Apart from the intellectual property right framework, existing regulatory frameworks could impede innovation at different levels. These can be countered by fiscal incentives, waiver of fees and duties, tax benefits and better legal protection to innovations, e.g., strengthening provisions of confidential business information.

In a workshop[28] on leadership in Asia in the context of sustainable development and climate change, a range of case studies and personal experiences with regard to different technologies, firms (finance as well as manufacturing), urban planning, agriculture, forestry and fisheries, were brought to the fore. They spelled out the significance of innovations in policy interventions that could set social and business processes in motion to not only deliver and fasten the transformation but also leverage business and citizen leadership to sustain it. The discussions stressed that while different technologies face different challenges of innovation, development and diffusion, strong policy signals can leverage and build upon the private sector entrepreneurs' desire of leadership and risk taking behaviour. Experiences with urban transformations, successful as well as failed ones, of European, American, and Asia-Pacific cities underscored the fact that transformations are essentially brought about by social processes. Various sections of the society, particularly the young generation and those in the position of any authority, must buy into the idea. This is the necessary condition for the success of any initiative. More specifically, for governance, it was emphasized that there has to be a right mix of top-down and bottom up approaches for participatory governance and value transformation that can make low carbon development possible and sustainable.

South Asia requires strong political leadership in all countries to harness the region's knowledge potential and use it for effective evidence-based decision-making.

Chapter 6

Conclusion

The present paper is based on the argument that in South Asia, developing countries need an approach to a green economy with growth-oriented climate investment and social inclusion at its core. The roadmap presented here may appear as a set of distinct strategic components. These actions are required to be integrated for a suitable transition to a South Asian green economy.

Transition literature (Rip and Kemp 1998) also supports the critical importance of simultaneous and synchronized changes in policy for successful deployment and up-scaling of green growth strategies. More importantly, social actors in the transition process will be motivated to adopt new technologies and practices only when there are well-defined institutional arrangements to account for and to distribute equitably the anticipated gains.

Notions around equity in the context of climate change have been anchored on principles such as "equal rights", "polluter pays" and "equal per capita emissions" (Ghosh 1993; Baer et al. 2000; Ghosh 2013). The inequality argument, which is not as widespread as the "co-benefits" argument, compels mitigation actions in order to have a more just development. The inequality argument, which is prevalent in India, recognizes the failure of the liberal growth model based on the "trickle-down effect" to meet this particular objective. It suggests a radically different development path while making a case for mitigation actions for the country (Isaksen 2012).

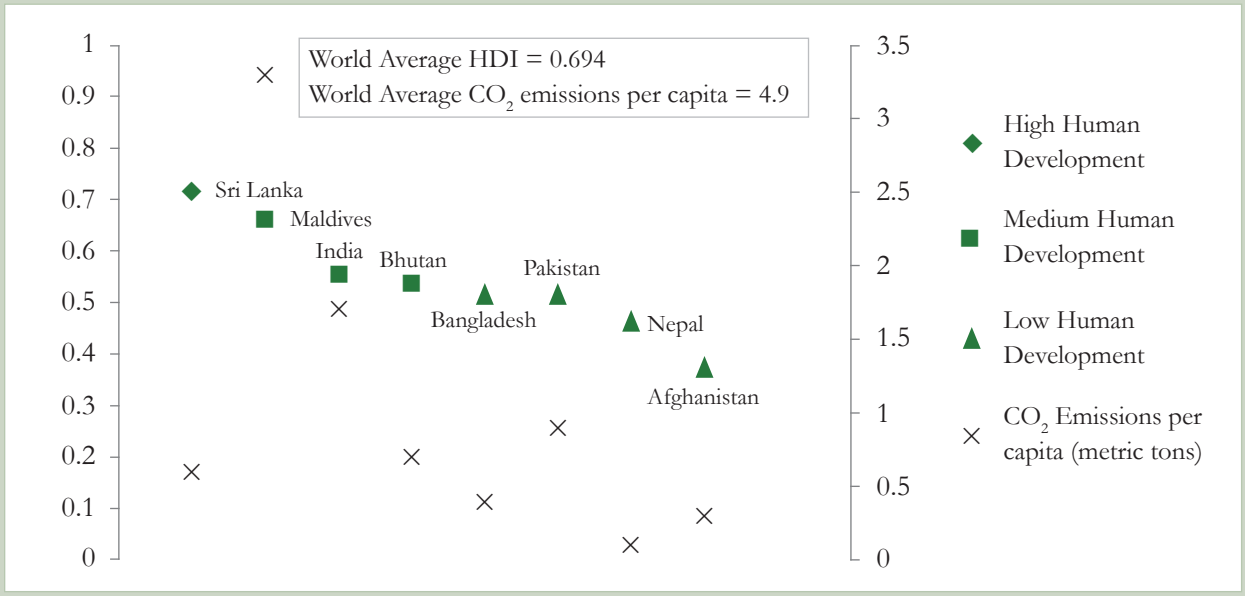
Notwithstanding interpretations on domestic climate actions, it has been seen that, in a very fundamental sense, the ideas that drive opinions regarding mitigation in developing countries in South Asia and Africa are those that hover around eradication of poverty and building domestic capabilities (Shrivastava 2012). Pioneers in ecological economics have submitted that addressing inequality in the world requires an entirely different approach than standard economics, which insists on relying exclusively on price mechanisms and financial transfers (Georgescu-Roegen 1977) to include aspects like participation and human capacity building.

To that end, countries in South Asia would need to move on a path which would promote high human development with a lower environment-related footprint. Currently, South Asian countries, except Sri Lanka, have a low Human Development Index than the world average. In terms of per capita CO_2 emissions, all countries are below the world average (Figure 6.1, next page).

South Asia would need both technological and human capacity to not follow a development trajectory like the developed world has done, where high human development is accompanied by higher carbon emissions. There can be several pathways to this transition depending on how the post-2015 (and beyond) international scenario develops. Climate change cooperation and the post-2015 development agenda, including the Sustainable Development Goals, can vary especially

The approach to a green economy in South Asia is as much a socio-cultural challenge at the country level, as that of the political leadership at the regional level.

Figure 6.1 Human Development Index and CO_2 emissions per capita (metric tons)



Sources: UNDP (2013); data.worldbank.org.

with reference to technology and finance flows from developed to developing nations. At one level, an effective approach would require regional cooperation on capacity development, in which green economy outcomes are treated as a regional public good and, at another level, collective bargaining with the North is necessary for easier access to clean technologies. Thus, the approach to a green economy in South Asia is as much a socio-cultural challenge at the country level, as that of the political leadership at the regional level.

Endnotes

1 The United Nations Environment Programme (UNEP) defines a "green economy" as an economy "that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities" (UNEP 2011). The OECD conceptualizes green growth for maximizing economic growth and development while avoiding unsustainable pressure on the quality and quantity of natural assets. According to UNESCAP, green growth "seeks to harmonize the two imperatives of economic growth and environmental sustainability by promoting fundamental changes in the way societies produce and consume". The Republic of Korea's Framework Act on Low Carbon Green Growth articulates green growth as growth achieved by saving and using energy and resources efficiently.

2 *The Future We Want*, paragraph 56, p. 10.

3 Submission to the UNCSD compilation document by the Third World Network.

4 United Nations Secretary-General's High-Level Panel on Global Sustainability published its report *Resilient People, Resilient Planet: A Future Worth Choosing* as a critical input for Rio+20. The key characteristics of a green economy or green growth have been extracted from the text and are summarized in the weblink www.un.org/gsp/sites/default/files/attachments/GSP_Report_web_final.pdf

5 As compared to accepting outcomes under the UNFCCC based on the principles of "burden sharing" and "historical responsibility".

6 The conceptual foundations of "green economy" can be traced back to writings much earlier to its coinage in 1989 (Pearce et al. 1989).

7 Other paradigms being frontier economics, deep ecology, environmental protection, and eco-development (Colby 1991).

8 The notion of finite planetary "sources" and "sinks" comes from the 1972 Club of Rome report *Limits to Growth*, which not only showcases scenarios of how population growth and natural resource use would interact with constraints imposed by the carrying capacity of the ecological system, but also points out the possibility of ameliorating solutions through technological advancement and institutional change. The notion of sources and sinks was later elaborated by Daly in terms of three simple rules to define the sustainable limits to material and energy: for a renewable resource (the rate of use cannot be greater than the rate of regeneration of its source); for a non-renewable resource (the rate of use cannot be greater than the rate at which a renewable resource can be substituted for it); and for a pollutant (the rate of emission cannot be greater than the rate at which it can be recycled, absorbed or rendered harmless in the sink).

9 In the context of successful technological solutions, it is also relevant to consider the "rebound effect": with increased productivity, there is a decline in the effective price of a commodity that results in higher demand for the commodity—the solution which only points at decoupling demand from efficiency gains.

10 Simple textbook recommendations are difficult to implement in reality because of political economy considerations, pre-existing market imperfections elsewhere in the economy, inertia, or lack of necessary investment funds. Hence, in many instances, policy makers have to rely on second best instruments. A salient example is energy policy, where it is extremely difficult to get rid of subsidies on fossil fuels and where the introduction of an adequate carbon tax faces many obstacles (e.g., Nordhaus 2010).

11 Under the Convention, an important step in this direction has been the launch of the Climate Technology Centre and Network (CTCN) and the Technology Executive Committee (TEC), which were conceptualized at Cancun in 2010. While the CTCN is expected to "serve an operative role in

technology transfer on an international to regional scale", the TEC is mandated to "identify technology needs and priorities, coordinate efforts and provide recommendations for improvement".

[12] According to the FAO database, the country-wise estimates of the share of food expenditure of the poor are: 65 percent in Bangladesh (2005); 68 percent in India (2004); 72 percent in Nepal (2010); and 75 percent in Pakistan (2005).

[13] While at an aggregated level, the statistics indicate the common cause of concern, the magnitude of the challenge differs significantly across countries in the region. For instance, while at the one end Sri Lanka has emerged as the leading country in the region with an electrification rate of more than 90 percent, at the other extreme, only 30 percent of the population in Afghanistan has access to electricity.

[14] The report gives the following estimates of the percentage share of informal employment in non-agricultural employment and in total employment, respectively: Afghanistan (79, 92), Bangladesh (74, 87), Bhutan (51, 88), India (72, 88), Maldives (21, 40), Nepal (82, 95), Pakistan (78, 88), and Sri Lanka (58, 71).

[15] There is an ongoing research at TERI on climate change-water-energy nexus, supported by Norwegian Ministry of Foreign Affairs. This gap is also highlighted by the IDRC project "Clean Energy and Water: An Assessment of Services for Adaptation to Climate Change".

[16] The former President of France, Nicholas Sarkozy, set up the Commission on the Measurement of Economic Performance and Social Progress under the chairmanship of Joseph Stiglitz "to identify the limits of GDP as an indicator of economic performance and social progress, to consider additional information required for the production of a more relevant picture, to discuss how to present this information in the most appropriate way, and to check the feasibility of measurement tools proposed by the Commission".

[17] msme.gov.in/Web/Portal/Default.aspx. Accessed on 18 February 2014.

[18] www.sbp.org.pk/departments/smefd/15March/5-IFC-Global-regional-SME.pdf. Accessed on 18 February 2014.

[19] academia.edu%2F236187%2FSMEs_in_Bangladesh_and_Their_Financing_An_Analysis_and_Some_Recommendations. Accessed on 18 February 2014.

[20] www.ifc.org/wps/wcm/connect/4858d20049585fada06ab519583b6d16/MSME-Factsheet-SA-10.pdf

[21] India: ICA 2006 Manufacturing Enterprise Survey, Bangladesh: 2006 Rural MSME Finance Services Survey, Pakistan: KfW Demand Survey 2005. www.sbp.org.pk/departments/smefd/15March/5-IFC-Global-regional-SME.pdf

[22] For example, in November 2007, 150 global companies signed a communiqué calling for a legally binding UN agreement to reduce greenhouse gas emissions by at least 50 percent by 2050 to provide the required certainty to "scale up global investment on low carbon technologies." The signatories, including Shell, General Electric, Cadbury Schweppes, British Airways, Adidas, Nestlé, Nokia and Virgin Group, advocated that a shift to a low carbon economy will create significant business opportunities, and suggested that "new markets for low carbon technologies and products worth billions of dollars will be created if the world acts on the scale required". During the climate summit in Copenhagen, the Business Day on 11 December 2009 attracted nearly 400 participants to discuss, among other things, the "three 'C' challenges for business: clarification, communication and coherence of business's medium to long term vision on climate change". www.iisd.ca/climate/cop15/bd/

[23] Global investment in renewable energy capacity reached a record US$257 billion in 2011—a 17 percent increase from the amount invested in 2010. Developed countries made up about 65 percent of this investment, while developing countries had a share of 35 percent. The top five countries in new capacity investment in 2011 were China (US$51 bn), US (US$48 bn), Germany (US$31 bn), Italy (US$29 bn) and India (US$12 bn). Recent estimates indicate that about five million people are employed directly or indirectly in renewable energy sectors. Obviously, China leads the world in renewable jobs, followed by Brazil, US, Germany and India.

[24] The OECD has defined the environmental goods and services industry as "activities which produce goods and services to measure, prevent, limit, minimise or correct environmental damage to water, air and soil as well as problems related to waste, noise and ecosystems".

[25] Paragraph 31 (iii) of the Doha Ministerial Declaration calls for negotiations on "the reduction or, as appropriate, elimination of tariff and non-tariff barriers to environmental goods and services", with a view to enhancing the mutual supportiveness of trade and environment.

[26] UNCTAD has arrived at the definition of EPPs as "Products which cause significantly less environmental harm at some stage of their life cycle (production/processing, consumption, waste disposal) than alternative products that serve the same purpose, or products the production and sale of which contribute significantly to the preservation of the environment".

[27] Also see Green Growth Best Practice Assessment. Available at http://ggbp.org/

[28] Asia Leadership Programme on Sustainable Development and Climate Change, 2–17 February 2013, New Delhi.

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