20th Annual Report

HUMAN DEVELOPMENT IN SOUTH ASIA 2017/2018

Sustainable Development in South Asia

LUMS | Mahbub ul Haq Research Centre

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Aerial view of the Islamabad Metrobus Line. © Hassan Tanveer [www.instagram.com/zehreela.mp4, (#Zehreela)]

ABBREVIATIONS

BDT..... Bangladeshi Taka
CFUGs ..... Community forestry user groups
CPEC..... China Pakistan Economic Corridor
CSD..... United Nations Commission on Sustainable Development
CSOs ..... Civil society organizations
DALYs ..... Disability-adjusted life years
EPI..... Environmental Protection Index
GBM ..... Ganges-Brahmaputra-Meghna
GCISC ..... Global Change Impact Study Centre
GCF ..... Green Clean Fund
GDP..... Gross domestic product
GEF ..... Green Environment Facility
GHGs ..... Greenhouse gases
GNP ..... Gross national product
HDI ..... Human Development Index
IHDI..... Inequality-adjusted Human Development Index
INDCs ..... Intended Nationally Determined Contributions
INR..... Indian rupee
ISWM..... Integrated solid waste management
IUCN..... International Union for Conservation of Nature
KBAs..... Key biodiversity areas
MDGs..... Millennium Development Goals
MEA..... Multinational Environmental Agreements
MFIs ..... Microfinance institutions
MGNREGA ..... Mahatma Gandhi National Rural Employment Guarantee Act
NGOs ..... Non-governmental organizations
OBOR ..... One Belt One Road Initiative
OECD..... Organization for Economic Co-Operation and Development
PKR..... Pakistani rupee
PM..... Particular matter
SAARC ..... South Asian Association for Regional Cooperation
SDGs ..... Sustainable Development Goals
SHSs..... Solar Home Systems
UN ..... United Nations
UNDP..... United Nations Development Programme
UNEP ..... United Nations Environment Programme
UNFCCC..... United Nations Framework Convention on Climate Change
US$ ..... United States dollar
WHO..... World Health Organization
ZLD..... Zero Liquid Discharge

Foreword

"Sustainable development is the pathway to the future we want for all. It offers a framework to generate economic growth, achieve social justice, exercise environmental stewardship and strengthen governance." [1]

The theme of the Centre's 20th annual report on *Human Development in South Asia 2017/2018* is 'Sustainable Development in South Asia'. The report addresses the links between environmental deterioration, equity, empowerment and economic growth. It explains how environmental degradation intensifies inequality through adverse impacts on the poor and the marginalized and how inequality vice-versa augments environmental deterioration. The report highlights the economic, social and environmental challenges that need to be addressed to promote sustainable human development, and recommends that these challenges should be overcome through equitable and empowering processes. The progress in human development over the last several decades cannot continue without addressing issues of environmental risk and inequality, particularly as the most deprived communities are the first ones to bear the consequences of such risks. In line with the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs), the region needs to follow a growth path that in the words of Ban Ki Moon helps in *"saving our planet, lifting people out of poverty and advancing economic growth"* at the same time. [2]

This report addresses the following questions: How is environmental sustainability linked to equity and economic growth? What has been the state of and trends in key environmental indicators in South Asia? Has it had any consequences for human well-being and human development? What are the relevant laws, policies and programmes at the national, regional and global level, and how effective are they? What actions could be taken in South Asia that simultaneously ensure environmental sustainability, economic growth, equity and human development?

The report presents a policy framework for sustainable development in the context of achieving broader SDGs in a balanced and integrated manner in South Asia. It concludes that environmental sustainability is key to fostering human development, and this can and should be done through the simultaneous pursuit of the eradication of poverty and hunger, reduction of inequalities, improvements in energy access for the poor, and minimization of environmental risks.

The 2017/2018 Report contains six chapters. Chapter 1 provides a conceptual framework for sustainable human development; a development model that improves economic growth by conserving natural resources and benefiting all. Chapter 2 records the progress and trends in economic growth, natural resource use, equity and environment since the Earth Summit 1992. Chapters 3, 4 and 5 provide country case studies on the context, trends and reasons for the state of environmental degradation and its relationship with equity and development in India, Pakistan and Bangladesh respectively. Based on these chapters, chapter 6 concludes by suggesting a strategy and framework for achieving sustainable development. As always, the report's background tables provide a wealth of information on sustainable development in South Asia.

Acknowledgments

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About Mahbub ul Haq Research Centre

The Mahbub ul Haq Research Centre is a centre of excellence in social science research at LUMS. It supports interdisciplinary research, scholarship and teaching on issues of human development, social exclusion and inequality across South Asia. Its vision is to co-construct knowledge on critical challenges with a community of scholars, students, practitioners and social actors to bring about transformative change for an *inclusive and equitable society*.

The Centre was set up in May 2016 at LUMS to honour the memory of Dr Mahbub ul Haq, founder and chief architect of the United Nations Development Programme (UNDP) Human Development Reports. With a special focus on South Asia, the Centre is committed to the promotion of the human development paradigm.

The Centre organizes professional research, seminars and debates on issues of economic and social development as they affect people's well-being. Believing in the shared histories of the people of this region and in their shared destinies, Haq was convinced of the need for cooperation among the countries of the region. His vision extended to a comparative analysis of the region with the outside world, providing a yardstick for the progress achieved by South Asia in terms of socio-economic development. The Centre's research work is presented annually through a report titled, Human Development in South Asia.

Continuing Mahbub ul Haq's legacy, the Centre provides a unique perspective in three ways: first, by analysing the process of human development, the analytical work of the Centre puts people at the centre of economic, political and social policies; second, the South Asia regional focus of the Centre enables a rich examination of issues of regional importance; and third, the Centre's comparative analysis provides a yardstick for the progress and setbacks of South Asia vis-à-vis the rest of the world.

The Centre's activities include: preparation of annual reports on Human Development in South Asia; publication of a collection of unpublished papers of Mahbub ul Haq; preparation of policy papers and research reports on poverty reduction strategies and other socio-economic issues; and organization of seminars, and conferences on global and regional human development issues. This year, with new leadership on board, the Centre is undergoing a re-envisioning exercise in relation to key activities and organization of research.

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Overview

The central objective of human development is to provide opportunities and choices for all. To do so, it is critical to address economic, social and environmental challenges in an equitable and empowering manner.

The 2017/2018 Report explains that achieving human well-being and eradicating poverty for all people is still possible, but only if there is a fundamental change in the relationship between people and nature, and a significant reduction in socio-economic and gender inequalities.

The current model of development has delivered prosperity to millions. However, it also has led to continuing poverty and other socio-economic and political deprivations; unprecedented levels of inequality; and has brought the world close to issues of global climate threats and biodiversity loss. The present development model is unsustainable, and the progress made in the last few decades is in danger of being reversed through worsening social inequalities and possible irreversible declines in the environment. The most deprived communities and people bear and will continue to bear the consequences of environmental risks.

Achieving sustainable development requires decoupling economic growth from environmental degradation, and reducing inequalities in wealth, income and access to opportunities. Environmental deterioration intensifies inequality through its adverse impacts on the poor and marginalized, and inequality in capabilities and opportunities augment worsening of the environment.

The report addresses a number of questions: How is economic development linked to environmental sustainability and equity? What has the state and trends in key sustainable development indicators been in South Asia since the Rio Earth Summit 1992? What has been the impact on human well-being and human development? What are the laws, policy and programmes at the national, regional and global level, and how effective are they? What actions could be taken in South Asia that simultaneously ensure environmental sustainability, economic growth, equity and human development?

The important point that this report highlights is that without an explicit commitment to sustainable development, economic growth is neither sustainable nor equitable. The imperative of promoting a just and sustainable development has been a continuing message of all the South Asia Human Development Reports. Based on the analysis, this report comes up with several findings.

1. Over the past few decades, South Asia has seen major advancements in economic, social, environmental and political aspects. The region's economic growth has been impressive, while poverty has reduced and human development has improved. However, serious challenges to human development remain. The region is home to the largest concentration of multi-dimensional poverty, and economic growth has widened inequalities in most parts of the region. This, along with unsustainable consumption and production patterns, has been associated with negative environmental outcomes.

2. With limited progress on environmental issues and few success stories, all components of the environment—land, water, atmosphere, biodiversity and oceans—point towards a deteriorating situation in South Asia. *Air* quality is deteriorating. *Water* scarcity and poor water quality is common. Both the demand for land and intensity of land use have gone up putting pressure on land. *Waste* management has become a serious problem. *Biodiversity* and ecosystem integrity are threatened throughout the region. Besides, environmental degradation makes South Asian countries more vulnerable to the adverse impacts of *climate change*. These trends, along with increasing energy insecurity, are posing threats to long-term economic growth and may reverse already gained socio-economic benefits.
3. In South Asia, environmental threats and global warming have far-reaching implications for people. Environmental deterioration and rising temperatures stunt people's capabilities by affecting their *health*. The burden of disease arising from air pollution, dirty water and unimproved sanitation, and inefficient solid waste management is disproportionately higher for children, women, and the poor.
4. Environmental degradation also impacts the livelihoods of millions of people around the region who depend directly on environmental resources for work. Around half of the region's economically active population works in *agriculture, forestry, fishing and hunting*. Environmental distress also forces people to displace or *migrate* from rural to urban areas or abroad, affecting both national and international migration patterns.
5. *Women's* traditional responsibilities including food production, water and fuel gathering and care-giving connect them to natural resources. Their limited access to resources, restricted property rights, insufficient decisionmaking power and traditional responsibilities make them highly vulnerable to environmental degradation. The impact includes increased time to manage livelihoods, increased food insecurity, increase in vulnerability to migration and violence, and an increase in the disease burden.
6. The challenge for South Asian countries is to foster economic development while reducing environmental damage and improving equity. The report identifies policies and strategies that ensure not only environmental sustainability but also equity and human development. Several public and private sectors and civil society actors have followed successful approaches that integrate environmental sustainability, equity, economic growth and human development.

The inability of the traditional growth framework to make the growth process inclusive and sustainable calls for the need of a new development model. This new model, sustainable human development, puts *all* people at the centre of development, regards economic growth as a means and not an end, preserves natural resources, and protects the life opportunities of current as well as future generations.

The world is under stress. Poverty continues to prevail in developing countries. Inequality is deepening. Climate change and environmental pressures threaten life. This calls for the need of a change of the course to address these crises.

A new development paradigm is needed to address the growing challenge of human deprivation, which puts *all* people at the centre of development,

regards economic growth as a means and not an end, preserves natural resources, and protects the life opportunities of current as well as future generations. Such a development framework enables all human beings to enlarge their human capabilities and protects the natural systems for sustaining future development too.

Sustainable development is both a way of looking at the world by creating links between economic, social and environmental change, and a way of relating our shared goals for a just society by combining economic development, social inclusion and environmental sustainability.

In the final analysis, sustainable human development is pro-people, pro-poor and pro-environment—a development which is economically, socially and environmentally sustainable. It gives priority to poverty reduction, decent jobs, social integration and environmental preservation. It improves economic growth and translates it into improvements in human lives without any discrimination, and without destroying the natural capital needed to protect the opportunities of future generations. The path for sustainable development integrates environmental considerations into public policy with the clear objectives of equity, environmental conservation and economic growth. The 2030 Agenda for Sustainable Development and the SDGs also emphasize on simultaneously improving economic growth, protecting the planet and ensuring social inclusion.

Increasing evidence indicates widespread environmental deterioration in South Asia. The region has experienced the second-highest annual economic growth of 6.2 per cent (between 1990 and 2017) in the world, however, the growth rate has neither been equitable nor environmentally sustainable. The process has been more harmful to the poor and deprived. Not only has it intensified inequality, but inequality in capabilities and opportunities has also augmented environmental worsening.

While the use of resources, such as minerals, metals and biomass, has tripled since 1990, access to these resources has simultaneously become more unequal. South Asia is one of the most unequal in the world due to a complex system of hierarchy and discrimination in which caste, ethnic and gender distinctions all play roles. The gaps in income, education and health between high and low-income groups remain high in South Asia. About 98 per cent of people in South Asia region live in countries in which income inequality has increased over the last two decades (1993-2013). The share of income received by the poorest has also gone down. Coupled with persistent social inequities and governance failures, this has resulted in the inadequacy in access to water, food and energy.

Environmental trends over recent decades show deterioration on several fronts with adverse implications for people's well-being.

- Development paths in South Asia have been characterized by high resource intensity. The region housed 24 per cent of the global population, used 9 per cent of global materials, consumed 7 per cent of global energy, withdrew 26 per cent of global water withdrawals, and produced 8 per cent of global greenhouse gas (GHG) emissions.
- Ninety-nine per cent of South Asia's population is exposed to air pollution concentrations that exceed the World Health Organization (WHO) guidelines. Air pollution, both indoor and outdoor, is costing South Asia 7.4 per cent of its GDP, and causing 1.6 million premature deaths annually accounting for one-third of such deaths in the world.
- South Asia is one of the most water-stressed regions of the world. Most alarming is depleting groundwater resources and the

balance between recharge rates and abstraction. Water pollution is causing diseases like diarrhoea, hepatitis and outbreaks of typhoid and cholera. Annually, 0.8 million people die in South Asia due to inadequate sanitation, lack of water supply/access and hygiene, accounting for half of such deaths in the world, and cost the region 2 to 4 per cent of its GDP.

- About two-fifths of South Asia's land is degraded, causing an economic loss equivalent to 2 per cent of its GDP or 7 per cent of its agricultural output.
- Deforestation is a major challenge in most countries of South Asia. It is threatening the flora and fauna, encouraging natural disasters and damaging many sensitive ecosystems. Pakistan and Afghanistan are among the countries of the world with the lowest forest cover ratio of about two per cent.
- The number of people affected by natural disasters in South Asia increased from 48 million to 65 million, while average annual economic losses increased from US$ 3 billion to US$ 8 billion between 1990-2000 and 2001-2017. Drastic changes in global climate are expected to exacerbate the frequency and intensity of disasters in the region.

Environmental degradation stunts people's capabilities in several ways, from incomes and livelihoods to health, education, gender, etc. The adverse impact of environmental deterioration and climate change is and would be disproportionate across groups, with a higher burden on the poor and marginalized (women, children and elderly). The risk of economic losses, injury and death from natural disasters, water insecurity, air pollution and land degradation is higher among children, women and the elderly, especially for the poor.

South Asia has many achievements coming from successful initiatives towards greater environmental sustainability, empowerment and economic development. However, there is an urgent need for a substantial shift in public policy to follow a model of economic development which not only improves economic growth but also preserves natural resources and ensures the benefits of growth for all.

The resource-intensive economic growth process in India has resulted in environmental pollution as well as a very high level of inequality. Despite the presence of environmental legislation and both the state and civil society-led community initiatives, the country's centralized approach and poor governance have failed to achieve sustainability goals.

The worsening impact of environmental conditions on people's livelihoods in India has given the environment a political voice, as is evident from the events of *Chipko* movement, Silent Valley crisis and *Rajaji* National Park. Population growth, dietary changes, rapid urbanization and industrialization, and global warming are all drivers as well as causes of environmental degradation in India. A resource-intensive economic growth process has led to poverty alleviation in some pockets of the country but has increased inequality and violence in many parts of the country.

Inequality has proved to be both a driver and a consequence of environmental degradation in India. In 2017, only one per cent of Indians owned 73 per cent of the wealth generated, against the global one per cent population owning 48 per cent of global wealth. The most vulnerable to environmental degradation are the informal workforce comprising 91.9 per

cent of the total workforce of the country. There is refusal among the privileged and the state, to acknowledge the structural unemployment problem and the development processes that push the poor further into dependence on the rapidly degrading environments. These workers are directly impacted through deforestation, groundwater degradation and urban pollution. A wide socio-economic disparity is also prevalent amongst the states of the country. For instance, in 2014-15 the per capita income of the richest state of Delhi was 2.9 times higher than the national average and 7.9 times higher than the poorest state of Bihar.

The state of India's environment continues to deteriorate, with the annual cost estimated to be US$80 billion or 6 per cent of the country's GDP in 2009. The country's environmental problems include high levels of water and air pollution, falling groundwater tables and growing water scarcity, loss of biodiversity and land degradation.

With the national average of 21-22 per cent of the country's land as forest area, a state-wise analysis indicates massive degradation in some states and afforestation in others, along with a decline in the quality of the forests. Among the greatest losses of deforestation is the loss of biodiversity, as 3.7 per cent of the world's threatened species is in India. The country's agricultural development has been accompanied by rising inequality, increasing land degradation and decline in food productivity and quality. About 40 to 57 per cent of the country's land is moderate to severely degraded.

India is facing a decline in both water availability and water quality, mainly attributed to poor water management. About 70 per cent of industrial wastewater is discharged untreated, contaminating both ground and surface water. The polluted water in result causes 100,000 diarrhoeal deaths among children under-five. Almost 80 per cent of them are from the poorest economic rung. The country's focus on constructing dams has led to the displacement of 25 to 50 million people. It has also failed to ensure even the minimum flow of freshwater downstream, leading to shrinking of the river delta followed by its ecological destruction. Moreover, the coastal ecosystem has become a dumping ground for waste, resulting in loss of coastal habitats. This has led to a reduction in marine fish catch, livelihoods loss for fishing villages, and lasting impacts on phytoplankton and copepod populations.

The level of air pollution is also found to be several times higher than the permissible safe limits in all the cities of the country, mainly due to vehicular traffic, wood-burning fires and crop residue burning. Coal-fired thermal power plants are the biggest contributors to air pollution. With just 18 per cent of the global population, India has a disproportionate burden of 32 per cent of the global disability-adjusted life years (DALYs) lost due to chronic respiratory diseases (COPD) and asthma.

The environmental policy framework of India has been based on three notions: polluter pays principle, the precautionary principle and intergenerational equity. Besides addressing the issue of the environment in its five-year plans, the country has also formulated several laws and regulations to safeguard and conserve the environment. However, the country's centralized approach, along with functional problems in environmental governance due to involvement of a multiplicity of institutions, has failed to address the issue of pollution. This is most visible in the Forest Rights Act 2006, which has a mere three per cent implementation after more than a decade of its passage.

Pakistan's sole focus on the quantity of economic growth has resulted in an unequal distribution of economic benefits and unsustainable use of natural resources. This is explained by poor public policies and failure to implement sustainability initiatives, increasing the vulnerability of the population.

Sustainable development accelerates economic growth and translates it into improvements in human lives, without destroying the natural capital needed to protect the opportunities of future generations. Over the last few decades, the economy of Pakistan has expanded at a reasonable rate. However, the economy is not only unequal but is also threatening the natural environment overwhelmingly. This has resulted in a huge number of people living in extreme poverty, with insufficient access to education, health and decent work. Large scale economic activity of humanity is also changing the global climate, the availability of water cycle, the safety of the air, the ocean's chemistry, and the habitats of other species.

Pakistan's economy has progressed at an annual rate of 4.8 per cent since FY1980. However, the country is still facing the widespread prevalence of human deprivation. Human Development Index (HDI) value ranked at 150th out of 189 countries in 2017, higher than Afghanistan only in South Asia. Four out of every ten people were multi-dimensionally poor. The income share of the poorest 20 per cent of the population decreased by 21 per cent between 1987-88 and 2010-11, while that of the richest increased by 12 per cent. In 2015-16, it was estimated that more than two-fifths (42 per cent) of the population was illiterate, with widespread inequalities. Pakistan has the third-highest rate of infant mortality in the world, is among the three countries of the world with endemic polio and is the sixth-highest with the burden of tuberculosis. About 37 per cent of Pakistan's population is food insecure and 40 per cent of children under-5 were chronically malnourished (stunted) with pervasive inequities. The widespread deprivation and extreme poverty in the form of lack of access to income, health and education force people to engage in activities that deteriorate the environment.

The country's growth record has also been clouded by a degrading environment and growing scarcity of natural resources, exposing the population to serious air, water and land pollution, with a negative impact on people's well-being. The Environmental Protection Index (EPI) ranks Pakistan among the 12 worst countries in environmental pollution.

Pakistan is the fifth most vulnerable country in the world to climate change impacts, with serious long-term implications for water, energy and food security in Pakistan. The energy sector of Pakistan is characterized by the heavy dependence on fossil fuels along with low access to clean fuel and inefficient energy use. Rebalancing the energy mix towards low-cost renewables will improve energy access, decrease energy cost and preserve the environment. Pakistan is a 'water scarce' country with per capita water availability less than 1,000 cubic metres. The other challenges of the water sector include poor farm sector water management and water pollution. Pakistan's air pollution crisis is taking an immense toll on public health and economic growth. It is the fifth largest risk factor to early deaths and costs the national economy one per cent of GDP. The increasing pollution in coastal and marine resources has not only reduced the fish-catch but also several species of indigenous fish have completely disappeared along the Sindh coast. Deforestation, desertification and loss of biodiversity have posed serious threats for environmental sustainability. Pakistan has one of the lowest forestation rate (of 1.9 per cent) in the world. About 80 per cent of the country's area is dry land and is getting severely affected by

desertification, land degradation and recurring droughts. The country is home to several endangered species including the Indian pangolin, snow leopard, the Indus river dolphin and the green turtle.

Pakistan has adopted several laws, policies and action plan to address issues of sustainability. Unlike its commitments towards the MDGs, the government has taken greater ownership of the SDGs, and various national and provincial policy visions incorporate the SDGs framework and the 2030 Agenda. The 12th Five Year Plan (2019-2023) talks about inclusive and sustainable development by explicitly covering issues of climate change and environment and people's empowerment. The Vision 2025, initiated in 2014, also focused on people-centred and environmentally friendly development, however, the progress shows that the targets set forth could not be achieved fully. The National Sustainable Development Strategy 2012 aimed to evolve into a just society through the promotion of economic growth without overexploitation of natural resources and with a fair distribution of development dividends to all. It is being revised to integrate the sector-specific policies and the SDGs. The National Environmental Policy 2005 focused on protecting, conserving and restoring the environment to improve the quality of life of the citizens through sustainable development.

Besides mainstream policies, the country has also formulated sector-specific policies and plans. Pakistan is among the small group of countries with climate change legislation (Act) building on the commitment made in Paris in 2015. Other climate change-related policies include the National Policy on Climate Change 2012, National Disaster Risk Reduction Policy 2012, and Framework for Implementation of the Climate Change Policy (2014-2030). Other sector-specific initiatives include National Energy Policy 2013, National Water Policy 2018, National Air Quality Standards 2010, second National Implementation Plan for Persistent Organic Pollutants (POPs) 2015-2019, Territorial and Maritime Zones Act 1976 (amended in 1997), National Forest Policy 2015, and Sustainable Land Management Programme 2015-2020, and Second National Biodiversity Strategy and Action Plan 2017-2030. But these policies have been victim of poor implementation mainly due to lack of political will along with insufficient human and financial resources and technical capacity. Economic policies with the consideration of environmental sustainability and inclusiveness can not only contribute to a higher level of economic growth but can also help to reduce the damage done by environmental deterioration.

Bangladesh's success in sustained economic growth and poverty reduction has been accompanied by uncontrolled pollution amid the rising threat of climate change. Bangladesh needs to improve the implementation of existing environmental governance by introducing institutional reforms.

Over the last three decades, Bangladesh has sustained robust and high economic growth while decreasing its poverty rate, led by urbanization and industrialization. In tandem with its economic development, the country has increasingly been urbanizing, mounting the urban population by about two times between 1990 and 2016. Yet development outcomes have come at considerable environmental costs that are increasingly harming the country's prospects for high economic progress and improvement in the standard of living. The progress has been accompanied by uncontrolled pollution and inadequate management of natural resources. Inadequate waste management, degradation of wetlands and forests, and high level of deprivation have made the country's population vulnerable to the natural disasters which are most triggered by Bangladesh's geographic location and vulnerability to climate change.

Air, water and noise pollution are threatening the progress of the country. Overexploitation and contamination of water have become a serious problem for the country. Without proper collection and disposal, effluents and wastes clog channels, leading to floods and contamination of water. The overuse of fertilizers and pesticides and excessive irrigation of saline lands has damaged farmland soils. Country's environmental problems have been complicated by frequent natural disasters and global warming. Air quality has deteriorated due to low-quality fuel and brick kilns. In 2013-2015, $PM_{2.5}$ concentration (at 80 ug/m^3) in urban areas were more than eight times the WHO's standard and more than five times the Bangladeshi guidelines. Excessive extraction of water has led to an increased risk of arsenic contamination and the lower level of groundwater. Rivers around cities are among the most polluted. Out of 64 districts, 56 have high levels of arsenic contamination. Similarly, the water table has decreased (from 15 metres in central Dhaka and 4 metres in peri-urban areas in 1990) to 60 metres in 2005. The forest to land area ratio was 11 per cent in 2015 against the required standard of 25 per cent, while the forest area coverage decreased by 5 per cent between 1990 and 2015. Similarly, 77 species including 21 mammals, 23 birds, 21 reptiles and 12 plants were threatened in 2015. Climate change is going to make the situation worse. Owing to climate change, it is estimated that by 2050, 26 million Bangladeshi people are projected to be affected and displaced by storm surges and sea-level rise.

Environmental stress is posing a significant cost on the economy and people's health. In 2015, the country lost US$ 6.5 billion or 3.4 per cent of its GDP due to pollution and environmental degradation in urban areas. Temperature variability, water pollution and lack of waste management are causing various diseases. In 2015, diseases caused by pollution were responsible for 28 per cent of all deaths in Bangladesh compared to 16 per cent in the world. In other words, 80,000 people died prematurely due to environmental pollution and other environmental health risks in 2015. Pollution affects marginal people such as poor, women and children most severely, further harming their ability to benefit from economic growth.

Since the 1990s, Bangladesh has improved its policy regime and systems for environmental and pollution management by formulating environment-related laws, policies and guidelines, however, the issue of non-implementations needs to be addressed. The government has made environmental sustainability a cornerstone of its Seventh Five Year Plan (2015-16 to 2019-20). It has also put a strong emphasis on the implementation of the 2030 Development Agenda and the SDGs, which provides an opportunity to address issues of environmental sustainability and equity. Bangladesh's specific efforts to strengthen pollution management policies include revision of the Environmental Conservation Rules, the introduction of the Environment Court Act 2010, the Brick Kilns amendment rules 2013, and the revision of the National Environment Policy (of 1992) in 2013. Other steps to integrate environmental planning in economic development include the adoption of green banking guidelines, creation of the Green Transformation Fund by the Bangladesh Bank, and stationing environmental counsellors in export processing zones. Weak implementation of policies has resulted in the current poor state of environmental sustainability situation in the country. The solution requires the introduction of institutional reforms with the objective to improve accountability and transparency.

Deteriorating environment, high population growth, rising inequalities amid high economic growth and relative political stability provide an opportunity for South Asia to move from traditional growth framework towards sustainable development framework.

South Asia needs to follow a policy framework, in line with the 2030 Agenda, that ensures the integration of economic, social, environmental and political aspects. This requires an integrated approach that links locally-driven efforts, with engagement by the private sector and efforts to implement better policies, strategies, regulations, incentive mechanisms and capacities at national and regional levels. Recent experiences have shown that with careful public policy, many win-win strategies exist that ensure economic growth, environmental sustainability and equity in an integrated way.

As South Asia is a diversified region, there is no one-size-fits-all approach, however, some general rules may be followed in line with country-specific circumstances. Each country needs to design the appropriate mix of tools tailored to its specific circumstances, combining economic instruments, legislation and regulations, research and technological innovations and awareness-raising. Furthermore, they need to stimulate and support the involvement of the local authorities, the private sector and civil society organizations in addressing the various facets of these challenges.

The current development model has not worked well in South Asia. An alternative development strategy should integrate environmental sustainability with socio-economic considerations. Analysing and understanding interlinkages among environmental protection, economic growth, and human well-being will be key to understanding the synergies and trade-offs as well as developing a new model for sustainable development. The achievement of environmental sustainability will require not only an integrated strategy but also improved policy coherence, strengthened institutional coordination and taking whole-of-government approaches at all levels of policymaking. Improved coherence and collaboration across government departments can make it easier to recognize opportunities and address potential trade-offs.

National level ownership and political will are the key to formulate appropriate policies and improve governance. However, no government can achieve a transformative environmental sustainability agenda alone. Local governments, business, academics, civil society organizations and citizens all have a role to play, whether by adopting locally sustainable development solutions, shifting to sustainable business models, inventing smart technologies or adopting sustainable consumption habits.

Adoption of green growth policies has the potential to unlock new growth engines and spur economic growth. Green growth policies and practices can contribute to growth by stimulating innovation, promoting the efficiency of resources, and increasing resilience to environmental and other shocks. Such policies and practices not only boost the development of technological solutions which countries can export but can also help countries and organizations save on energy, water, and raw material costs by promoting greater resource efficiency.

Scientific progress and technological development offer some promise for decoupling economic growth from long-term environmental degradation. However, there is no guarantee that innovations will appear when and where they are most needed. Countries need to create a policy environment that provides the right incentives for innovation, including supporting private initiatives and funding basic research. The role of the private sector is also important in securing livelihoods, ensuring sustainable use of natural resources and minimizing

environmental impacts of its operations.

Effective and inclusive environmental governance is crucial for agenda-setting and the implementation of sustainable development. There is also a need for national development planning, which integrates global and regional environmental sustainability issues with national development policies.

The threat of climate change and environmental issues provide an opportunity for South Asia to formulate a joint regional strategy to address the common threats. It can build trust in the long-run and the resulting interdependence can decrease the risk of potential conflicts. This will not only help the region to address the threat but also help to exploit the regional renewable energy potential and the intra-regional trade potential to eradicate poverty and boost economic growth.

In line with the SDG 17, global level cooperation and partnerships are needed in at least three areas: availability of sufficient financial resources, fair international trade rules, and dissemination of innovative and affordable technology solutions. Mobilization of sufficient financing remains a major challenge. Raising domestic resources remain vital. However, external resources in the form of foreign direct investment, portfolio and loan flows as well as remittances are crucial to complement and bridge the domestic financing gaps. Strengthening the contribution of trade for sustainable growth is particularly important for South Asia. The multilateral trading system is currently falling short of its objectives and it needs to be improved by reforming the World Trade Organization (WTO). The third area for global partnership is technology as an engine of sustainability. Special efforts are needed to build capacity and enabling environments and to facilitate technology development, transfer and dissemination for sustainable development.

The availability of reliable, high quality and nationally comparable data is a crucial step in the achievement of a sustainable human development framework. South Asian countries should work in collaboration with the private sector, civil society organizations (CSOs) and global organizations on three front for this: the enabling environment, data production and data dissemination.

South Asia's rapidly rising population and unplanned urbanization along with its high vulnerability to climate change, and growing inequities and environmental deterioration provide a threat to the sustainability of long-term economic growth and the already achieved developmental gains. All these challenges combined with high economic growth and relative political stability provide an opportunity for the region to move from traditional growth framework towards a sustainable human development framework.

CHAPTER 1

Sustainable Development: A Conceptual Framework

Introduction

The global population is projected to increase by two billion over the next three decades. This will put a strain on resources and systems that are already scarce in many cases. Despite considerable socio-economic progress, huge challenges remain globally. High level of economic growth has improved global GDP, but social inequity is still largely prevalent across the world. Unsustainable use of natural resources has degraded and polluted the environment, and global problems, such as climate change, continue to grow.

National governments face the complex challenge of finding the right balance between the competing demands on natural and social resources, without sacrificing GDP growth. Understanding processes that support just societies and a healthy planet is an urgent need.

"Today, faced with the imperative of tackling climate change and responding to radical, fast-paced shifts in global technology, consumption and population patterns, there is growing consensus that sustainable development is the only way that we can avert environmental and social disaster", said Dr Gro Harlem Brundtland in a 2019 report of the United Nations.[1]

In addition to balancing economic, environmental and social objectives, a basic tenet of sustainable development is the need to balance the needs of current and future generations. *"Sustainability is not merely an environmental issue; it implies a new concept of economic growth, one that provides fairness and opportunities for all the people in the world, not just a privileged few, without further destroying the world's finite natural resources and carrying capacity,"* said Dr Mahbub ul Haq.[2] The idea of sustainability suggests that we have a collective responsibility towards the least privileged factions of our society today and in the future.

Understanding processes that support just societies and a healthy planet is an urgent need

The 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs) also endorse the need for a new development framework which focuses on improving economic growth while protecting the planet and ensuring equitable development for the present and the future. Their implementation offers a pathway to a world where poverty, inequality and conflict will not blight the life chances of millions of people who are currently denied the opportunity to enjoy their fundamental rights and freedoms.

This chapter discusses the concept of sustainable development, its history, evolution and what it means to the world today, especially for South Asia. It also explains how economic growth has been linked with equity as well as environmental worsening.

Sustainable human development: A model for growth, inclusiveness and sustainability

There are 7.7 billion people in the world in 2019, and the global population is estimated to increase to 9.7 billion by 2050.[3] These 7.7 billion people are looking for economic opportunities to find the food, water and sanitation, health, education and shelter. The global economy is US$ 86 trillion (2018).[4] The modern economy is highly unequal both within and between countries. The poor face issues

of undernutrition, lack of water and sanitation, insufficient health and education facilities, informal jobs and inadequate shelter.

Worldwide, 1.3 billion people are multidimensionally poor (2018), 821 million people are undernourished (2017), one out of five children live in extreme poverty, 122 women (25-34 years) live in extreme poverty for every 100 men, 262 million children are out of school (2017), 750 million adults are illiterate (2016), 5.4 million children do not survive their first five years of age (2017), 61 per cent of employed workers are in informal employment, and gender income gap stands at 44 per cent (2018).[5]

Sustainable development makes sense of the interactions among three complex systems: economy, people and the environment

The global economy is not only unequal but is also threatening the earth itself. Impacts of environmental degradation and global warming are more visible in the world today than ever before. Beyond philosophical debates, theories and headlines for global warming and depleted ozone, there are solid facts about environmental deterioration and the resulting impact on economic growth, income distribution and human lives. They affect the lives of billions of people all over the world, however, the impacts are differently distributed among gender and class owing to the level of preparedness-opportunities, skills and capacities.

Globally, 785 million people lack a basic drinking water service (2017), 701 million people continue to practice open defecation (2017), 90 per cent of urban dwellers breath unsafe air causing 2.9 million deaths (2017), 2 billion people do not have access to waste collection services, over 1 billion people live in slums (2016), 3 billion people rely primarily on inefficient and polluting cooking systems (2017), water scarcity affects more than 40 per cent of population, about 75 per cent of crop diversity has been lost from farmers' fields since the 1900s, and 12 million hectares are lost due to drought and desertification every year.[6]

The challenge to achieve inclusive and sustainable economic growth takes us to the concept of sustainable development. Sustainable development makes sense of the interactions among three complex systems: economy, people and the environment. Achieving sustainable development on our crowded, unequal and degraded planet is the most important challenge today.

A framework for sustainable development enables all individuals to enlargen their human capabilities to the fullest and to put those capabilities to their best use in economic, social, cultural and political fields. It also protects the development needs of future generations by protecting finite natural resources needed for sustaining development in the future. In the words of Dr Brundtland in a 2019 report on, *The Future is Now*, *"I am as convinced today… that we will only secure a prosperous, peaceful and livable planet if we harness economic growth and development to social solidarity across and between generations."*[7]

Pursuing sustainable development requires an understanding of the ecosystem, people's dependence on it, as well as the drivers of change in the ecosystem. Each natural ecosystem—from forests and agroecosystems to freshwater systems and coral reefs—provides a set of benefits that contribute to human health, well-being and livelihood. For example, sustainable management of terrestrial and marine ecosystems is a prerequisite to global food security. Likewise, environmental degradation adversely affects human health through exposure to bacteria, parasites and disease vectors. Environmental changes and human development are inter-related. Poor and marginalized communities such as indigenous people depend disproportionately on ecosystem services. At the same time, human activities have harmed the natural environment through increased consumption of scarce water and energy resources, desertification, loss of biodiversity and global climate change.

In a truly sustainable society, the economy will assist everyone, poverty and inequality will be reduced, natural

resources will be preserved, ecosystems will be protected, and unsustainable patterns of consumption and production will be reversed. All in all, the quality of human life will be improving or at least maintained. If a society lives in a situation of abject poverty and conflict, natural resources are often pillaged with little thought for the future. Similarly, if a country's economy suffers a great depression with many people losing jobs, environmental protection might be brushed aside, as immediate basic needs will trump the long-term goal of saving the environment.

Globally, sustainability has been recognized as a new development path in several global agreements. The Millennium Development Goals (MDGs) included environmental sustainability as one of its eight goals. The 2005 World Summit on Social Development recognized environmental, economic and social sustainability as three pillars of sustainable development. In 2015, the 2030 Agenda and the SDGs gave tremendous focus to pro-poor and sustainable development. Similarly, on 12 December 2015, 195 states committed to reducing carbon emissions to below 2 degrees Celsius (°C) in the United Nations Paris Agreement on Climate Change.

In sum, sustainable development recognizes that economic growth must be inclusive and environmentally sustainable to reduce poverty and build shared prosperity for current and future generations. The three pillars of sustainable development—economic growth, environmental stewardship, and social inclusion (table 1.1)—carry across all sectors of development, from cities facing rapid urbanization to agriculture, infrastructure, energy development and use, water availability, and transportation.

History and evolution of sustainable development

The ideas behind sustainable development can be traced back to early works such as Rachel Carson's *Silent Spring 1962*, Garret Hardin's *Tragedy of the Commons 1968*, Paul Ehrlich's *Population Bomb 1971*, *The Blueprint for Survival* by the Ecologist magazine in 1972 and the Club of Rome's *Limits to Growth 1972*. These works raised public con-

Table 1.1 Components of sustainable development

	Examples	Enablers
Environmental sustainability	• Protecting biodiversity • Stable climate • Universal access to clean water and sanitation • Resilience to natural disasters	• Sustainable use of natural resources (climate, oceans, biodiversity) and management of waste • Managing disaster risk and improving disaster response
Inclusive and sustainable economic development	• Eradicating income poverty and hunger • Reducing inequalities • Ensuring decent work and productive employment	• Fair and stable global trading system • Adequate financing for development and a stable financial system • Affordable access to technology and knowledge • Providing sustainable energy for all • Coherent macroeconomic and development policies supportive of inclusive and green growth
Inclusive and sustainable social development	• Adequate nutrition for all • Quality education for all • Reduced mortality and morbidity • Gender equality • Adequate social protection • Freedom from violence, conflict and abuse	• Sustainable food and nutrition security • Universal access to quality health care • Universal access to quality education • Inclusive social protection systems • Managing demographic dynamics • Regulating international migration • Democratic and coherent global governance mechanisms • Good governance practices based on the rule of law • Human rights protection

Source: Mensah 2019 and MHRC staff compilations.

cerns over environmental problems from human activities and highlighted the importance of systems thinking.

The concept of sustainable development gained its first global recognition in 1972 at the United Nations Conference on the Human Environment. It was the United Nation's first major conference on international environmental issues and brought the challenge of maintaining sustainability in the context of economic growth and development to the global forefront. The term was not referred to explicitly, but nevertheless, the international community agreed to the notion that both development and the environment, hitherto addressed as separate issues, could be managed in a mutually beneficial way.

The concept of sustainable development gained its first global recognition in 1972 at the United Nations Conference on the Human Environment

While the year 1972 put the challenge of sustainable development at the global stage, the phrase itself was first introduced in the 1980 report on *World Conservation Strategy: Living Resource Conservation for Sustainable Development* by the International Union for Conservation of Nature (IUCN). The report stated, *"Human beings, in their quest for economic development and enjoyment of the riches of nature, must come to terms with the reality of resource limitation and the carrying capacities of ecosystems, and must take account of the needs of future generations."*[8]

The phrase was then adopted and popularized in the *Our Common Future*, also known as the *Brundtland Report 1987* by the World Commission on Environment and Development (the Brundtland Commission). It defined sustainable development as *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*[9] This intergenerational concept was widely adopted.

It was not until the 1992 United Nations Conference for Environment and Development, also known as the Rio Summit, however, that major world leaders recognized sustainable development as the major challenge. The Summit further refined sustainable development by developing an agenda (Agenda 21) for countries to follow that would move the world toward sustainable development. It also produced a Convention on Biological Diversity (CBD); a Framework Convention on Climate Change (UNFCCC), or Global Warming Convention; the Rio Declaration on Environment and Development (the Rio Declaration); and a Statement of Principles on Forests. The Global Warming Convention was amended in 1997 by the Kyoto Protocol and in 2015 by the Paris Agreement on Climate Change, both of which aimed to limit global average temperature increases through reductions in greenhouse gas (GHG) emissions. The Summit also led to the creation of the United Nations Commission on Sustainable Development (CSD), tasked with the follow-up to the Rio Conference. The Summit stated that sustainable development should become a priority item on the agenda of the international community and proceeded to recommend that national strategies be designed and developed to address economic, social and environmental aspects of sustainable development.

Ten years later, the World Summit on Sustainable Development 2002, known as Rio+10, was held in Johannesburg to review progress in implementing the outcomes from the Rio Summit. It developed a plan of implementation for the actions set out in Agenda 21, known as the Johannesburg Plan, and also launched a number of multi-stakeholder partnerships for sustainable development. It spoke of *"the integration of the three components of sustainable development as interdependent and mutually reinforcing pillars: economic development, social development and environmental protection."*[10] Key commitments included those on sustainable consumption and production, water and sanitation, and energy.

This three-component vision of sustainable development was again underlined on the United Nations Conference on Sustainable Development, also known as Rio+ 20, in 2012. It was held to mark the 20th anniversary of the 1992 Rio Summit and the 10th anniversary of the 2002 Rio Summit. The final document of

the conference on *The Future We Want* states the objective of sustainable development as:

"We also reaffirm the need to achieve sustainable development by promoting sustained, inclusive and equitable economic growth, creating greater opportunities for all, reducing inequalities, raising basic standards of living, fostering equitable social development and inclusion, and promoting integrated and sustainable management of natural resources and ecosystems that supports, inter alia, economic, social and human development while facilitating ecosystem conservation, regeneration and restoration and resilience in the face of new and emerging challenges."[11]

The outcome document calls for the need of SDGs based on the three dimensions.

"The goals should address and incorporate in a balanced way all three dimensions of sustainable development and their interlinkages. They should be coherent with and integrated into the United Nations development agenda beyond 2015, thus contributing to the achievement of sustainable development and serving as a driver for implementation and mainstreaming of sustainable development in the United Nations system as a whole. The development of these goals should not divert focus or effort from the achievement of the MDGs. We also underscore that sustainable development goals should be action-oriented, concise and easy to communicate, limited in number, aspirational, global in nature and universally applicable to all countries while taking into account different national realities, capacities and levels of development and respecting national policies and priorities. We also recognize that the goals should address and be focused on priority areas for the achievement of sustainable development, being guided by the present outcome document. Governments should drive implementation with the active involvement of all relevant stakeholders, as appropriate."[12]

The United Nations Sustainable Development Summit 2015 adopted the *2030 Agenda for Sustainable Development* to provide a shared blueprint for peace and prosperity for people and the planet, now and into the future.[13] The 17 SDGs recognize that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth—all while tackling climate change and working to preserve our oceans and forests.

Sustainable development and the Human Development Reports

From a human development perspective, one of the strongest arguments in favour of environmental protection and sustainability stems from the ethical need to guarantee that future generations have the opportunities that the current generation enjoys.[14] At the same time, environmental sustainability discourse often tends to neglect intragenerational equity issues. However, the idea of sustainable human development requires that in our anxiety to protect future generations, we should not overlook the pressing needs of people today.[15] Human Development Reports have played a key role in this regard by consistently reminding sustainability advocates that intragenerational equity is as important as intergenerational equity.[16] Fortunately, the international development community has recognized the importance of both intergenerational and intragenerational equity in the 2030 Agenda for Sustainable Development.

For human development to be sustainable, it must be achieved with sustainable means

In the 2030 Agenda for Sustainable Development, human development is both the ends and the means. For human development to be sustainable, it must be achieved with sustainable means. In this context, the human development paradigm considers sustainability as another dimension of human development. At the same time, human development is critically important in achieving the SDGs, not just because it might help ensure that the goals are achieved, but also because it will enable the progress made to be sustainable beyond the target date of 2030. Without solid gains in human development, progress in sustainable development risks ultimately being re-

versed.

Since 1990, many global, regional and national Human Development Reports have advocated the idea of sustainable human development. Even a quarter-century back, the global *Human Development Report 1994* stated that *"sustainable human development is the development that not only generates economic growth but distributes its benefits equitably; that regenerates the environment rather than destroying it; that empowers people rather than marginalizing them. It gives priority to the poor, enlarging their choices and opportunities and provides for their participation in decisions affecting them. It is the development that is pro-poor, pro-nature, pro-jobs, pro-democracy, pro-women and pro-children."* [17] The sustainable human development paradigm is the synthesis of human development and sustainable development approaches.

Since 1990, many global, regional and national Human Development Reports have advocated the idea of sustainable human development

Dr Haq, the chief architect of Human Development Reports, stated that *"sustainable development implies the formulation of trade, economic, fiscal, energy and related policies in a way to bring about development that is economically, socially and ecologically sustainable."*[18] Each generation must meet its development needs without incurring debts—economic, social and ecological—on future generations. The current consumption cannot be financed for long by incurring economic debts on future generations. There is a need to invest sufficiently in health, education and nutrition of current generations to avoid social debt on future generations. Resources must be used in ways that do not create ecological debts by overexploiting the carrying and productive capacity of the planet.

It may be noted that the global *Human Development Report 2011* integrated equity and sustainability ideas within a single framework for evaluating human progress to gain a new perspective on the apparent trade-offs between equity and sustainability. The global *Human Development Reports 2006*, *2007/2008* and *2014* also focussed on environment-related topics such as water crises, climate change, sustainability, vulnerability and resilience. Even when the environment is not an explicit focus, many Human Development Reports have highlighted the disproportionate impact of environmental degradation on the poor and vulnerable in their analysis or recommendations. For example, the global *Human Development Report 1998* on consumption highlighted that *"ever-expanding consumption puts strains on the environment—emissions and wastes that pollute the earth and destroy ecosystems, and growing depletion and degradations of renewable resources that undermines livelihoods"* and such *"environmental damage threatens both the earth's carrying capacity and people's coping capacity. And it may have serious consequences for future generations"*.[19] Similarly, the global *Human Development Report 2003* advocated *"for strengthening institutions and governance, making environmental sustainability part of all sector policies, improving markets and removing environmentally damaging subsidies, bolstering international mechanisms for environmental management, investing in science and technology for the environment and increasing efforts to conserve critical ecosystems."*[20]

Over the years, Human Development Reports have also suggested several environmental sustainability policy measures in various domains ranging from planning, regulatory and economic instruments to advocacy and information exchange to advance the sustainable human development agenda. Planning related policy instruments focused on national plans, goals, strategies, programmes and roadmaps that governments create, implement and monitor to promote sustainable development. Regulatory related instruments aimed to influence social, economic and environmental action through binding 'regulations' and suggesting norms and acceptable be-

haviours, while limiting certain activities in society. Economic policy instruments often focus on fiscal and other economic incentives and disincentives to advance the sustainable development agenda. Informational measures focus on advocacy methods such as knowledge transfer, communicating an argument, persuasion, advice, moral appeal, etc., to influence human action in the context of promoting sustainable development.

Sustainability and economic growth

Sustainability and economic growth are mutually inclusive. Economic growth alone is not sufficient for poverty reduction and achieving equity and sustainable development. Poverty and deprivation is a threat to environmental sustainability. Poor people exploit natural resources (water, land and forests) in a haphazard manner for their survival and will continue to do so if the current poverty levels continue to exist. For example, one of the major reasons for deforestation in developing countries is attributed to the use of wood for cooking and heating purposes in remote areas-poor households. Economic growth is essential for providing better options to poor societies, but the model of economic development must become less energy-intensive, less resource-intensive, environmentally sustainable and must translate into human well-being. This requires a change in the character, distribution and quality of future economic growth.

The consumption and production pattern adopted by rich countries for development is not a suitable model for developing nations. Replication of western consumption patterns in the South would require 10 times the present amount of fossil fuels and about 200 times the minerals. With the current population trajectory of South Asia, it is speculated that in about four decades, these requirements would double.[21] Thus, it is of utmost importance that the nature, character and quality of the current growth model should be changed with a focus on environmental sustainability and people's empowerment. This would certainly require changes in lifestyle and a shift in use and sources of energy.

The current lifestyle of industrialized countries also needs an overhaul. Rich countries have a lower share in global population but higher share in income, wealth, and in the use of resources such as minerals and energy. The Organization for Economic Co-operation and Development (OECD) countries have about one-sixth of the world's population (17.3 per cent in 2017) and comprise of two-third of the global GDP (61.5 per cent in 2017).[22] They consume about two-fifth of the world's energy (38.4 per cent in 2016),[23] and account for one-third (33.6 per cent in 2014) of global carbon dioxide emissions.[24]

The nature, character and quality of the current growth model should be changed with a focus on environmental sustainability and people's empowerment

The economic models of environmental sustainability and sustainable human development demand change in the patterns pertaining to material production and consumption. Such models do not consider the environment as a free good, especially commons (water, air, etc.). They put a price on it, reflecting its scarcity and value. This not only helps discourage waste to a considerable level but through this, the violators and polluters could be highly taxed in order to pay for the damage they incurred to the environment. This model could be adopted at national as well as global level in order to treat environmental resources as finite assets that require conservation and promote policies for prudent asset management. This, however, does not ensure a complete shift in the behaviour of consumers. There are instances where abuse of resources continue as long as one can pay the penalty.

Globally, the idea of energy efficiency and transition towards renewable energy production sources (wind and solar) forms the core of the sustainability and climate change debate. The shift of energy from fossil fuels to renewable sources is essential to protect scarce re-

sources and prevent GHG emissions. There is also a need to make production and consumption less energy-intensive. There is considerable scope for improving the efficiency of energy in South Asia. Currently, energy intensity in South Asia is higher than the global average. In 2013, an average of 513 units of energy was required to produce 1 unit of GDP in South Asia [measured in kilograms of oil equivalent (koe) per US$ 1,000 GDP] compared to the global average of 232. Within South Asia, the energy used to produce every unit of GDP was 889 koe per US$ 1,000 GDP in Nepal, 545 in Pakistan, 530 in India and 314 in Bangladesh. The corresponding values were 136 in Australia, 134 in Singapore, 95 in Japan and 58 in Hong Kong. This clearly shows the inefficient use of energy in South Asia.[25]

Energy intensity in South Asia is higher than the global average

Over the next four decades (between 2012 and 2050), primary energy consumption is projected to increase by two-fifth (41 per cent) in the world (from 575.4 to 813.7 quadrillion British thermal units) and by over one and half times (169 per cent) in India (from 28.4 to 76.5 quadrillion British thermal units). Energy-related carbon dioxide emissions are also projected to increase if a business, as usual, continues, by one-fourth (26 per cent) in the world (from 33,902 to 42,771 million metric tons) and by one and half times (152 per cent) in India (from 2,002 to 5,043 million metric tons).[26] This calls for the formulation of a less energy-intensive strategy aimed at a low level of carbon dioxide emissions. Future strategy requires the proper pricing of non-renewable energy and an increase in investments for renewable energy. This can lead to the adoption of new technologies and new patterns of production that can significantly help in improving energy efficiency and in restraining the GHG emissions from the energy sector.

Equity

Inequality is a fundamental issue of human development and has a significant relationship with environmental conservation and sustainability.

The 2008 global economic and food crises, the Arab Spring and food riots in Mexico highlight the issue of inequity on top.[27] A majority of the population is deprived of the basic needs of life, while the huge reward goes to those few on top. The 26 richest people in the world in 2018 had the same wealth as the poorest half (3.8 billion) of the world's total population, down from 43 people in 2017.[28] Globally, 3.4 billion people (46 per cent of humanity) have barely escaped extreme poverty and are living on less than US$ 5.5 a day (in 2015); while the wealth of the world's billionaires increased by 12 per cent, and that of the poorest decreased by 11 per cent between 2017 and 2018.[29] There is a direct result of increasing inequality and of prosperity accruing disproportionately to those at the top. Between 1980 and 2016, the poorest 50 per cent of the world only captured 12 cents in every dollar of global income growth, while the top 1 per cent captured 27 cents of every dollar, a direct result of prosperity.[30] This has devastating human costs: 10,000 people die daily due to lack of access to health care, 262 million children are out of school, 16.4 million hours of unpaid work is done mostly by women.[31]

Extreme inequalities in social, economic and political opportunities have a direct impact on human capabilities. According to Dr Haq, *"equity is a central tenet of (human) development. Equity in access to economic and political opportunities must be regarded as a basic human right in a (human) development paradigm."*[32] Human development approach values life due to its built-in assumption that all individuals must be enabled to develop their human capabilities to the fullest and deploy their capabilities for the betterment of all spheres of their life. Equity in access to opportunities demands a restructuring of power such as distribution of assets through land re-

forms; distribution of income from rich to the poor through progressive taxation; overhaul of the credit system to meet the needs of the poor; reform of the political system to ensure participation of the poor and voiceless; and removal of social and legal barriers to improve access to economic and political opportunities without discrimination.

According to the global *Human Development Report 2005*, various aspects of inequity include income and wealth inequities, social inequities in health and education, inequities based on gender, race, class and ethnicity, cultural and religious discrimination and barriers in political participation.[33] Deep inequities persist within countries between the rich and the poor, men and women, rural and urban, and across regions and groups. They are interlinked and create mutually reinforcing structures of disadvantage that follow people through life cycles and across generations. Inequities limit and restrain economic growth, poverty reduction and sustainable development. Inequality accumulates through an individual's lifetime: a child who starts life with limited access to health care often has worse schooling options in adolescence and ends up as an adult with low income. Between countries with very high human development compared to those low on the Human Development Index (HDI), there is a gap of nearly 19 years in life expectancy (in 2015); while in the more developed countries over twice as many receive primary education and nine times as many progress to tertiary education (2017); the global richest 10 per cent own over 70 per cent of global wealth, while the poorest 50 per cent own less than 2 per cent (2017); and global gender income gap is 44 per cent (2018).[34]

The concept of inequality is prominent in the 2030 Agenda. According to the United Nations Post-2015 Development Agenda, *"high inequalities have impeded sustainable development and have no place in a world where decent and secure well-being should be a prerogative of all citizens."*[35] The SDGs aim to end poverty, protect the planet and ensure prosperity for all. In addition to a specific goal (SDG 10) on inequality, the SDGs commitment to 'leave no one behind' indicates the extent to which inequality is understood as a multi-faceted and urgent problem. SDG 10 is devoted to reducing inequalities within and among countries. The goal includes targets on income inequality, social and political empowerment of all, fairer fiscal and wage policies, migration, financial regulation and democratic governance of the global economy.

Tackling inequality is also instrumentally essential in achieving several other SDGs. Goal 10 of the SGDs on reduced inequality is strongly linked to SDG 1 (end poverty) and SDG 2 (end hunger). If economic growth over the last three decades had been equally distributed, the world would be on track to eliminate extreme poverty. Achieving SDG 3 (ensure healthy lives and promote well-being for all) and SDG 4 (ensure inclusive and quality education for all) also depends on the reduction of inequalities. Many health and education outcomes are affected by the level of inequality in society. A meaningful action to address the issue of climate change (SDG 13) also depends on patterns of economic and consumption concentration, wherein the richest 1 per cent emit 175 times more carbon than the poorest 10 per cent of the population.[36] And finally, high levels of economic and social inequality is a constraint on inclusive economic growth (SDG 8) and gender equality (SDG 5).

Deep inequities persist within countries between the rich and the poor, men and women, rural and urban, and across regions and groups

Environmental sustainability and equity

Environmental sustainability and sustainable human development address both intragenerational and intergenerational equity. Development patterns that result in the levels of poverty and inequality seen today are neither desirable nor sustainable. The current patterns of income

inequality, gender and racial discrimination, and inequities on the basis of nation, religion, caste, ethnicity, residence and colour are neither sustainable nor worth sustaining. The path towards sustainable human development integrates environmental considerations into mainstream development policy with clear objectives of equity, environmental conservation and human development.

Inequality and poverty reduction have a very strong link with environmental sustainability

Inequality and poverty reduction have a very strong link with environmental sustainability. Unlike the issues of global warming and depletion of the ozone layer, the poor are concerned with the provision of clean water and improved sanitation facilities which put their lives at risk. Unless the problems of poverty are addressed, environmental sustainability cannot be guaranteed. Similarly, the level and progression of inequity undermine economies, social inclusion and environmental sustainability. The global *Human Development Report 2019* says, that climate change will affect the poor and widen existing inequalities. *"Between 2030 and 2050 climate change is expected to cause an additional 250,000 deaths a year from malnutrition, malaria, diarrhoea and heat stress. Hundreds of millions of more people could be exposed to deadly heat by 2050, and the geographical range for disease vectors such as mosquitoes that transmit malaria or dengue will likely shift and expand."*[37] The report further states, that if not addressed, it will only get difficult to address the widening inequality which is reinforced by climate change and technological disruptions which tend to hit the poorest population the hardest and earliest.

In Dr Haq's words, *"the ethical and philosophical foundation of the new development paradigm lies in acknowledging the universalism of life claims. No newborn child should be denied development opportunities because the child happens to be born in the 'wrong class', 'wrong country' or to be of 'wrong sex'. The purpose of development should be to increase opportunities and choices for people on an equal footing."*[38]

Sustainable development and the Sustainable Development Goals (SDGs)

The 2030 Agenda and the resulting SDGs, and the 2015 Paris Agreement are crucial steps towards conserving the environment and ensuring human development for everyone. *"Their implementation offers a pathway to a world where poverty, inequality and conflict will not blight the life chances of millions of people who are currently denied the opportunity to enjoy their fundamental rights and freedoms."*[39]

The SDGs and the Paris Agreement on Climate Change suggest that there is increasing awareness about the importance of sustainable development. The SDGs framework provides an opportunity to work for an equitable and environmentally sustainable world. The SDGs provide a 15-year time frame (from 2016 to 2030) to achieve the agenda of leaving no one behind by closing the human development gaps today and ensuring that future generations have the same or better development opportunities.

The SDGs are a welcome step forward. Their focus is not only on improving the well-being of present societies but also on maintaining the improvements over time for future generations. This means that the notion of sustainability has been incorporated across the global agenda. Furthermore, compared to the previous eight MDGs, the new SDGs have more than doubled their number of goals to 17, and now include goals concerning equality, justice and peace. Unlike MDGs, the focus of the SDGs is not only the developing world but towards developed countries as well. This implies that the world today is plagued with the issues of inequality, unsustainable production and consumption pattern and lacks sustainable economic models. The 2030 Agenda includes 17 SDGs, 169 tar-

Table 1.2 List of Sustainable Development Goals (SDGs)		
	Goals	Targets
1.	No poverty	End poverty in all its forms everywhere
2.	Zero hunger	End hunger, achieve food security and improve nutrition and promote sustainable agriculture
3.	Good health and well-being	Ensure healthy lives and promote well-being for all at all ages
4.	Quality education	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
5.	Gender equality	Achieve gender equality and empower all women and girls
6.	Clean water and sanitation	Ensure availability and sustainable management of water and sanitation for all
7.	Affordable and clean energy	Ensure access to affordable, reliable, sustainable and modern energy for all
8.	Decent work and economic growth	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
9.	Industry, innovation and infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
10.	Reduced inequalities	Reduce inequalities within and among countries
11.	Sustainable cities and communities	Make cities and human settlements inclusive, safe, resilient and sustainable
12.	Responsible consumption and production	Ensure sustainable consumption and production patterns
13.	Climate action	Take urgent action to combat climate change and its impacts
14.	Life below water	Conserve and sustainably use the oceans, seas and marine resources for sustainable development
15.	Life on land	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
16.	Peace, justice and strong institutions	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
17.	Partnerships for the goals	Strengthen the means of implementation and revitalize the global partnership for sustainable development

Source: UN 2019.

gets and 230 indicators. Table 1.2 shows the list of 17 SDGs.

The 2030 Agenda for Sustainable Development provides an ambitious and shared blueprint for peace and prosperity of the people and the planet, now and in the future. The Agenda makes it very clear that sustainable development cannot be achieved by governments alone; it requires the active participation of all stakeholders such as civil society, the private sector and the scientific community. But sustainable development cannot be left entirely to the market and nongovernmental actors. The state should serve as a trustee for the interests of current and future generations. Governments across the world need to design appropriate policies and strategies to tackle the pressing claims of those currently poor while safeguarding the interests of future generations. In this context, the human development framework can contribute intrinsically in the form of improving poor people's capabilities (e.g., health and education) as well as instrumentally in the form of increasing their 'human capital' with lasting influence in the future.

Implementation of the Paris Agreement is essential for the achievement of the SDGs. The Agreement provides a roadmap for climate actions that will reduce emissions and build climate resilience.

In December 2015 at the Conference of Parties (COP 21) in Paris, a follow-up agreement on international climate protection was reached. Under the Paris Agreement, the United Nations Framework Convention on Climate Change (UNFCCC's) existing financial mechanisms, the Green Environment Facility (GEF) and Green Clean Fund (GCF) shall serve as the financial mechanisms to achieve the ambitious goal to

limit the increase in global average temperature to well below 2°C above preindustrial levels, while aiming to limit it to 1.5°C. Against the old promise to increase climate finance for developing countries to US$ 100 billion a year by 2020, there is no road map on how to get there, nor even an agreed definition of what constitutes North-to-South climate financing. Similarly, by old commitment to transfer climate technology to developing countries, there is interest to help developing countries decrease GHG emissions, but less focus to help them to cope with the effects of climate change. Despite a number of flaws, the Paris Agreement is an important achievement as it symbolizes the efforts of governments to cooperate to avert disastrous global warming that threatens human survival.

Significant 'win-win' opportunities exist to reduce poverty and inequality, sustain growth and improve the environment

In South Asia, levels of political commitment are reasonably high in simultaneously pursuing a low-carbon emissions pathway as well as attempting to tackle their current developmental challenges. For example, all South Asian countries have already ratified the 2015 Paris Agreement on Climate Change. Many of them have also submitted their Intended Nationally Determined Contributions (INDCs) in areas such as sustainable lifestyles, cleaner economic development, the reduced emission intensity of GDP, increased shares of non-fossil fuel-based electricity, enhanced forests carbon sink, adaptation to climate change, mobilizing finance, and technology development and transfer.

At the same time, it must be noted that tackling climate change and achieving sustainable development requires more than merely ratifying a global agreement on climate change. Success depends on how countries translate international commitment in their policies and devise innovative ways to implement and monitor the strategies thus formed. Currently, the South Asia region has difficult but clear choices to make: continue to pursue a short-term 'grow-now-clean-up-later' model that has proven costly and risky or adopt a long-term and environmentally sustainable growth strategy that can sustain long-term growth and the well-being of current and future generations. The chapters in this report argue that South Asia cannot continue on a path of 'grow-now-clean-up-later'. They stress that low-emission 'green-growth' is not only necessary but is relatively inexpensive when looking at the larger picture. In this regard, all governments in the region need to design strategies that value sustainability. This would help guide the consumption and investment decisions of households, businesses and the public sector in a more sustainable direction. Such integrated strategy to sustainability and equity concerns will give new impetus to not only the realization of environmental sustainability but the 2030 Agenda of achieving economic growth, social development and environmental protection in an integrated and balanced manner.

Until recently, many have argued that ensuring environmental sustainability means curtailing economic growth. However, many recent reports such as the global *Human Development Reports 2007/08* or *2011* identified pathways for people, communities, countries and the international community to promote environmental sustainability *and* economic growth in mutually reinforcing ways. Recent development experiences have also demonstrated that with judicious policymaking, significant 'win-win' opportunities exist to reduce poverty and inequality, sustain growth and improve the environment. For example, the Indonesian government has recently phased out fossil fuel consumption subsidies to reduce GHG emissions but also enhanced its fiscal space to extend social protection programmes focused on poor people and tax exemptions for some industries and agriculture to mitigate the effects of energy price increases. Such a win-win strategy can bring major benefits to all dimensions of sustainable development. Due to the sustained efforts of the United

Nations and others, public awareness of the scale and scope of the environmental sustainability challenges has increased in recent years.

Thus, the interlinkages between human development, environmental preservation and sustainable development are indisputable. In lieu of the plethora of interconnections and complexities at play, the need of the hour is a coherent policy framework to overcome various trade-offs and synergies involved in the implementation of the Sustainable Development Agenda. Such a policy framework requires, among other things, the past trends, current status and emerging challenges, which is the focus of the next chapter.

Is South Asia on track to achieve the SDGs?

In this section, an attempt has been made to assess the performance of countries in South Asia with regards to their performance on the SDGs and the interconnected elements of sustainable development: economic growth, social inclusion and environmental conservation by 2030. Although the international community is engaging in achieving the 2030 Agenda, the pace is not at par with the deadline.

South Asia's average value of the SDG index of 59 suggests that the region is on average 59 per cent of the way to the best possible outcome across the 17 SDGs (table 1.3). It varies from 65 per cent in Bhutan and Sri Lanka to 46 per cent in Afghanistan. This is much lower as compared to the best-performing country around the world—Sweden, with a value of 85 per cent. Bhutan and Nepal, both landlocked countries with low levels of development, are among the best performing countries in the region. Sri Lanka is the second-best performing country with progress on track for SDG 1 'poverty', SDG 6 'water' and SDG 8 'economic growth'.

The only goal for which all South Asian countries, except Afghanistan, appear to be on track is that of eliminating poverty. The region does not seem to be on track for all the remaining goals. Goals for which the current performance of the countries is 'moderately improving', the current rate of progress would be inadequate to meet them. At the current rate of progress, even with optimistic assessments, countries are lagging behind on 14 of the 17 SDGs. Much of this sluggish and stagnated performance can be attributed to persistent inequalities. The region is one of the most unequal in the world due to a complex social system of hierarchy and discrimination in which identities such as caste, ethnicity and gender define power over political, economic, social and environmental rights.

South Asia is on average 59 per cent of the way to the best possible outcome across the 17 SDGs

Conclusion

The chapter provides a conceptual framework for sustainable human development by establishing a link between economic, social and environmental sustainability. It is a development model that improves economic growth by conserving natural resources and benefiting all. It not only ensures the development opportunities for the current generation but also for future generations.

Environmental concerns are a reality as indicated by the huge number of deaths and economic losses due to air pollution, water pollution, global warming, land degradation, deforestation and the loss of biodiversity. It not only impedes economic growth but also increases the burden of poverty and deprivation. The poorest bear the burden of environmental devastation, even though they contribute very little to the problem. The high and the disproportionate impacts of environmental deterioration calls for a new model of development, a model which can not only preserve natural resources and address inequities today but can also meet the needs of the future generations in an equitable way.

The 2030 Agenda for Sustainable

Table 1.3 Sustainable Development Goals (SDGs) progress for South Asia, 2018

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka
1. No poverty	On track (moderate)	On track (moderate)	On track (moderate)	Stagnating	On track (moderate)	On track (good)
2. Zero hunger	Moderately improving	Moderately improving	Moderately improving	Stagnating	Moderately improving	Moderately improving
3. Good health and well-being	Moderately improving	Stagnating	Moderately improving	Moderately improving	Moderately improving	Moderately improving
4. Quality education	…	Stagnating	…	…	…	Moderately improving
5. Gender equality	Stagnating	Stagnating	Moderately improving	Stagnating	Moderately improving	Stagnating
6. Clean water and sanitation	Moderately improving	…	…	Moderately improving	…	On track
7. Affordable and clean energy	Stagnating	Moderately improving	Moderately improving	…	Moderately improving	Stagnating
8. Decent work and economic growth	On track	Moderately improving	Stagnating	Stagnating	Moderately improving	On track
9. Industry innovation and infrastructure	Moderately improving	Moderately improving	Moderately improving	…	Moderately improving	Moderately improving
10. Reduced inequalities	…	…	…	…	…	…
11. Sustainable cities and communities	Stagnating	Worsening	Stagnating	Stagnating	Stagnating	Stagnating
12. Responsible consumption and production	…	…	…	…	…	…
13. Climate action	Good maintaining	Good maintaining	Good maintaining	On track	Good maintaining	Good maintaining
14. Life below water	Moderately improving	Stagnating	Stagnating	…	…	Moderately improving
15. Life on land	Stagnating	Worsening	Worsening	Stagnating	Stagnating	Stagnating
16. Peace, justice and strong institutions	Stagnating	Stagnating	Stagnating	…	Stagnating	Worsening
17. Partnerships for SDGs	Stagnating	…	Stagnating	…	Moderately improving	Worsening
SDGs rank (out of 156 countries)	112	126	111	151	102	89
SDG index value	59.1	54.9	59.3	46.2	62.8	64.6

Source: Sachs *et al.* 2018 and MHRC staff computations.

Development is in line with the message of Dr Haq and the global Human Development Reports, and calls for a model which can empower all and conserve natural resources today as well as for the future. It provides an opportunity for South Asia to reorient its development policies in a way to make the economic growth process more equitable and sustainable.

The remainder of the report is structured as follows: chapter 2 records the progress and trends in economic growth, natural resource use, equity and environment since the early nineties, when the United Nations Conference on Environment and Development, also known as the Rio Earth Summit, was held in 1992. Chapters 3, 4 and 5 provide country case studies on the context, trends and reasons for the state of environmental sustainability and its relationship with equity and development in India, Pakistan and Bangladesh, and chapter 6 concludes by suggesting a strategy and framework for achieving sustainable development with equity.

CHAPTER 2

Sustainable Development in South Asia

Introduction

The chapter analyses facts and figures from South Asia to gauge the state of affairs from a sustainability perspective. It outlines key patterns and trends in economic growth, inclusiveness, natural resource use and environmental indicators since the Earth Summit in 1992. It also presents evidence of the threats to economic growth posed by both environmental degradation and worsening inequality. The chapter shows that the most disadvantaged bear and will continue to bear the burden of global warming and environmental deterioration.

Since the Rio Earth Summit in 1992, South Asia has experienced the second-highest annual economic growth of 6.2 per cent (between 1990 and 2017) globally. However, the growth rate has been neither equitable nor environmentally sustainable. It has happened at the cost of inefficient use of natural resources and a high level of energy consumption which has resulted in the deterioration of the environment. Moreover, it has worsened inequity in the form of income, health and education across income groups, rural-urban areas, gender, ethnicity and religion. Environmental and equity indicators have worsened with clear impacts on air quality, land productivity and water availability. The process has been more harmful to the poor than the well-to-do. Environmental degradation has also furthered poverty across the world.

The Addis Ababa Action Agenda, the 2030 Agenda for Sustainable Development and the Paris Climate Change Agreement provide windows of opportunity to renew and advance commitments and action towards sustainable development by ensuring that no one is left behind.

Economic growth and economic structure in South Asia

Since the Rio Earth Summit in 1992, South Asia has experienced the second-highest annual economic growth of 6.2 per cent

Sustained and inclusive economic growth is a prerequisite for poverty reduction, social uplift and the achievement of the SDGs. In particular, SDG 8 aims to promote sustained, inclusive and sustainable economic growth, and productive employment. Its targets include GDP growth, productivity, creation of decent jobs, resource efficiency and access to financial support, among others.

South Asia's economic performance has been encouraging over the last two and a half decades (1990-2017). The situation has been attributed to economic reforms and liberalization policies. The region stands as one of the principal drivers of the global economy. South Asia as a whole has performed better than all other regions of the world (except for East Asia and the Pacific), with an average growth rate of 6.2 per cent per annum (see table 2.1). All three sectors, agriculture, industry and services, had witnessed reasonable economic growth, especially the service sector had expanded greatly in India. The share of the service sector in GDP increased in all countries. The service sector now accounts for half (50 per cent) of GDP in South Asia.

The region's economic performance during the three decades was impressive on several fronts:

- For South Asia, GDP increased from 5.3 per cent per annum in 1990-2000 to 6.7 per cent in 2001-

Table 2.1 Trends in annual GDP growth (%) in South Asia and other regions of the world, 1990-2017

	1990-2000	2001-2017	1990-2017
India	5.6	7.2	6.6
Pakistan	4.0	4.3	4.2
Bangladesh	4.8	6.0	5.5
Nepal	5.0	4.1	4.4
Sri Lanka	5.3	5.3	5.3
South Asia	5.3	6.7	6.2
Arab World	4.6	4.0	4.2
East Asia and the Pacific	7.9	8.2	8.1
Europe and Central Asia	-2.1	4.3	1.8
Latin America and the Caribbean	2.6	2.6	2.6
Middle East and North Africa	4.4	3.6	3.9
Sub-Saharan Africa	2.1	4.7	3.7
Developing countries	3.0	5.6	4.6
World	2.8	2.8	2.8

Source: World Bank 2019f.

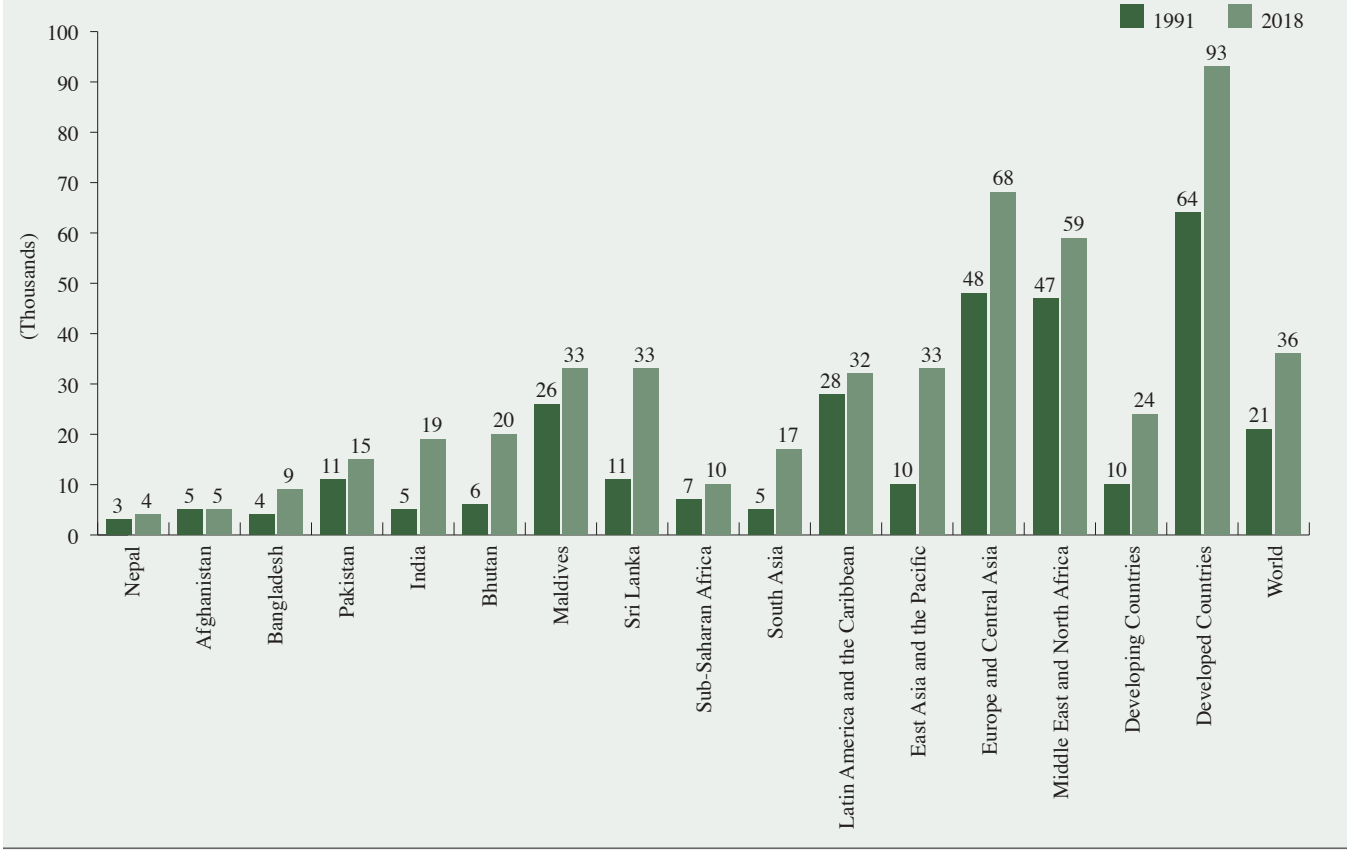
2017. This trend was set by India and followed by Bhutan, Bangladesh and Sri Lanka.

- This growth was broad-based. Much of the growth was driven by India, Pakistan and Bangladesh which accounted for 82.3 per cent, 7.7 per cent and 5.6 per cent, respectively of the region's GDP. Between 1990 and 2017, GDP increased at the highest annual rate in India (6.6 per cent). This was followed by Sri Lanka (5.3 per cent), Bangladesh (5.5 per cent), Nepal (4.4 per cent), and Pakistan (4.2 per cent). Economic growth was driven by services, private sector investments, and foreign remittances.
- There was a significant structural transformation in the region. The share of agriculture to GDP decreased from 27.5 to 16.3 per cent between 1990 and 2017, with a similar trend in all countries of South Asia except for Pakistan where it remained stagnant at 23 per cent. The contribution of the industry declined from 26.9 per cent to 25.2 per cent; Bangladesh, Sri Lanka and Bhutan experienced an increase in industrialization. While the share of the service sector increased from 36.7 per cent to 49.9 per cent.[1] This transformation of the economy towards services and industrialization has been the main driver of the economy and has created employment opportunities for both men and women. This is evident from an increase in the share of urban areas in total employment (in case of the information technology sector in India) and an increase in employment opportunities for women (ready-made garments sector in Bangladesh).
- Trade and foreign direct investment also increased. The region was one of the world's largest textile exporters and was able to compete in the global market with most other players. The region was also diversifying in high technology exports.

Economic structural changes have been accompanied by labour productivity increases. Between 1991 and 2018, labour productivity (GDP per person employed) increased more rapidly in South Asia (4.2 per cent per annum) than in any other region of the world except for East Asia and the Pacific (4.4 per cent per annum). Despite rapid growth, labour productivity remains the lowest in South Asia only after Sub-Saharan Africa in the world. In 2018, the average worker in South Asia produced half of the annual output of an average worker in each East Asia and the Pacific and Latin America and the Caribbean (see figure 2.1).

Within South Asia, the average annual growth rate in labour productivity since 1991 was the highest in India (5.1 per cent), followed by Bhutan (4.3

Figure 2.1 Labour productivity (GDP per person employed) in constant PPP 2011 US$, 1991-2018



Source: World Bank 2019e.

per cent), Sri Lanka (4.2 per cent) and Bangladesh (3.2 per cent), but the lowest in Afghanistan (-0.3 per cent), the Maldives (0.9 per cent) and Pakistan (1.3 per cent) respectively.[2] The progress can be explained by factors such as urbanization-led industrialization, improvement in skill and educational attainment, and the increasing use of technology. An increase in output per worker also resulted in a rapid increase in consumption and improvements in living standards. Increase in labour productivity has been, however, linked with either jobless economic growth or creation of low-quality jobs in the region. This, in result, has increased social and economic disparities. Labour productivity improvements have been achieved due to increased inputs of energy and capital-intensive investments.

While South Asia's growth performance has been remarkable, the process has heightened concerns for the deteriorating environment. The creation of special economic zones along with population growth in South Asia has resulted in the diversion of farmland for industrialization which as a result has threatened biodiversity and caused eco-degradation. For instance, in India 2,061 square kilometre (sq km) of land (0.12 per cent of total land area) has been allocated for 762 special economic zones.[3] This in return has resulted in overexploitation of the country's natural resources. The economic cost of environmental degradation in India is estimated at US$ 80 billion or 5.7 per cent of its GDP.[4] Similarly, a large concentration of industries has polluted water sources. Bangladesh has experienced high and sustained economic growth due to the stable growth of services and the faster growth of manufacturing. However, the industrial-led growth process has been accompanied by environmental deterioration; more than 1,200 industrial sites in Bangladesh have been identified to be causing

significant pollution.[5] In the same way, in Pakistan leather and textile industries are the major source of wastewater that is polluting rivers and lakes, causing environmental problems in major cities. The region needs to use ways to promote the industry in an environmentally friendly way (see box 2.1).

South Asia is still undergoing the process of economic structural transformation, as the agricultural sector accounts for one-sixth (16.3 per cent in 2017) of South Asia's GDP which is the highest in the world. The corresponding value was 3.5 per cent for the world, 8.7 per cent for East Asia and the Pacific, 9.0 per cent for developing countries and 1 per cent for the developed countries.[6] South Asia's continuing process of economic transformation will have far-reaching implications for resource efficiency and use. The impact will depend on the nature of future investment models, types of infrastructure projects and governance mechanisms to manage the trade-off between environmental threats, equity and

Box 2.1 Environmental compliance of textile industry in Tirupur in India: Zero liquid discharge (ZLD)

The dyeing and bleaching industry in the South Indian knitwear hub Tirupur, in the Indian state of Tamil Nadu, is the first Indian cluster known for systematically practicing zero liquid discharge, eliminating the release of pollutants from water. Today, Tirupur is demanding a 'green tag' from the Indian government so that their textiles may have a better market abroad. The components of zero liquid discharge (ZLD) (such as reverse osmosis) enable extensive reuse and recovery of water and salts, and the process reduces the freshwater requirements.

The Tirupur District, known as the 'Manchester of India', manufactures around half of India's total knitwear textiles export. It provides direct employment to over 570,000 workers and indirectly to about one million people. The district has 800 garment factories and exporting firms and 1,200 merchant exporters, 425 registered dyeing units and more than 3,000 finishing units, as well as about 2,000 micro, small and medium-sized enterprises (MSMEs) targeting the domestic market. Also, there are so-called wild-cat units that operate from residential buildings and engage in for instance bucket dyeing of small items like buttons and zippers. Tirupur's clients range from the big garment lines such as Calvin Klein, Gap, Tommy Hilfiger and others, to the low-cost domestic market. Ministerial delegations from the Netherlands, Denmark, Sweden and other countries have taken an interest in Tirupur's effluent treatment plants.

Exports from the city started in the 1970s and increase drastically in the 1990s after the Indian government ushered in economic reforms and liberalization. However, as the industry blossomed, the impact of poorly treated effluents soon became trouble for farmers and domestic water users. Polluted water from the Noyyal River severely impacted the fish production as well as the farm output.

In the mid-1980s, there was no enforcement of effluent standards. The country established the Pollution Control Board in 1982 and promulgated the Environmental (protection) Act in 1986 to monitor and curb air, land and water pollution, however, (until recently) the standards were scattered, non-comprehensive and outdated. The transformation was prompted by many actors. The region's farmers stood behind the initial push, along with the Pollution Control Board and the court system (High Court, Supreme Court and the National Green Tribunal). However, the pressure to change behaviour at a large scale came from the Madras High Court: after it ordered the closure of all dyeing factories in 2011 who did not meet the ZLD standard (and until zero wastewater seepage was achieved). Overnight, all the factories were closed.

Following the zero-discharge directive, Tirupur became an experimentation hub for pollution control techniques for many years until the textile makers achieved results that accommodated the new regulations. The state and the central government also supported the industry in the implementation of ZLD. The new government formed a high-level committee, alternative technical solutions to ZLD were looked into, and finally, an INR 2 billion (US$ 30 million) interest-free loan was made available to the Common Effluent Treatment Plants (CETPs) to comply with the order. Through a series of trial and error, the industry borrowed technology from various parts of the world and came up with its version of effluent treatment plants of two types: Individual Effluent Treatment Plants (IETPs) and CETPs. Larger manufacturers set up IETPs to process their waste, while smaller units came together to route their polluting effluents through a single CETP. Today, there are 18 CETPs in Tirupur. Smaller units could not afford a separate effluent treatment plant for themselves, so shared plants were then proposed, with around 30 small units directing their effluents into one such plant, obtained primarily through government loans and subsidies. The first stage of treatment of the polluting effluent (the biological stage involving bacteria to break down the dyes) was copied from a similar method used in Italy. The second stage (reverse osmosis to cleanse the water) was picked up from desalination plants. The third stage (evaporation, to remove the sludge) was a local innovation. These effluent treatment plants are a result of South Indian *jugaad* (innovation).

In 2014, the industry properly began to pick up again. The industry in Tirupur is now recycling 92 per cent of the water that is discharged as effluent. The city saves 100 million litres of water each day due to the effluent treatment plants, which ensure 92 per cent efficiency in cutting pollution.

Sources: Ravishankar 2016a and b, WWAP 2017 and Grönwall and Jonsson 2017.

economic opportunities. Sustainable development requires an increase in the economy's capacity for people's economic empowerment and equitable opportunities and seeks to make economic activities and lifestyles less energy-intensive, more environment-friendly and resource-efficient.

Inequality and inclusiveness of economic growth in South Asia

Inequality in capabilities as well as opportunities is not only harmful to economic growth but also harms environmental sustainability and sustainable development. According to a study based on cross-country data, a one per cent increase in income inequality (measured by Gini coefficient) causes a two per cent increase in loss of biodiversity (measured by the number of threatened species).[7] Similarly, income inequality is positively associated with resource consumption and generation of solid waste. For instance, the US with one of the highest levels of income inequality has been found to have high levels of water and fish use and municipal waste generation compared to the situation in Japan, Norway and Sweden.[8]

High levels of inequality and poverty in South Asia are contributing to further degradation of the environment. Similarly, environmental risks pose unequal risks to the poor and women.

Ultimately, addressing the issue of inequality is integral to improving living standards on a resource-scarce planet. Inequality impacts environmental quality through the household, community, national and global channels. At the household level, a low level of income inequality can, on one hand, reduce the consumption (and ecological footprint) of the rich, and on the other hand, can decrease the need of the poor to engage in environmentally harmful practices. At the community level, the empowerment of communities can help to preserve common property rights which is also very important and effective for climate change adaptation and mitigation. At the national level, a low level of income inequality can improve people's political empowerment which is crucial for the adoption of more environmentally sustainable policies. And lastly, at the global level, unequal distribution of economic and political power often hampers the mobilization of collective effort needed to protect the global environment and to reduce GHG emissions.

Despite an impressive growth rate over the last two and a half decades, the gap between haves and have-nots has increased in most of the countries in the world due to massive increase in income of the rich. Developing countries, especially South Asia, are characterized by a large degree of social and economic inequality. Progress in human development, as measured by HDI, has been significant in South Asia, however, it has been uneven, and inequities and deprivation persist. Progress has bypassed the poor, women, disabled, ethnic groups and rural residents. There is considerable disparity across countries, geographic areas, gender, ethnicity and caste which is a threat to sustainable development.

Progress in human development has been significant in South Asia, however, it has been uneven, and inequities and deprivation persist

South Asia's HDI value increased at an annual rate of 1.4 per cent, from 0.439 in 1990 to 0.638 in 2017 (see table 2.2). This puts South Asia's average value in 'medium human development', with Sri Lanka and the Maldives in 'high human development', Afghanistan in 'low human development', and India, Pakistan, Bangladesh, Nepal and Bhutan in 'medium human development'. However, HDI value represents the average situation in a country and do not represent the unequal distribution of human development. Inequality-adjusted HDI (IHDI) not only represents the average human development but also quantifies the effects of inequality on human development across the three dimensions of human development: education, health and income. IHDI shows that unequal distribution of human development oc-

Table 2.2 Loss in Human Development Index (HDI) and its components due to inequality, 2017

	HDI value	Inequality-adjusted HDI value	Inequality loss in HDI (%)	Inequality loss in life expectancy (%)	Inequality loss in education (%)	Inequality loss in income (%)
India	0.640	0.468	26.8	21.4	38.7	18.8
Pakistan	0.562	0.387	31.0	31.0	46.2	11.6
Bangladesh	0.608	0.462	24.1	17.3	37.3	15.7
Afghanistan	0.498	0.350	29.6	28.4	45.4	10.8
Nepal	0.574	0.427	25.6	16.6	40.9	16.3
Sri Lanka	0.770	0.664	13.8	7.1	12.8	21.0
Bhutan	0.612	0.446	27.2	17.8	41.7	19.6
Maldives	0.717	0.549	23.4	5.7	40.0	20.5
Arab States	0.699	0.523	25.1	15.7	32.6	26.1
East Asia and the Pacific	0.733	0.619	15.6	10.0	13.1	23.1
Europe and Central Asia	0.771	0.681	11.7	10.9	7.2	16.7
Latin America and the Caribbean	0.758	0.593	21.8	12.1	18.4	33.2
South Asia	0.638	0.471	26.1	21.4	37.7	17.6
Sub-Saharan Africa	0.537	0.372	30.8	30.8	33.7	27.7
Developing countries	0.681	0.531	22.0	17.4	25.3	23.1
World	0.728	0.582	20.0	15.2	22.0	22.6

Source: UNDP 2018.

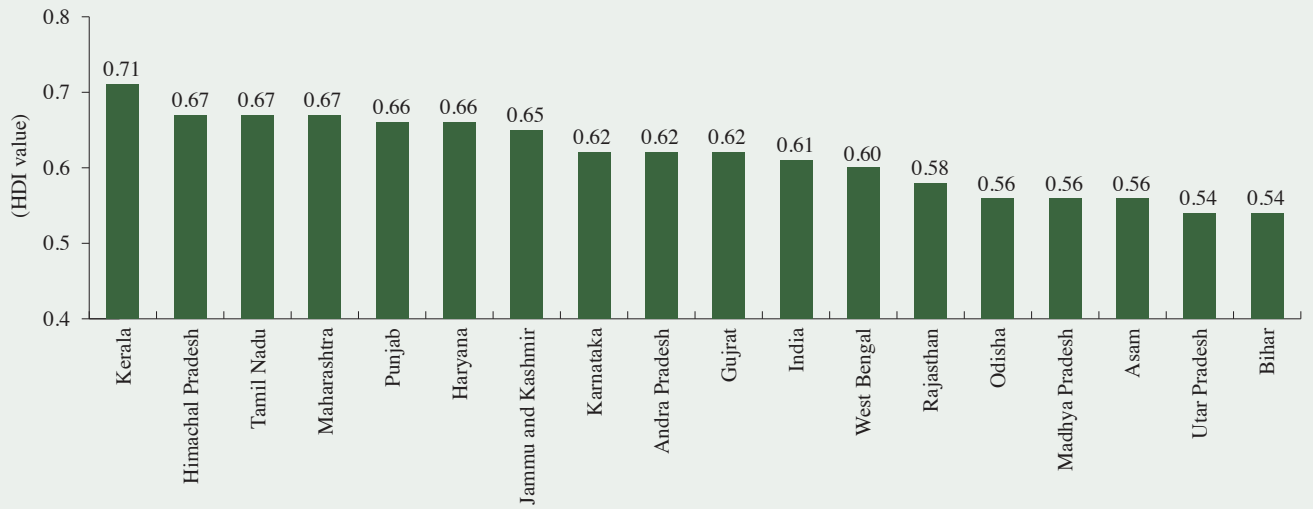
curs in all countries of South Asia and all regions of the world.

The average loss in South Asia's HDI due to inequality is about 26 per cent (second highest in the world after Sub-Saharan Africa). It shows that the region's HDI (adjusted for inequality) of 0.638 would fall to 0.471, which represents a drop from the 'medium human development' to the 'low human development' category. HDI losses range from 13.8 per cent in Sri Lanka to 31.0 per cent in Pakistan, with India, Afghanistan, Nepal and Bhutan losing at least 26 per cent (see table 2.2). On average, inequality in education contributes the most to the region's aggregate inequality, followed by inequality in life expectancy and income, with a similar trend in the five largest countries of the region. South Asia's IHDI value reflects the need for deliberate public policy interventions to address unequal distributions in capabilities to ensure human development for all.

A regional, ethnic, and district level analysis of HDI also shows wide disparities and wide inequalities in all countries of South Asia. A country's national-level value of human development may improve, but this does not mean that entire populations benefit equally.

- In India, unlike the 'medium human development' level of the country, there are considerable inter-state variations due to its huge population size and diversity (see figure 2.2). Among the 17 major states of India concerning population and geographic area in 2014, one (Kerala) was in 'high human development', 14 in 'medium human development' and two (Uttar Pradesh and Bihar) in 'low human development'. This indicates that Kerala's HDI is comparable to Sri Lanka and the Maldives, while Uttar Pradesh and Bihar's HDI is comparable to Afghanistan's. The HDI value varied from 0.712 for Kerala, 0.670 for Himachal Pradesh and 0.666 for Tamil Nadu, the three states with the highest HDI value, to 0.536 for Bihar, 0.541 for Uttar Pradesh and 0.555 for Assam, the three states with the lowest HDI value. Despite ranking fifth in income sub-index (of HDI)

Figure 2.2 Human Development Index (HDI) by the state in India, 2014

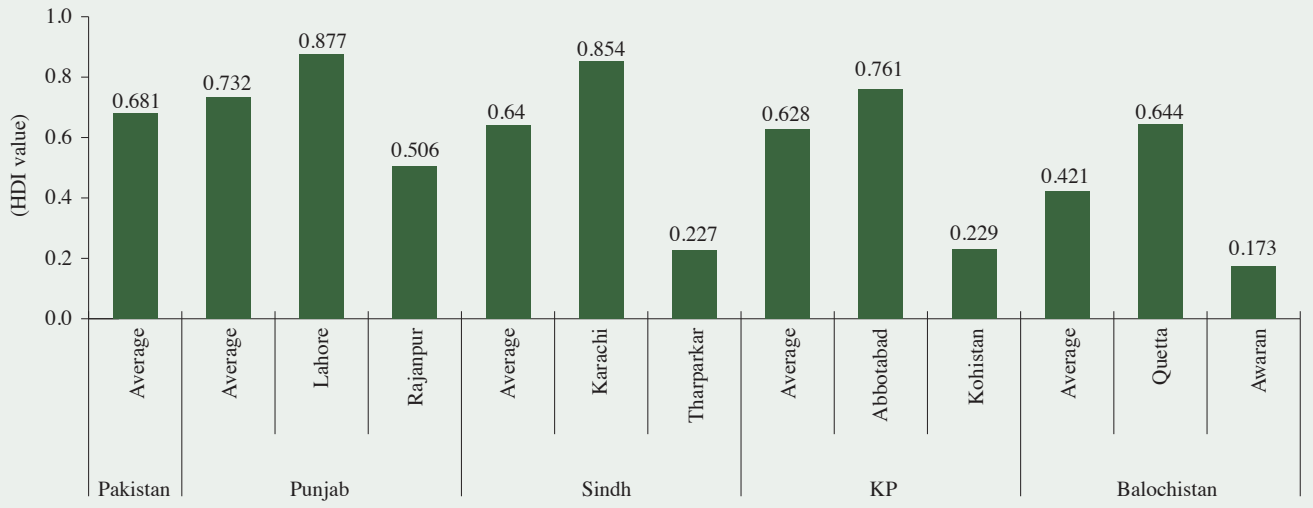


Source: Kundu 2015.

among the 17 states, Kerala ranked on top in HDI value due to its best performance in education and health, while Haryana emerged as the richest state, but was ranked at sixth in HDI value due to the seventh rank in the health and education.[9]

- In Pakistan, compared to the average value of HDI (of 0.681) for the year of 2014-15, there were stark differences within the country and the provinces (see figure 2.3). The Punjab Province with an HDI value of 0.732 tops the rank, followed by Sindh (0.640), Khyber Pakhtunkhwa [KP (0.628)] and Balochistan (0.421). This indicates that contrary to the 'medium human development' category of the country, Punjab is in 'high human development', Sindh and KP in 'medium human development', while Balochistan in 'low human development'. A district-level analysis across provinces shows the highest disparities in Sindh and Balochistan and the lowest in Punjab. Within Sindh, Karachi with the highest HDI value (0.854) scores 3.8 times less than Tharparkar with the lowest HDI value (0.227).

Figure 2.3 Human Development in Pakistan by province and district, 2014-15



Source: UNDP, Pakistan 2016.

The difference is 3.7 times in Balochistan where Quetta (0.644) is on top and Awaran (0.173) at the bottom. In KP, the HDI value of Abbottabad (0.761) is 3.3 times higher than of Kohistan (0.229). In Punjab, the district level HDI score varies by 1.7 times from 0.877 for Lahore to 0.506 for Ranjanpur.[10]

- Historically, Sri Lanka has been the best performer in South Asia in terms of HDI value. In 2015, with an HDI value of 0.770 and HDI rank of 76, Sri Lanka maintained its rank in 'high human development category'. Except with the Maldives and India, the remaining countries of South Asia have not yet reached Sri Lanka's HDI value (0.625) in 1990. However, persistent inequalities exist across provinces, districts and among social groups. In 2011, for instance, compared to the national level average value of 0.692, the HDI score varied from 0.752 in the Gampaha District to 0.635 in the Nuwara Eliya District.[11] Among the provinces, the Northern Province had the lowest HDI value of 0.625, reflecting the impact of conflicts.[12] Uva, Central and Sabaragamuwa provinces, in particular, which include many of the plantations, still suffer from high levels of poverty, hunger and malnutrition.
- Nepal's HDI value has improved considerably over the last two and half decades, however, considerable inequality exists across ethnic groups and geographic regions. An ethnic/caste level analysis shows that in 2011 the Newar people had the highest HDI value (0.565), followed by the Brahman-Chhetris (0.538), Janajatis (0.482), Dalits (0.434) and Muslims (0.422). This was explained by the highest inequalities in education which might have pronounced long-term effects on capabilities later in life. A district-level breakdown shows that compared to the average HDI value of 0.490 for Nepal in 2011, the HDI values varied from 0.632 in Kathmandu to 0.378 in Achham.[13]

In Brazil, Ecuador and Paraguay, income inequality has gone down due to progressive public spending and targeted social policies

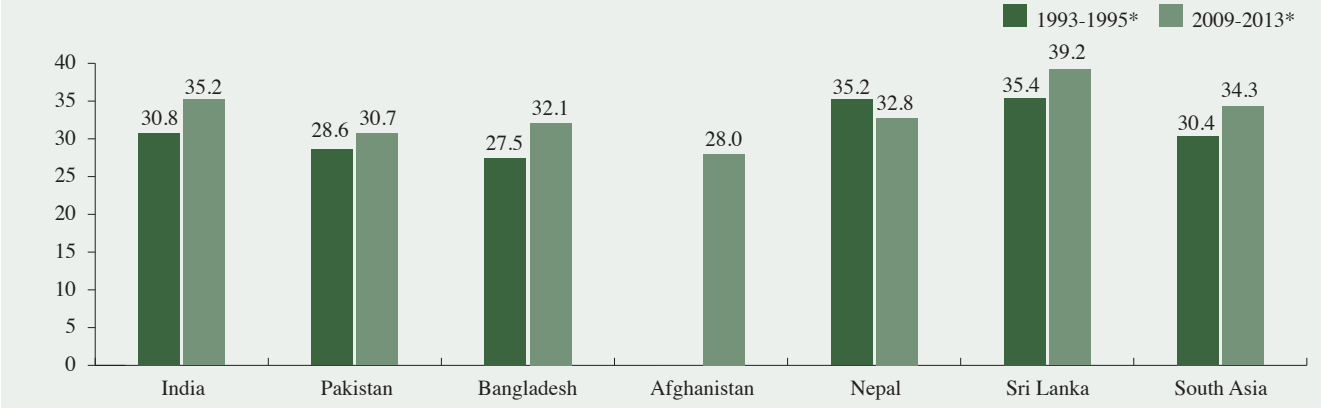
Rising income inequality

Income inequality, as measured by the Gini coefficient, has increased in most developing countries since 1980. A region-centric analysis of income inequality also shows an increase in inequality in all regions of the world except for Latin America and the Caribbean. In Brazil, Ecuador and Paraguay, income inequality has gone down due to progressive public spending and targeted social policies.

In South Asia, income inequality has increased in most of the countries. The region's economy has expanded at an average annual growth of over six per cent, however, inequality remains pervasive. Between 1993 and 2013, income inequality increased in India, Pakistan, Bangladesh, Afghanistan and Sri Lanka, and decreased in Nepal, Bhutan and the Maldives (see figure 2.4). A low trickle-down impact is explained by globalization as well as domestic policy measures. Trade and financial liberalization weakened the bargaining power of immobile labour, promoted capital-intensive technology, and increased the dependence on volatile global capital. Unlike the case in Latin America, domestic policy measures have worsened the impact of globalization in South Asia. Macroeconomic policies emphasized price stabilization over growth and employment creation. Labour market policies weakened the bargaining power of workers. And fiscal policies prioritized fiscal consolidation over social sector expenditure and progressive taxation.

The difference in Gini coefficients is related to variation in the share of wealth held by the poor. This means the higher the value of the Gini coefficient, the lower the share of wealth cap-

Figure 2.4 Trends in income inequality measured by the Gini coefficient in South Asia, 1993-2013



Note: *: Data refer to the most recent year available.
Source: MHRC 2017/2018, *Statistical Profile of Sustainable Development in South Asia*.

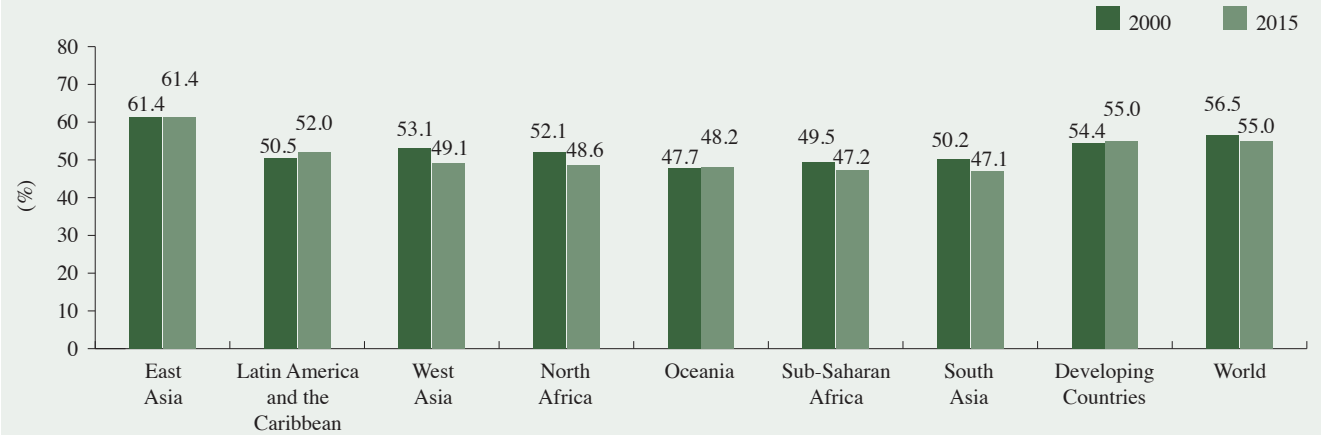
tured by the poor. In Pakistan, the poorest 20 per cent of the population accounted for 6.8 per cent of national income, while the richest 20 per cent for 48.9 per cent in 2013-14.[14] In India, between 1993-94 and 2009-10, the income of top 10 per cent of the urban population increased from 7.1 to 10.3 times that of the bottom 10 per cent, and from 10.5 to 14.3 times in rural areas.[15]

The labour share of GDP, which represents the share of wages and social protection transfers in an economy, also provides an aggregate measure of income inequality. The income from capital is often highly concentrated among the rich, while wages constitute the income of the majority of people in the world. The shifting distribution of income from labour towards capital adds to widening inequality in personal incomes. Globally, the share of labour in GDP decreased between 2000 and 2015, mainly attributed to stagnating wages and a decline in employer's social contributions (see figure 2.5). However, it increased in Latin America and the Caribbean, Oceania and developing countries, reflecting a shift of income towards labour from the capital. Unlike an average increasing trend in developing countries, in South Asia, the share of labour in GDP decreased by 6.2 per cent between 2000 and 2015.

Inequality in health

Although there has been significant progress in improving access to health since 1990. However, significant disparities in opportunities for health exist across varying income groups as well as gender and spatial dimensions. However, the worse-off groups still have lower access to public services compared to the

Figure 2.5 Labour share of GDP (PPP), comprising wages and social protection transfers, 2000-2015



Source: UN 2016.

well-off factions. Moreover, the quality of public services provided to the poor is worse than that provided to the rich. Inequities in access to quality health services create cycles of deprivation that are transmitted across generations.

The gaps in health between high- and low-income groups remain high in South Asia. Wide gaps persist in child mortality rates between the rich and the poor. Under-five mortality rate, for instance, is far more frequent among the poorest people across all countries. In India, Pakistan and Nepal, the under-five mortality rate is 2.5 to 3.0 times more common in the bottom fifth of the income distribution than in the richest. In Pakistan, only one-fourth of children in the poorest households received full vaccination treatment, compared with three-fourths of children in the richest households. In Pakistan, Bangladesh and Nepal, child malnutrition is 2.6 to 3.0 times higher among children from the poorest households compared to the richest (see table 2.3).

A similar trend can be seen in India where wide differences exist across rural-urban areas and states. In 2005-06, two-fifths of children in rural areas and about three-fifths in urban areas, received full immunization. In terms of hospital beds, Kerala had one government hospital bed for every 1,299 people, while Uttar Pradesh (with one-sixth of India's population) had one bed for every 20,041 people. Similarly, compared to the universal attendance of births by trained health personal in Kerala, only one-fourths (27 per cent) of births were attended by health personal in Uttar Pradesh.[16]

Inequality in education

Education is a fundamental human right and a key driver for attaining SDGs. However, for education to have an impact on the achievement of sustainable development, it is important to ensure equality of opportunity for learning. Target 4.5 of SDG 4 focuses exclusively on the need to ensure equal access to education at all levels.

Since 1990, South Asia has observed substantial and widespread improvement in educational attainment indicators. However, inequity has not only persisted but has also worsened in access to education. According to the global *Human Development Report 2010*, despite a 180 per cent average increase in educational attainment in South Asia, education inequality worsened by 8 per cent in the region.[17]

In South Asia, about two-thirds (63 per cent) of the 358 million adults (aged 15 and over) who are unable to read and write are women. Regionally, children of primary school age from the

Table 2.3 Health gaps by income in South Asia

		Prevalence of child under-five malnutrition (underweight)		Child immunization for all vaccinations (% of children ages 12-23 months)		Under-five mortality rate (per 1,000 live births)		Births attended by skilled health staff	
		Poorest quintile	Richest quintile	Poorest quintile	Richest quintile	Poorest quintile	Richest quintile	Poorest quintile	Richest quintile
India	2016	...	...	...	...	75	25	67	96
Pakistan	2013	48	16	23	75	119	48	34	86
Bangladesh	2014	45	17	69	92	62	37	18	74
Afghanistan	2015	…	…	23	37	81	40	27	88
Nepal	2016	33	11	83	93	62	24	39	90
Bhutan	2010	16	7	…	…	106	…	34	95
Maldives	2009	24	11	95	92	28	21	92	100

Source: World Bank 2019f.

poorest 20 per cent of households are five times more likely to be out of school than their richest peers. Similarly, except the Maldives, there is a 22 to 29 percentage points difference among the richest and poorest income groups who completed primary school. A similar trend is evident from the average years of schooling (see table 2.4).

Gender disparities

Gender inequality intensifies the negative impacts of income and other forms of inequality on environmental preservation. There is significant evidence from India that a greater presence of women in community decision-making bodies leads to better protection of common property resources and other forms of environment.[18] As gender inequality is linked with unequal distribution of income and wealth and social norms, there are synergies between the reduction of gender inequality and income inequality. Such synergy may be used for promoting the goal of environmental sustainability and preservation. The 2030 Agenda and the SDGs have identified the role of income inequality for environmental sustainability by including goals on reduced inequalities and gender equality.

Women in South Asia face discrimination and are disadvantaged in key areas of human development such as health, education, employment and decisionmaking.

South Asia's female HDI value was 19.4 per cent lower than the male HDI value in 2017, which was the highest in the world (see table 2.5). The gap was about 9.1 per cent for the developing countries and 6.2 per cent for the world. The main factors responsible for the lowest value of South Asia's female-to-male HDI value in the world are significant gender disparities in per capita income (272.5 per cent: US$ 10,035 of male versus US$ 2,694 of female) and mean years of schooling (60 per cent: 8.0 years for men versus 5.0 years for women). The situation varies within the region with the highest female to male HDI differential in Afghanistan (60.2 per cent), Pakistan (33.3 per cent), India (18.8 per cent) and Bangladesh (13.6) respectively. Nepal, Sri Lanka and the Maldives are the best performers with female to male HDI difference less than 8.8 per cent. In Pakistan and Afghanistan, the gender disparity in HDI is explained by gender differences in expected years of schooling, mean years of schooling and per capita income. In India, mean years of schooling and per capita income are the main contributing factors.

High levels of poverty, inequality and deprivation inadvertently make the poor more vulnerable to environmental degradation. According to the global *Human Development Report 2011*, household environmental deprivations in the form of indoor air pollution and inadequate access to clean water and san-

Table 2.4 Education gaps by income, 2005-2014

	Primary completion rate (% of relevant age group)		Average years of schooling (ages 15-49)		Children out of school (% of primary-school-age children)	
	Poorest quintile	Richest quintile	Poorest quintile	Richest quintile	Poorest quintile	Richest quintile
India	81	103	7	10	35	7
Pakistan	…	…	6	11	62	13
Bangladesh	56	85	6	9	10	8
Nepal	68	90	6	10	12	1
Bhutan	65	92	10	15	0	0
Maldives	115	126	9	9	16	16
South Asia	69	90	7	10	35	8

Source: World Bank 2019f.

Table 2.5 Human development Index (HDI) by gender in South Asia and other regions of the world, 2017

	HDI		Life expectancy at birth (years)		Expected years of schooling (years)		Mean years of schooling (years)		Estimated gross national income per capita (2011 PPP $)	
	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
India	0.575	0.683	70.4	67.3	12.9	11.9	4.8	8.2	2,722	9,729
Pakistan	0.465	0.620	67.7	65.6	7.8	9.3	3.8	6.5	1,642	8,786
Bangladesh	0.567	0.644	74.6	71.2	11.7	11.3	5.2	6.7	2,041	5,285
Afghanistan	0.364	0.583	65.4	62.8	8.0	12.7	1.9	6.0	541	3,030
Nepal	0.552	0.598	72.2	69.0	12.6	11.8	3.6	6.4	2,219	2,738
Sri Lanka	0.738	0.789	78.8	72.1	14.1	13.6	10.3	11.4	6,462	16,581
Bhutan	0.576	0.645	70.9	70.3	12.4	12.2	2.1	4.2	6,002	9,889
Maldives	0.679	0.739	78.8	76.7	12.7	12.6	6.2	6.4	7,064	18,501
South Asia	0.571	0.682	70.9	67.8	12.1	11.7	5.0	8.0	2,694	10,035
Arab States	0.630	0.736	73.4	69.8	11.6	12.2	6.2	7.7	5,380	25,533
East Asia and the Pacific	0.717	0.750	76.7	72.8	13.5	13.2	7.6	8.3	10,689	16,568
Europe and Central Asia	0.751	0.785	77.0	69.7	13.9	14.2	9.9	10.6	10,413	20,529
Latin America and the Caribbean	0.748	0.765	78.9	72.6	15.0	14.1	8.5	8.5	9,622	17,809
Sub-Saharan Africa	0.506	0.567	62.4	59.0	9.5	10.6	4.7	6.5	2,763	4,034
Developing countries	0.649	0.708	72.7	68.8	12.2	12.2	6.7	8.1	6,562	13,441
World	0.705	0.749	74.4	70.1	12.8	12.7	7.9	9.0	10,986	19,525

Source: UNDP 2018

itation are positively related to the level of (human) development.[19] Such deprivations decrease as the HDI level improves and vice versa.

Sustainability of resource use in South Asia

The achievement of SDGs, environmental sustainability and sustainable development requires a shift from a resource-intensive development strategy to a resource-efficient strategy. SDG 12 aims to support sustainable consumption and production patterns. Its targets include the implementation of the 10-year framework of programmes on sustainable consumption and production adopted at the UN Conference on Environment in Rio De Janerio in 2012, and the achievement of the sustainable management and efficient use of natural resources, among others.

Over the last two and half decades, an impressive rate of economic growth in South Asia has lifted millions of people out of poverty and deprivation. However, it has happened at the cost of increased use of natural resources, growing emissions and rising amounts of waste. South Asia housed 1.8 billion people or 23.7 per cent of the global population in 2016, used 9 billion tons or 8.8 per cent of global materials (2017), consumed 981.5 kilotonnes of oil equivalent or 7.4 per cent of global energy (in 2014), withdrew 981 billion cubic metres or 26 per cent of global water withdrawals (in 2014), and produced 3.9 billion tonnes or 7.9 per cent of global GHG emissions (in 2014).[20] On the other hand, per capita material and energy consumption, and per capita GHG emissions are still significantly lower than the developed countries and are just approaching global averages, indicating future growth to come.

Increased use and consumption of natural resources has not been efficient and sustainable with devastating consequences for environmental ecosystems and human health with a disproportionate impact on the poor, deprived and marginalized communities

and groups. South Asia's development process has been characterized by high resource intensity. Improvements in resource efficiency have not been enough to compensate for the increase in the use of these resources. To meet the needs of the growing population and to improve the well-being of the currently deprived sections of the society, the region has to make the choices to seize the resource efficiency opportunities.

Material use: Domestic material consumption

Domestic material consumption is measured as the quantity of natural resources extracted from the domestic territory, plus imports and minus exports. They comprise of biomass, fossil fuels, construction minerals and metal ores. South Asia consumed 8.8 per cent of global materials (in 2017) while accounting for 23.7 per cent of the world's population (in 2015) and merely 3.6 per cent of the world's GDP (in 2015). Despite lower global share of the use of natural resources, South Asia's use of natural resources is growing at a faster rate than other regions of the world due to rapid industrialization and high population growth. As South Asia's global share of GDP increases, its share of global resource use will also increase in the future.

- The use of materials in South Asia increased by about one and half times, from 3,532 to 9,013 million tons between 1990 and 2017 compared to a one-time increase in the world, with the lowest increase of 77 per cent in Afghanistan to the highest increase of 14 times in the Maldives.
- The use of materials increased at an annual rate of 3.5 per cent in South Asia compared to 2.7 per cent in the world between 1990 and 2017.
- India alone accounted for 82 per cent of South Asia's use of natural resources in 2017, followed by Pakistan (10 per cent) and Bangladesh (5 per cent).
- Material use per person increased by 60 per cent in the region, from 3.1 to 5.0 metric tons between 1990 and 2017. The averages mask a wide range, from 1.9 metric tons in Afghanistan to 10.4 metric tons in Bhutan (in 2017) (see table 2.6).
- The use of all materials increased, but the region transitioned from biomass-based to mineral-based economies. However, situation varies within South Asia, with minerals accounting for majority (45 to 54 per cent in 2017) of materials in India, Bhutan and the Maldives; biomass for most (51 to 93 per cent) of materials in Pakistan, Bangladesh, Afghanistan and Nepal; and fossil fuels for most (65 per cent) of materials in Sri Lanka. In South Asia, the utilization of each of non-metallic minerals (construction and industrial minerals) and biomass accounted for over two-fifths of total materials in 2017, increasing by 3.9 times and 1.7 times respectively since 1990. While the consumption of fossil fuels accounted for over one-sixth of materials, increasing by 4.6 times mainly due to India, Bhutan and Sri Lanka.[21]

Although material use per capita is significantly lower in South Asia, the situation is entirely different in case of resource efficiency

Although material use per capita is significantly lower in South Asia compared to developed countries such as Australia, the Republic of Korea, Singapore and Japan, the situation is entirely different in case of resource efficiency. India, Pakistan and Bangladesh, the three largest countries of South Asia, use two to three times as many resources per dollar of GDP, as average value for the world [(1.1 kilogramme (kg) per US$ in

Table 2.6 Domestic material use per capita and resource intensity, 1990-2017

	Domestic material consumption					
	Total (million tons)		Per capita (metric tons)		Intensity (kilogrammes per one US$ (2010) GDP)	
	1990	2017	1990	2017	1990	2017
India	2,859	7,403	3.3	5.5	6.2	2.8
Pakistan	391.6	875.8	3.6	4.4	5.0	3.7
Bangladesh	154.1	435.7	1.5	2.6	3.7	2.4
Afghanistan	38.2	67.9	3.1	1.9	4.3	3.1
Nepal	48.6	111.6	2.6	3.8	7.2	5.1
Sri Lanka	36.0	107.4	2.1	5.1	1.8	1.3
Bhutan	4.1	8.4	7.7	10.4	10.1	3.5
Maldives	0.2	3.0	0.8	6.8	0.3	0.9
Japan	1,614	1,140	13.0	8.9	0.3	0.2
Republic of Korea	483.0	576.9	11.3	11.3	1.3	0.4
Singapore	64.7	186.1	21.5	32.6	1.0	0.6
Australia	668.0	927.3	39.2	37.9	1.0	0.6
South Asia	3,531.6	9,012.9	3.1	5.0	5.7	2.9
World	42,480	88,180	7.6	11.7	1.1	1.1

Source: UN ESCAP 2019.

2017] and 12 to 18 times than Japan (0.2 kg per US$ in 2017) (see table 2.6).

Despite an improvement in the use of material efficiency in South Asia since 1990, a high level of material inefficiency reflects a huge potential for improvement. This improvement can happen with the upgrading of modern technology and more contribution of resource-efficient sectors to GDP.

Energy use

As one of the fastest-growing regions of the world, South Asia needs an uninterrupted power supply to keep its industry vibrating and economies expanding. However, 80 per cent of its electricity is generated by coal, gas and oil, which is the second-highest in the world after the Middle East and North Africa (table 2.7).

Table 2.7 Electricity production by the source in South Asia, 2015

	Sources of electricity production (% of total)					
	Coal	Natural gas	Oil	Hydropower	Renewable sources	Nuclear power
India	75.3	4.9	1.7	10.0	5.4	2.8
Pakistan	0.1	25.7	37.2	30.7	0.8	4.8
Bangladesh	1.7	80.7	16.4	1.0	0.3	0.0
Nepal	0.0	0.0	0.0	99.8	0.2	0.0
Sri Lanka	33.7	0.0	17.8	45.3	3.2	0.0
South Asia	66.1	9.1	4.8	11.5	4.8	2.8
East Asia and the Pacific	59.4	13.5	1.7	15.2	5.0	3.8
Europe and Central Asia	23.2	24.3	1.4	16.2	11.8	16.0
Latin America and the Caribbean	6.7	27.2	9.9	44.0	7.6	1.9
Middle East and North Africa	3.2	67.1	18.6	2.3	0.5	0.3
North America	30.9	29.0	0.9	12.7	7.2	19.0
Sub-Saharan Africa	50.6	9.5	4.0	20.5	2.4	3.0

Source: World Bank 2019f.

Such a high share of fossil fuels in electricity production causes environmental damage in the form of air pollution with harmful impacts on human health. It also causes an increase in global warming; energy accounted for three-fourths of GHGs emissions in South Asia in 2014 compared to 48 per cent in 1990.[22] The transition towards carbon-free economy was recognized by the Paris Climate Agreement in 2015 and is central to the UN 2030 Agenda for Sustainable Development. SDG 7 sets a twin challenge of meeting new benchmarks in renewable energy and energy efficiency for countries while ensuring universal access to modern energy.

In South Asia, the progress towards achieving the SDG 7 is slow. South Asia has the second-largest population (255 million in 2016) living off-grid, accounting for over one-fourth of all the people in the world without access to electricity.[23] Even people with access to electricity face frequent power outages; the *2019 Global Competitiveness Report* ranked India 108th, Pakistan 99th, Bangladesh 68th, Nepal 119th and Sri Lanka 39th among 141 economies in the reliability of their electricity supplies.[24] Low access and low quality of electricity force people to use kerosene lamps which are a dirtier and costlier source of light; with an estimated 244 million lamps in South Asia. In 2016, 3 out of every 5 people were using alternative heating and cooking sources such as wood, charcoal, coal or animal waste, leaving far too many people exposed to the deadly impacts of indoor air pollution.[25] Alternate such as firewood also increases the rate of deforestation.

Energy intensity—a measure of the energy efficiency of economies—reflects how much energy is used to produce one unit of GDP. Improving energy intensity through the use of energy-efficient technologies in buildings, transport and manufacturing has the potential to improve economic growth to coincide with low carbon development. There is a considerable variation in energy intensity in countries of South Asia, depending on their industrial structure and the efficiency of their energy consumption. Energy efficiency has been promoted in South Asia as part of the shift towards a low-carbon development path. Between 1990 and 2015, the region reduced its energy intensity by 39 per cent due to significant improvements in India and Sri Lanka, while there was a global reduction of 33 per cent. The decrease was attributed to energy efficiency improvements and changes in the economic structure of the region. Within the region, Sri Lanka and Bangladesh are the most energy-efficient countries while India, Pakistan and Nepal are the least. However, to produce one unit of GDP, South Asia requires two times the energy than that produced by Singapore, and 20 per cent more than in Japan, indicating room for further improvement (see table 2.8). Power sector distortions, attributed to low efficiency cost the South Asian region 4 to 7 per cent of its GDP.[26]

South Asian countries are making efforts to shift to more sustainable forms of energy, but the transition has been slow. Globally, India ranks fourth in terms of installed wind energy capacity and sixth in solar energy capacity. Similarly, Bangladesh is a global hotspot of the off-grid solar energy market. Most recently, the newly elected government in Pakistan (elections were held in July 2018) is also planning to increase focus

Table 2.8 Energy intensity [megajoules (MJ) per unit of GDP (2011 PPP)] in South Asia and other regions of the world, 1990-2013

	1990	2015
India	8.3	4.7
Pakistan	5.5	4.4
Bangladesh	3.9	3.1
Nepal	10.8	7.4
Sri Lanka	3.7	2.1
South Asia	7.5	4.6
Japan	5.0	3.7
Singapore	4.6	2.4

Source: UN ESCAP 2019.

on renewable energy sources. However, besides a high share of fossil fuel, Pakistan and Bangladesh have set ambitious plans for expanding the use of coal for energy production.

Low access rates, low quality of supply and high needs of the growing population require South Asia to increase energy supply. Increased industrialization, urbanization and motorization are also going to increase energy demand in the region. South Asia needs to improve energy efficiency along with a shift toward a less energy-intensive pattern of growth. A focus on renewable energy provides an opportunity to increase energy to ensure low carbon development, energy security and poverty alleviation (see boxes 2.2 and 2.3).

Water use

Unlike domestic material consumption and energy use, South Asia has a higher share of global water use. With 6.9 per cent of global renewable water resources, South Asia accounted for 26 per cent of global water withdrawals in 2014.

Water stress[27]: The level of water stress, measured by freshwater water withdrawals as a percentage of total renewable water resources, is very high in the region: the ratio increased from 29.6 per cent to 46.2 per cent between 1990 and 2014, which is higher than 25 per cent threshold of becoming water stress.[28] Within South Asia, India, Pakistan, Afghanistan and Sri Lanka are the water-stressed countries (see figure 2.6). Pakistan, in particular, is facing severe physical water scarcity, as it withdrew more than 100 per cent of its renewable water resources. A high level of water stress indicates substantial use of resources and hinders the sustainability of natural resources, as well as economic and social development.

Most alarming are groundwater resources and the balance between

Box 2.2 *Jyotigram Yojana* (rural electrification scheme) in Gujrat: Management of electricity and groundwater

The state of Gujrat in India, with over 18,000 villages and 10 million rural households, suffered from the problem of the irregular power supply until the state government launched the *Jyotigram Yojana* in 2003.

The decades-long policy of free groundwater and the free electricity to pump it contributed to severe groundwater overdraft, near bankruptcy of the State Electricity Board, and poor power supply to farmers and other rural residents. Rather than following the traditional approach of putting a price on electricity and groundwater to reflect their value, the government under the *Jyotigram Yojana* focused on rationally managed subsidies where needed, and pricing where possible. The programme transformed the power deficit situation by solving the dual problem of water scarcity and electricity shortage. The scheme is providing 24/7 three-phase quality power supply to all the 18,000 villages of the state.

Under the scheme, US$ 260 million was invested in separating electricity feeder lines for agricultural and non-agricultural users to make farm power rationing effective. Villages are given 24-hour, three-phase power supply for domestic uses, in schools, hospitals and village industries, all at metred rates. While farmers operating tube-wells continue to receive free electricity, but for 8 hours, rather than 24 hours.

The efforts have made Gujarat, the first state in India to achieve 100 per cent electrification in households, commercial establishments and educational institutes across cities and villages in Gujarat. Moreover, the scheme has radically improved the quality of village life, spurred non-farm economic enterprises, reduced aquifer depletion and resulted in an agrarian boom. The scheme decreased rural to urban migration by 33 per cent, and reduced school absenteeism by 13 per cent. Besides, the programme has indirectly raised the price of groundwater supplied by tubewell owners in the informal market by 30 to 50 per cent, thus providing a signal of scarcity and reducing groundwater overdraft. The scheme also helped drive agricultural production to new heights while improving the quality of life for farming families. While GDP from agriculture grew at 2.9 per cent per annum for India as a whole, Gujarat recorded nearly 10 per cent growth from fiscal year (FY) 2001 to FY2007—the highest in all India for that period.

The environment benefited as well. The inevitable result of high electricity subsidies for agriculture was uncontrolled over-exploitation and rapidly declining aquifers. Between 2001 and 2006, electricity use for groundwater extraction fell by 37 per cent, indicating a decline in groundwater withdrawal as over 90 per cent of groundwater withdrawal in Gujarat occurs through electrified pumps.

The programme has become a flagship programme of the Government of India, with replication in Punjab, Haryana, Karnataka, Andhra Pradesh, Maharashtra and Madhya Pradesh. The scheme provides a remarkable learning opportunity for other South Asian countries.

Sources: SIWI 2012, IWMI 2011 and Satphathy *et al.* 2015.

Box 2.3 Solar energy in rural Bangladesh: Solar Home Systems (SHSs)

Bangladesh has succeeded in developing the largest and most dynamic national off-grid electrification programme in the world, yielding lessons that may apply to other countries of South Asia, considering off-grid solutions to improve access to electricity. This is Bangladesh's great achievement given that the country has the electricity generation capacity of 6,500 MW against the peak demand of 8,000 MW. Moreover, in Bangladesh, about 60 million people (38 per cent of the total population) are without access to electricity, while 142 million (89 per cent) are relying on firewood, dung cakes, charcoal or crop residue to meet their household cooking needs.

With the help of microfinance institutions, the Government of Bangladesh initiated the Solar Home Systems (SHSs) programme to install solar home systems in remote rural areas, which are not easily accessed by the national electricity grid, with focus on providing basic electricity coverage to improve the life of rural regions and low-income households.

Since its inception in 2003, Bangladesh's SHS programme has installed 4.13 million electrification systems in rural households. The programme so far has benefitted more than 18 million people, accounting for 12 per cent of the country's total population. It has a target to finance six million SHSs by 2021 with an estimated generation capacity of 220 MW of electricity.

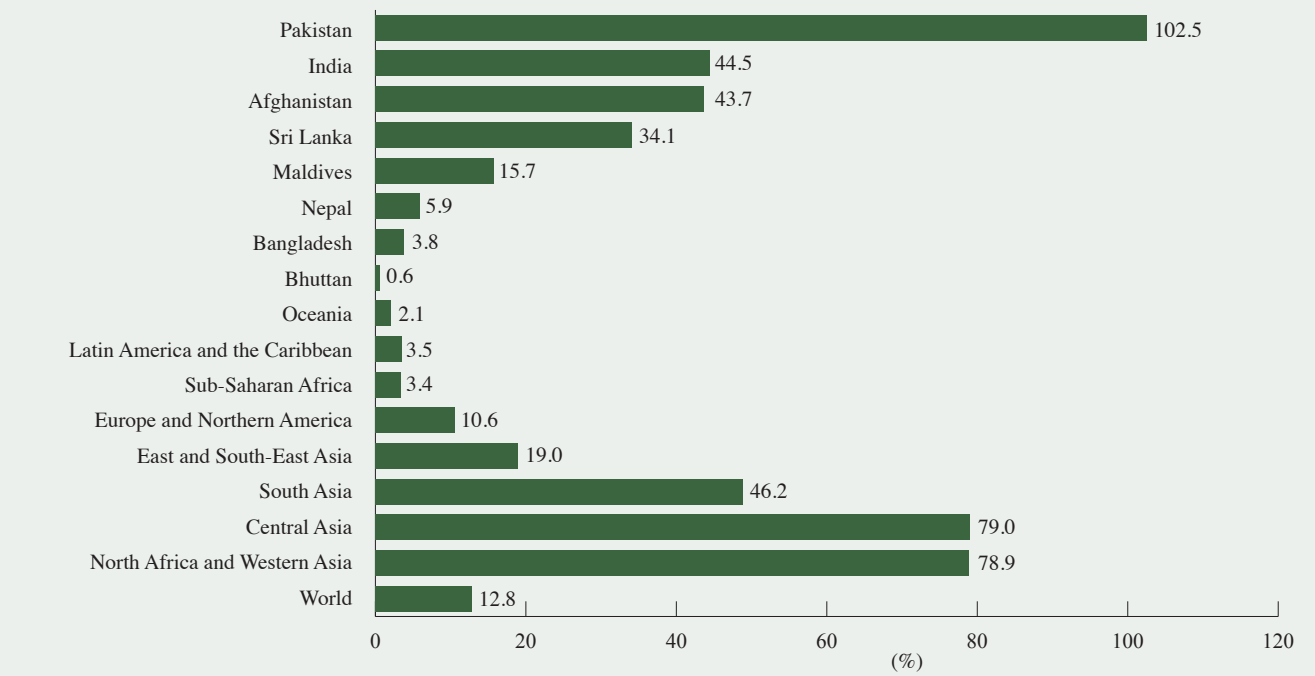
SHSs are small, household-level electrical systems powered by solar energy. They consist basically of a solar panel, inverter and battery. Depending on their size, they can power various domestic appliances, including lights, radios, televisions, fans and refrigerators. The system initially relied on subsidies which decreased from US$ 90 per system in 2003 to US$ 20 in 2016 [which is now available for small systems of 30-watt peak (Wp) and below for the poorest households].

Facilitated by the government-owned Infrastructure Development Company Limited (IDCOL), currently, 56 Partner Organizations (PO) including Grameen *Shakti* and Bangladesh Rural Advancement Committee (BRAC), are implementing the programme. IDCOL provides grant and soft loans as well as necessary technical assistance to the POs who then select customers, extend loan (with minimum 10 per cent down payment and the repayment period from 2 to 3 years at 10 to 15 per cent interest rate), install the systems and provide after-sale service. IDCOL's total investment under the programme is BDT 52,240 million (US$ 696 million) out of which loan is US$ 600 million and grant is US$ 96 million by the World Bank and other international donors.

The programme has so far saved consumption of 1.14 million tons of kerosene worth US$ 411 million. Over the next 15 years, the already installed 4.1 million SHSs will save consumption of another 3.6 million tons of kerosene worth US$ 1,300 million. The household access to the systems has found to increase per capita food, non-food and total expenditure by 9.3, 4.7 and 5.1 per cent respectively due to savings from the SHSs or the time freed up for a productive activity. Moreover, adopting an SHS has been found to reduce respiratory disease among women (aged 16 and above) by 1.2 per cent. The programme also impacted domestic industry positively. Initially, batteries were the only component produced in Bangladesh. Today, all components (including solar panels on a limited scale) are produced locally. This contributed to the growth of the renewable energy market in Bangladesh as a whole, which employed 114,000 people in 2013 alone.

Sources: World Bank 2014c, IDCOL 2019 and Center for Public Impact 2017.

Figure 2.6 Level of water stress: Freshwater withdrawals as a proportion of freshwater resources, 2014



Sources: UN 2019 and MHRC 2017/2018, *Statistical Profile of Sustainable Development in South Asia*.

recharge rates and abstraction. India, Pakistan and Bangladesh are among the world's six largest abstractors of groundwater, accounting for about two-fifths of global groundwater use. In these countries, 89, 94 and 86 per cent of groundwater is used for irrigation respectively. They along with Nepal use about 23 million pumps with an annual energy cost of US$ 3.8 billion.[29] The increasing demand for groundwater in the future and its impact on water tables, water quality and energy will become more important as global warming affects the flow of surface water.

Water productivity: South Asia's water productivity (of US$ 3), as measured by GDP generated per unit of cubic metre of water, is the lowest in the world; it is three times lower than the average value for the world (US$ 16) (see figure 2.7). This is mainly attributed to the high use of water in the farm sector. About 91 per cent of South Asia's total water withdrawals are for irrigation purpose which is higher than the average value for the world (65 per cent in 2014). Water productivity ranges from US$ 1 in Pakistan and Afghanistan to US$ 2 in Nepal, US$ 3 in India, US$ 4 in Bangladesh to US$ 6 Sri Lanka and Bhutan.

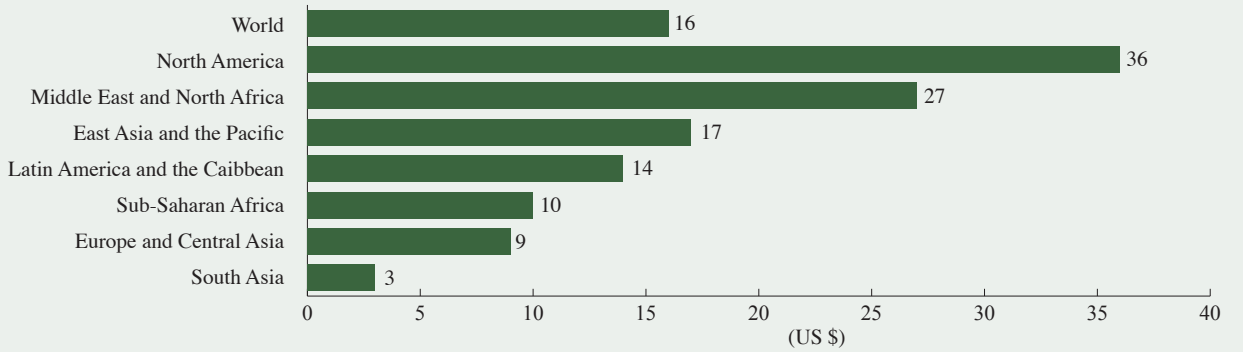
Greenhouse gases (GHGs) emissions

The GHG emissions from human activities are driving climate change. The GHGs depend on the characteristics of the domestic energy system, land use and livestock. Without action, the world's average surface temperature is estimated to surpass 3°C over the 21st century. In April 2016, 175 Member States signed the historic Paris Agreement, which sets the stage for ambitious climate action by all for sustainable development by ensuring that global temperatures rise no more than 2°C.

In 2014, South Asia emitted a total of around 3.9 billion tonnes of GHGs, one and half times more than what it was emitting in 1990. Over this time, South Asian regional emissions increased from 4.5 per cent to 7.9 per cent of the global total. Within South Asia, India is the largest emitter of GHGs and has increased the most in absolute terms (after the Maldives) and its relative contribution: from 74.5 per cent of regional GHGs emissions in 1990 to 82.5 per cent in 2014, mainly by fast economic growth, industrialization and urbanization. The largest absolute increase was in the Maldives, partly explained by tourism infrastructure development between 2000 and 2014 (see table 2.9). Nepal and Bhutan observed a decrease in GHG emissions due to the uptake of renewable energy sources; over 90 per cent of electricity in these countries was generated from hydropower.

South Asia's GDP increased by 244 per cent while GHG emissions increased by 114 per cent between 1990 and 2012, as a result, GHG intensity decreased by 60 per cent (from 4.3 to 1.7 metric tons per US$ 1,000 GDP) between

Figure 2.7 Water productivity, total (constant 2010 US$ GDP per cubic metre of total freshwater withdrawal) in South Asia, 2015



Source: World Bank 2019f.

Table 2.9 Greenhouse gases (GHGs) emissions in South Asia							
	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	South Asia
GHGs emissions total [metric tons of CO_2 equivalent ($MtCO_2e$)]							
1990	1,142	176	117	15.2	56.4	27.8	1,532
2014	3,202	362	197	33.4	44.1	45.2	3,883
GHGs by source (% of total GHGs) 2014,							
Energy	68.7	43.9	33.1	29.3	29.6	46.1	61.0
Industrial processes	6.0	4.8	4.7	1.1	3.6	2.9	5.6
Agriculture	19.6	41.5	37.9	44.3	50.1	12.9	24.5
Waste	1.9	1.9	9.5	25.2	1.9	28.2	3.3
Land-use change and forestry	3.8	7.9	14.8	0.0	14.8	9.9	5.5

Source: MHRC 2017/2018, *Statistical Profile of Sustainable Development in South Asia*.

1990 and 2012.[30] This can partly be explained through a shift from the farm, which accounted for one-fifth of GDP and more than two-fifths (44 per cent) of GHG emissions in 1990, to the non-farm sector. With a change in economic structure, South Asia diversified its sources of emissions from agriculture to energy, industry and land-use change. The situation varies within the region based on energy use and deforestation. In India, Pakistan and Sri Lanka, energy-related consumption is responsible for the bulk of emissions, reflecting an increase in urbanization and industrialization, while in Bangladesh, Afghanistan and Nepal, agriculture accounts for the majority of emissions. Despite reduction over time, South Asia's current level of GHG intensity is higher than the global average (0.6 tons for US$ 1,000 GDP), as well as all other regional averages for Africa (1.1), Europe (0.3), Latin America and the Caribbean (0.5) and North America (0.4) (see table 2.10). A higher value of GHG intensity in South Asia (1.7) compared to the average value for the world (0.6) shows that there is still vast potential to reduce the carbon intensity of South Asia about three-fold further. Since there is a need for future economic growth for a reduction in poverty and inequality, South Asia needs to reduce GHG intensity for sustainable economic growth strategy and climate change mitigation options.

Environmental threats and challenges

Although South Asia's economic performance has been impressive over the last few decades. The unsustainable production and consumption patterns (as discussed earlier) have led to worsening air quality, land degradation, loss of biodi-

Table 2.10 GHGs emissions intensity in South Asia, 1990-2012		
	1990	2012
India	4.5	1.7
Pakistan	3.6	1.8
Bangladesh	4.5	1.6
Afghanistan	3.3	1.3
Nepal	7.6	2.3
Sri Lanka	2.1	0.5
Bhutan	5.9	1.3
Maldives	0.3	0.4
Japan	0.4	0.2
Republic of Korea	1.1	0.5
Singapore	0.8	0.2
Australia	1.4	0.4
South Asia	4.3	1.7
World aggregates	1.4	0.6
Association for Southeast Asian Nations (ASEAN)	2.9	0.9
Africa	3.0	1.1
Europe	0.8	0.3
Latin America and the Caribbean	1.8	0.5
North America	1.0	0.4

Source: UN ESCAP 2019.

versity and waste generation. Air quality has deteriorated in major cities in South Asia, making them among the worst polluted cities in the world. Land degradation is a major problem in the region causing negative impacts on cultivable land and posing a threat to food security. South Asia is the home of a wide variety of terrestrial and marine biodiversity. But declining forests covers has led to the loss of natural habitat for species of plants, animals and birds. The situation is exacerbated by adverse global warming effects and an increasing number of natural disasters. The main drivers and causes of environmental deterioration are population, urbanization, economic growth, technology and global warming (see table 2.11). This indicates that South Asia cannot follow the same development framework and pattern that it has followed so far to increase economic growth as well as to improve the well-being of its people.

There is a significant relationship between environmental deterioration and inequality. Inequality and poverty contribute to further environmental degradation and environmental threats pose unequal risks to the poor and deprived.

Air pollution

Air pollution is the greatest environmental threat to health today, causing an estimated 1.6 million premature deaths in South Asia while costing the region's economy about an estimated annual welfare loss equivalent to 7.4 per cent of its GDP.

Even though a stand-alone goal on air quality is not included in the SDGs, it has been incorporated into the targets and proposed indicators of the goals for health (Goal 3) and sustainable cities (Goal 11), and at least five additional SDGs address it directly or indirectly. For instance, targets 7.1.1 and 7.1.2 for access to energy and clean fuels of SDG 7 'affordable and clean energy'; target 12.4 on management of chemicals and their reduced emission in the air of SDG 12 'responsible consumption and production'; reduced emissions of air pollutants from agriculture in SDG 2 'zero hunger'; reduced GHGs emissions which have co-benefits for air pollution

Table 2.11 Drivers of environmental threats and challenges

Drivers	Explanation
Population	. South Asia's population poses significant environmental challenges, by increasing pressure on resources. The region's population, 23.7 per cent of the world's total, reached 1.8 billion in 2018 and is projected to rise to 2.3 billion by 2050.
Urbanization	. The demographic shift to urban areas: Percentage of population in South Asia's urban areas will increase from 33.5 per cent to 52.5 per cent between 2018 and 2050. . Urbanization increases demand because of higher incomes and power. . Urbanization can decrease per capita footprint through concentration, but increase risks to floods and droughts. . Growing informal settlements lack services and are exposed to pollution. About 31 per cent (180 million) of the urban population in South Asia live in slums.
Economic growth	. The world's second-highest economic growth rate has led to a sharp increase in material use and energy in the region which is both inefficient and unsustainable. . Increasing pollution, declining biodiversity and natural resource depletion. . Increases prosperity but decreases equality.
Technology	. Can reduce pollutants per capita while enhancing well-being. For instance, India's *Unnat Jyoti* by Affordable LEDs for All (UJALA) programme, through distribution of light-emitting dioxide (LED) lamps to the poor at one-third the market price, lowered electricity bills and mitigated emissions. . Can accelerate extraction and (electronic) waste.
Global warming	. It leads to climate change impacts which worsens the environment with devastating impacts on energy, water and food security.

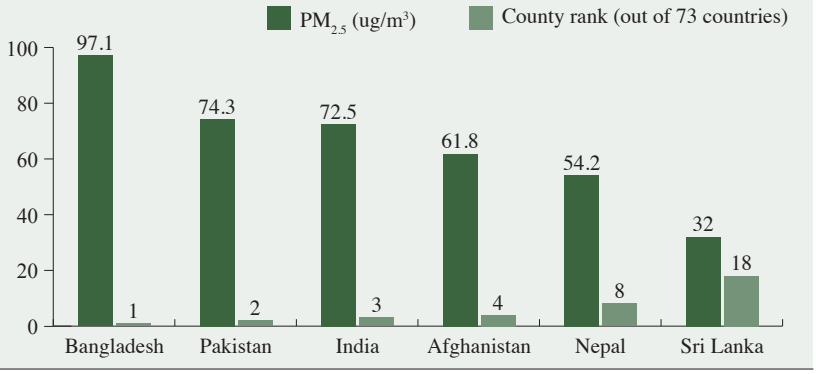
Sources: UN DESA 2019b and UNEP 2019a.

in SDG 13 'climate action'; and adoption of clean technologies which have benefits for air in SDG 9 'industry, innovation and infrastructure'.

In 2018, 99 per cent of (84 monitored) cities in South Asia exceeded the World Health Organization (WHO's) annual exposure guidelines for fine particular matter ($PM_{2.5}$)—tiny airborne particles, about a 40th of the width of a human hair, penetrating into human body through respiratory system and causing a wide range of short and long term health effects. In 2018, India, Pakistan and Bangladesh—the three largest countries of South Asia—accounted for 18 of the world's 20 cities with the worst air pollution, including major population centres of Faisalabad, Lahore, Delhi and Dhaka ranking 3rd, 10th, 11th and 17th respectively.[31]

Average concentrations in the cities of Bangladesh, Pakistan, India and Afghanistan were among the top four most polluted countries (out of 73) of the world; air pollution level exceeded 60 micrograms per cubic metre (µg/m³), which is six times higher than WHO's air quality guidelines of 10 µg/m³ (see figure 2.8). The biggest contributing factors are household emissions, industrial emissions, coal combustion and transport.[32] Global warming is making the effects of air pollution worse by changing atmospheric conditions and amplifying forest fires.

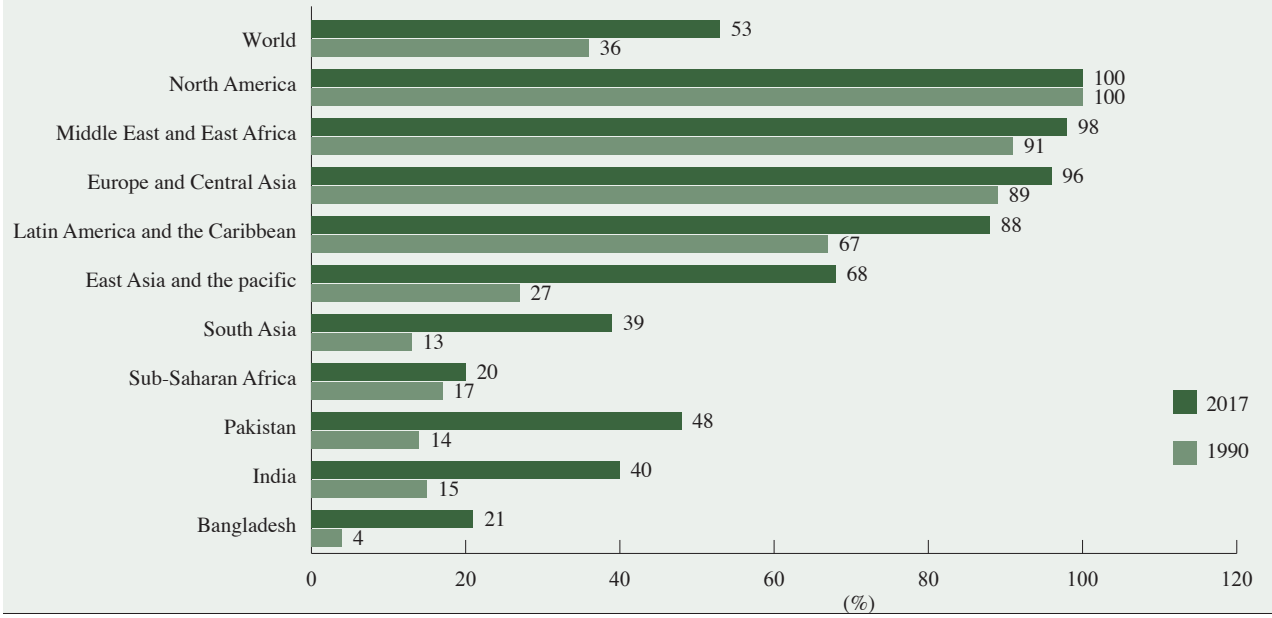
Figure 2.8 Estimated average $PM_{2.5}$ concentration (µg/m³) in South Asia, 2018



Source: Greenpeace and AirVisual 2019.

Air pollution threatens everyone, but the poorest and most marginalized people bear the brunt of the burden. About three-fifths of South Asia's population, most of them women and children, are still breathing deadly smoke every day from using polluting stoves and fuels in their homes, which is the highest ratio in the world only after Sub-Saharan Africa (see figure 2.9). From 1990 to 2017, the proportion of South Asia's population with access to clean fuels and technologies for cooking, such as gas and electric-

Figure 2.9 Proportion of population with primary reliance on clean fuels and technologies for cooking, 1990-2017



Source: HEI 2019.

ity, increased from 13 per cent to 39 per cent. The absolute number of people relying on polluting fuels for cooking, such as solid fuels and kerosene, however, has actually increased, reaching an estimated 1.1 billion people in 2017, accounting for 31 per cent of the world total of 3.5 billion. The situation varies within South Asia, with the population without access to clean fuels for cooking in the range of 60 to 79 per cent in India, Bangladesh, Afghanistan and Nepal.

Impact on health: Air pollution—comprising ambient $PM_{2.5}$, household and ozone—continues to be one of the most important risk factors contributing to death and disability in South Asia, with a significant impact on children and women. In South Asia, 1.6 million people died in 2017 from polluted air that penetrates deep into the lungs and cardiovascular system, causing diseases including stroke, heart disease, lung cancer, chronic obstructive pulmonary diseases and respiratory infections, including pneumonia, accounting for one-fifth (20 per cent) of total premature deaths in the region. Women accounted for 46 per cent of air pollution-related deaths in South Asia, while children under-five for 8 per cent. India, Pakistan and Bangladesh were among the top five countries of the world with the highest number of such deaths in 2017. Air pollution also caused a loss of 50 million disability-adjusted life years (DALYs) in South Asia. The region's share in world's total air pollution-related premature deaths increased from 28 per cent to 32 per cent between 1990 and 2017, while its share in world's total loss of healthy years increased from 33 per cent to 34 per cent (see table 2.12).

Ambient air pollution alone caused some 0.8 million deaths in 2017, it increased by 132 per cent in the region between 1990 and 2017 compared to 68 per cent increase in the world.

Household air pollution from cooking with polluting fuels and technologies caused an estimated 0.6 million deaths in 2017. Women and girls bear the largest health burden both from domestic pollution and from fuel-gathering. For instance, in the Bhaktapur city of Nepal, children in households where kerosene was used for cooking had a significantly higher risk of acute lower respiratory infection than those living in homes where electricity was used.[33] The dependence on polluting fuels also puts a cost on women in terms of the time they spend to collect fuels. In the Himachal Pradesh State of India, on average women walk an average of 2.7 hours for fuelwood collection and undergo stress like stiff-neck, backache, headache and loss of workdays. Moreover, in Himachal Pradesh, female children under-five and female adults 30-60 years had a higher proportion of respiratory symptoms than males of similar age-groups.[34]

Ozone pollution-related premature deaths also increased by 69 per cent in South Asia (from 0.1 million in 1990

Table 2.12 Number of deaths attributable to air pollution in South Asia, 1990-2017

(thousands)

		India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	South Asia	Global
Air pollution	1990	1,019	108	132	27	27	9	1,323	4,693
	2017	1,241	128	123	26	26	8	1,552	4,895
Ambient particulate matter pollution	1990	284	25	25	4	6	2	347	1,752
	2017	673	64	47	6	13	3	806	2,937
Household air pollution from solid fuels	1990	692	79	104	22	20	7	925	2,709
	2017	482	59	70	19	11	5	647	1,641
Ambient ozone pollution	1990	85	4.9	7.2	0.3	1.6	0.0	99	392
	2017	146	8.2	9.0	0.5	3.2	0.1	167	472

Source: HEI 2019.

to 0.2 million in 2017) compared to 20 per cent increase in the world.

Impact on economy: According to the World Bank, in 2013, both indoor and outdoor air pollution cost the global economy US$ 5,112 billion in welfare losses. South Asia lost 7.4 per cent of its GDP to air pollution, one of the highest ratio in the world. From 1990 to 2013, the welfare losses increased by more than three times (from US$ 135 to US$ 604 billion) in South Asia, despite countries having made great gains in economic development and health outcomes (see table 2.13).

Table 2.13 Cost of air pollution in the world, 2013

	Total welfare losses from air pollution	
	US$ billions, 2011 PPP adjusted	% of GDP
East Asia and the Pacific	2,306	7.5
Europe and Central Asia	1,245	5.1
Latin America and the Caribbean	194	2.4
Middle East and North Africa	154	2.2
North America	495	2.8
South Asia	604	7.4
Sub-Saharan Africa	114	3.8
World	5,112	...

Source: World Bank 2016b.

Water resources and quality

Sustainable management of water resources is central for economic, social and environmental benefits and is essential to achieving the 2030 Agenda for Sustainable Development. South Asia is facing enormous challenges if it has to meet the targets of SDG 6 on water and the related SDGs on poverty, hunger, inequality, health, education, gender, sustainable cities, sustainable economic growth and sustainable consumption.

South Asia's economic growth has been rapid, however, the increasing demand for water has put the finite water resources into a more precarious situation. South Asia's water availability per person, is three times less than the average value for the world (of 7,454 cubic metres). Between 1992 and 2014, it declined by about one-half, from 3,217 to 2,175 cubic metres. India and Pakistan (after the Maldives) have the lowest water availability per person in South Asia.[35] The region's water resources and water security are under stress due to population growth, urbanization, mismanagement, water pollution, water-related disasters and global warming. The challenge for South Asia is to increase food production for the increasing population, and also providing water for domestic users and meeting industrial and energy demands. Table 2.14 summarizes water-related issues in South Asia.

Water quality: Water quality is degraded by high levels of agricultural, industrial

Table 2.14 Water-related issues faced by countries in South Asia

	Increasing water scarcity threat	High water utilization	Deteriorating water quality	Poor water quality and low water endowment	Flood prone countries	Cyclone prone countries	Drought prone countries	Climate change risk	Poor access to drinking water	Poor access to sanitation
India	X	…	…	…	X	…	X	X	…	X
Pakistan	X	X	X	…	…	…	…	X	…	…
Bangladesh	…	…	…	…	X	X	…	X	…	X
Afghanistan	X	…	X	…	X	…	X	X	X	X
Nepal	…	…	…	X	…	…	…	X	…	X
Sri Lanka	…	…	…	…	…	…	…	X	…	…
Bhutan	…	…	…	X	…	…	…	…	…	…
Maldives	X	…	…	X	…	…	…	X	…	…

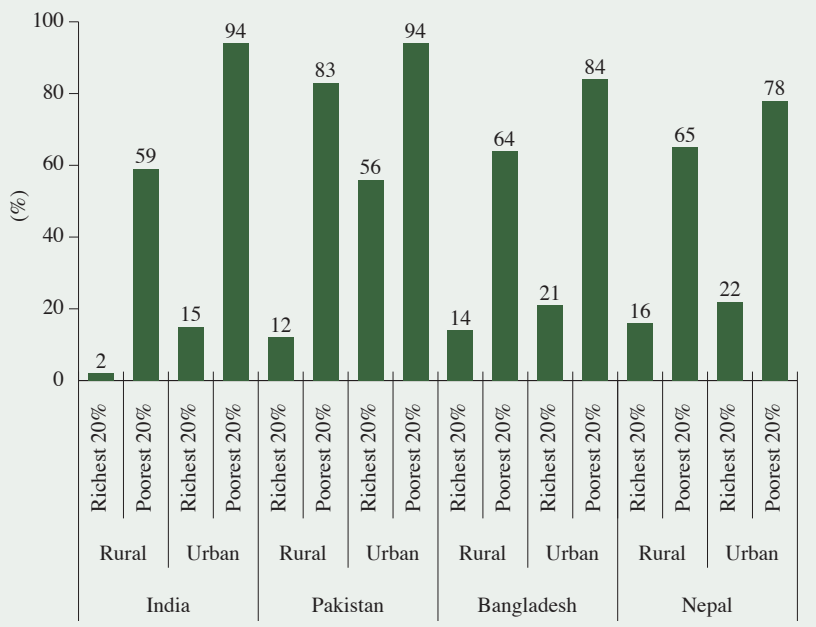
Sources: WWAP 2012 and UNEP 2019a.

and domestic pollution, and is exacerbated by unplanned urbanization and inefficient irrigation practices. Significant amounts of wastewater are charged directly into surface water bodies without any treatment which puts severe strains on water resources. In South Asia, 72 to 90 per cent of all wastewater produced is released untreated, polluting ground and surface water resources, as well as coastal ecosystems. The largest producer of municipal wastewater in South Asia is India, where 71 per cent of municipal wastewater remains untreated. Pakistan is the second-largest producer of wastewater in South Asia with 82 per cent of the total untreated.[36] In Bangladesh, Nepal and Bhutan, 17, 12 and 10 per cent of wastewater are treated respectively.[37]

Inadequate water supply and sanitation: In 2015, 963 million South Asians were without access to improved sanitation facilities, accounting for 41 per cent of the global population without access to such services. Among those lacking adequate sanitation were 610 million people without any facilities at all, who continued to practice open defecation and accounted for about two-thirds (60 per cent) of the global population practicing open defecation. In South Asia, access to improved water increased from 80 per cent to 92 per cent between 2000 and 2015. However, over 133 million people still do not have access to improved drinking water. It is currently estimated that in South Asia, 68-84 per cent of total water sources are contaminated.[38] Moreover, significant inequalities persist between rural and urban areas. For instance, in rural areas of South Asia, the use of piped water increased from 7 to 17 per cent from 1990 to 2015, but it remained lower than the urban coverage of 56 per cent in 2015. Similarly, in case of access to improved sanitation, compared to the regional average value of 45 per cent, it varied from 67 per cent in urban areas to 36 per cent in rural areas in 2015. There are also massive inequalities across income groups (see figure 2.10). For instance, in terms of access to improved sanitation services in urban areas of India, there is 79 percentage points difference among the poor and the rich. In rural areas of Pakistan, the people from the poorest 20 per cent of the population have seven times less access to improved sanitation services. There are also wide disparities among slum and non-slum areas within the cities. In 2014, about one-third (31 per cent) of South Asia's urban population was living in slum areas and often lack adequate drinking water and sanitation services.[39] Slums often lack durable housing, water and sanitation infrastructure and drainage. In Dhaka, Bangladesh, almost 60 per cent of the city's slums lack effective drainage.[40]

Health and economic development: The costs of inadequate water supply and sanitation in terms of its impact on human health are high: 0.8 million (in 2017) people die every year in South Asia due to inadequate sanitation, water supply and hygiene, accounting for half (50 per cent) of such premature deaths in the world. Women account for 58 per cent,

Figure 2.10 Population with access to improved sanitation in South Asia by income group, 2012



Source: WHO and UNICEF 2017.

while children under-five account for one-fifth (19 per cent) of total premature deaths in South Asia caused by dirty water, sanitation and poor hygiene. Similarly, 31 million DALYs were lost in South Asia in 2017 due to it, accounting for 37 per cent of such global DALYs.[41]

Besides its impact on health, water insecurity also imposes constraints on economic growth with negative impacts on poverty and inequality. Water is likely to become a constraint for economic growth. Globally, water insecurity costs the economy about US$ 500 billion annually or one per cent of global GDP. In South Asia, inadequate water and sanitation-related economic losses as a percentage of GDP range from 2 to 4 per cent in India, Pakistan and Bangladesh to more than 8 per cent in Afghanistan.[42] Globally, each dollar invested in water and sanitation can provide a return of US$ 5 to US$ 46 in the form of reduced health costs and improved economic productivity.

Water also provides jobs to a large number of workers. Globally, three out of four jobs are water-dependent and more than 1.4 billion jobs (42 per cent of the total workforce) are heavily water-dependent.[43] In India, Mahatma Gandhi National Rural Employment Programme, which provides jobs to one-fourth of rural households, has largely focused on

Box 2.4 Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA): Sustainability of ecological infrastructure

The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) under the MGNREGA of 2005 aims at reducing rural poverty by guaranteeing 100 days of wage employment in a financial year to a rural household whose adult members volunteer to do unskilled manual work. The Scheme is significant in three ways: it aims at eradicating acute poverty in villages by ensuring that the poorest of the poor are given sufficient employment; it aids in empowering local governments, as the implementation of the Act is vested with them; and it supports activities that create productive assets that could potentially make villages self-sustaining. The programme is implemented in all 615 rural districts of the country and INR 55,000 crore has been allocated for FY2019, accounting for 2 per cent of Union Budget and 0.3 per cent of GDP (FY2016). During the FY2018, the MGNREGS generated 2.1 billion days of work reaching 48.7 million families, with women representing 53 per cent of the employed workforce.

Since the main thrust of MGNREGS is enhancing the natural resource base in rural areas, it is regarded as the world's largest ecological restoration programme. Many villages have already benefited from its support to water conservation programmes—critical in rain-fed areas of India. About half of the total projects under the MGNREGS are related to water conservation, harvesting and groundwater replenish works.

For example, in the district of Jalaun in Uttar Pradesh, MGNREGS provided training and jobs for villagers to develop solutions to their heavily silted water harvesting infrastructure, alleviating their water shortage. In FY2008, more than 3,000 new soak pits, together with hand pumps were constructed. This has helped conserve an estimated five million litres of water.

Similarly in Andhra Pradesh, MGNREGS supported the restoration of a network of water storage tanks dating back over 500 years in the principal arid zone. Repairs to the gates of the tanks, as well as works to de-silt the channels feeding them, has restored to full capacity. This has not only boosted crop and livestock production but has also contributed to groundwater replenishment.

A 2013 study by Deutsche Gesellschaft für-Internationale Zusammenarbeit (GIZ) and the Government of India (GOI) has found that the MGNREGS has generated environmental advantages. It is based on the experience of MGNREGS in five states of Andhra Pradesh, Karnataka, Madhya Pradesh, Rajasthan and Sikkim. In these states, the bulk of the works during the study period (2006-07 to 2013) were linked to water conservation such as water harvesting, irrigation, drought-proofing and renovation of customary water bodies. The study concluded that the MGNREGS projects improved both groundwater level and drinking water availability in these states. Other works like percolation tanks, check dams and de-silting of water tanks also contributed to an upsurge in the area irrigated by bore wells, resulting in an increase in crop output in 30 out of 40 study villages. Drought proofing tasks such as horticulture development and afforestation led to an upsurge in the overall forest cover.

In Jharkhand, over the last few years, more than 100,000 wells have been sanctioned for construction under the MGNREGS in an effort to tackle drought and improve access to water in rural areas. Jharkhand, one of the poorest states of India with one of the lowest irrigation coverage rate in India, is mostly rain-fed and has been affected by severe drought over the past decade. About 95 per cent of completed wells are being utilized for irrigation, leading to a near tripling of agricultural income of those in the command area. The real rate of return from these wells is estimated to be close to six per cent, a respectable figure for any economic investment.

Sources: GOI and GIZ 2013 and Bhaskar *et al.* 2016.

water-related projects (see box 2.4).[44]

Deforestation, land degradation and loss of biodiversity

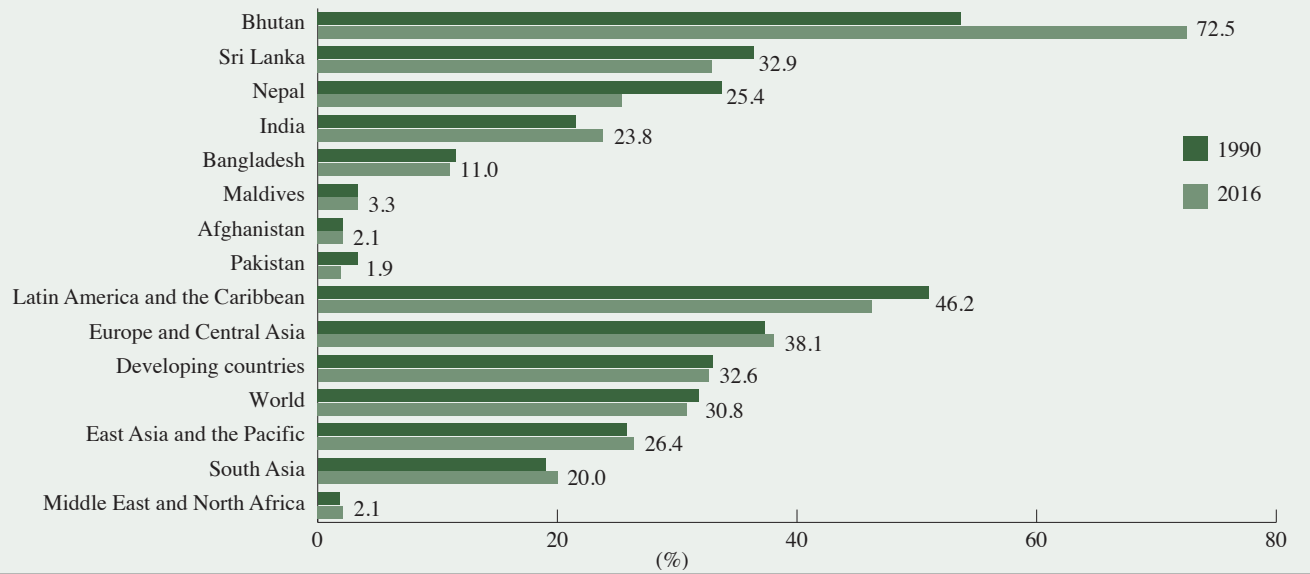
Deforestation, land degradation and loss of biodiversity pose major challenges to sustainable development and have affected the lives and livelihoods of millions of people. SDG 15 focuses specifically on managing forests sustainably, restoring degraded lands and successfully combating desertification, reducing degraded natural habitats and ending biodiversity loss. Land degradation, deforestation and loss of biodiversity may have a severe impact on indigenous people who depend on the land and natural resources for their livelihoods. Globally, there are more than 370 million self-identified indigenous peoples in 70 countries. Asia and the Pacific numbers more than 70 groups. They face exclusion and discrimination in the laws, in access to education in their mother tongue and in access to land, water, forests and intellectual property rights.[45]

Deforestation: Forests play a vital role for people and the planet, by strengthening livelihoods, providing clean air and water, conserving biodiversity and reducing global warming. Forests are critical in providing livelihoods and food security for many of the region's rural poor. In Asia, around 27 per cent (or 84 million) of the rural poor in extreme poverty live in forests, savannahs and their surroundings. In developing countries, forests account for one-fifth of income for rural households, and that income from forests is proportionally more important for the poorest households.[46]

South Asia is covered by 83.5 million hectares of forests (in 2016), accounting for 20.0 per cent of the region's land area, and 2.1 per cent of global forest cover. India, Bangladesh, Nepal, Sri Lanka and Bhutan have over 23 per cent forest land. While Pakistan (1.9 per cent) and Afghanistan (2.1 per cent) are among the countries of the world with the lowest proportions of forest cover (see figure 2.11).

Since 1990, forest area has declined in all countries of South Asia with the exception of India and Bhutan. This is mainly due to an increase in the use of forest land to meet the agriculture and other needs of the growing population. In India, forest area has increased since 1990 due to large-scale afforestation programme and the reversion of low-productive farmland back to the forest. Howev-

Figure 2.11 Forest area (% of land area) in South Asia, 1990-2016



Source: World Bank 2019f.

er, a careful analysis shows the evidence of displacement of deforestation to other countries. A study of seven developing countries (India, Bhutan, China, Costa Rica, Chile, El Salvador and Vietnam), experiencing the transition from deforestation to reforestation, validated that the displacement of land use abroad accompanied local reforestation. For every 100 hectares of reforestation, these countries on average imported the equivalent of 74 hectares in wood products.[47]

South Asia has 11 million hectares of privately owned forests and their area is increasing, with Bangladesh and Pakistan having the highest proportion of privately owned forests (36 and 34 per cent respectively in 2010).[48] An increase in the share of private ownership of forests could have serious implications for sustainable forest management in the future. Indigenous people own the least among all categories of forest ownership, and the ratio is on the decline. This may have serious implications not only for forest conservation but also for empowerment of indigenous people, who are already among the most deprived.

South Asia's forests provide, formal and informal, employment (full-time equivalent) to about 7.9 million, with 6.3 million in India, 1.5 million in Bangladesh and 0.1 million in Nepal. Forestry is also an important source of employment for women. Globally, Bangladesh has the highest number of women (600,000) working in the forestry.[49] The country has updated its forest policy and legislation to enhance women's participation in social forestry. The Billion Tree Tsunami Project in Pakistan has also created over 0.5 million green jobs mostly for rural women and unemployed youth, who are owning 13,000 nurseries as well as community chosen forests.[50]

Land degradation: South Asia is mostly agro-based with the poorest section of the population mostly dependent on subsistence farming. The region accounts for 3.7 per cent of the world's land area, while it accounts for one-fifth (23.8 per cent) of the world's population.[51] Food and agricultural output have increased in South Asia since 1990. However, it has also resulted in an increase in the degradation of land. According to the global *Human Development Report 2011*, South Asia has the highest share of severely and very-severely degraded land in the world. About two-fifths (or 84 million hectares) of South Asia's total agricultural land is affected by various types of degradation.[52] It varies from 66 per cent in dry zones to 24 per cent in humid zones of the region. The worst country affected is Bangladesh with 75 per cent of agricultural land degraded, followed by Pakistan (61 per cent), Sri Lanka (44 per cent), Afghanistan (33 per cent), Nepal (25 per cent), India (25 per cent) and Bhutan (10 per cent). Wind and water erosion are the main types of land degradation affecting 25 and 18 per cent of all agricultural land respectively. Soil fertility decline (13 per cent), waterlogging (2 per cent) and salinization (9 per cent) are other forms of land degradation.[53] The main causes of land degradation include natural hazards, human factors (deforestation, overgrazing, agricultural activities and overcutting of vegetation) and socio-economic structures. Land degradation causes South Asia an annual economic loss of US$ 10 billion equivalent to two per cent of its GDP or seven per cent of its agricultural value-added.

Protection of key biodiversity areas (KBAs) by ecosystem: In 2017, 7.3 per cent of South Asia's land was under protection compared to 14.7 per cent in the world, which are recognized, dedicated and managed to achieve the long-term conservation of nature.[54] To safeguard places that contribute significantly to global biodiversity, protected areas have been established and identified as KBAs. The percentage of South Asia's freshwater, terrestrial and mountain KBAs cov-

The Billion Tree Tsunami Project in Pakistan has created over 0.5 million green jobs mostly for rural women and unemployed youth

ered by protected areas increased from 21.4 to 25.0 per cent, 27.7 to 32.8 per cent and 32.4 to 40.5 per cent from 2000 to 2018, respectively (see table 2.15). However, the ratios are about one-half of the average values for the world. Safeguarding KBAs in all three ecosystems is crucial for maintaining genetic, species and ecosystem diversity and the related benefits for people.

Loss of biodiversity: With 2.7 per cent of the world's total forests, South Asia provides shelter for about 15.5 per cent flora and 12 per cent fauna of the world. The floral diversity comprises 39,875 species of flowering plants, 66 conifers and cycads, and 764 ferns. Faunal diversity is wide-ranging with 933 species of mammals, 4,494 birds, 923 reptiles, 332 amphibians and 342 freshwater fishes.[55] Species in South Asia are facing the highest level of extinction risk in the world, as indicated by the International Union for Conservation of Nature (IUCN's) Red List Index for species (see figure 2.12). Between 1993 and 2019, the Red List Index for South Asia decreased from 0.77 to 0.67—the lowest value compared to all other regions of the world in 2019—, indicating an alarming trend in the decline of mammals, birds, amphibians, corals and cycads in the region. The biggest cause of the loss of species is explained by the habitat loss from unsustainable agriculture, unsustainable harvest and trade,

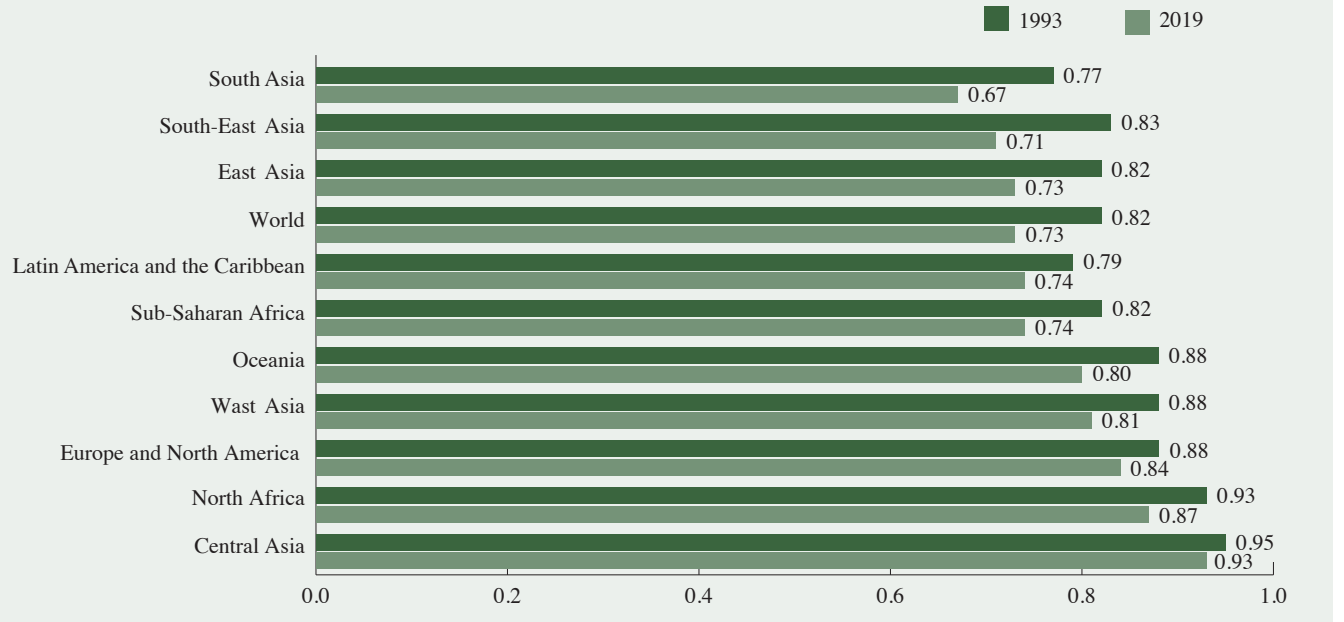
Table 2.15 Average proportion of each freshwater, terrestrial and mountain key biodiversity areas (KBAs) that is covered by protected areas, 2000-2018

(%)

	The proportion of KBAs covered by protected areas					
	Freshwater		Terrestrial		Mountain	
	2000	2018	2000	2018	2000	2018
India	13.2	15.2	21.7	26.0	28.0	35.4
Pakistan	36.3	37.0	35.0	36.6	36.0	36.0
Bangladesh	20.8	20.8	38.0	48.0	…	…
Afghanistan	0.1	0.1	0.1	6.1	0.1	12.3
Nepal	22.0	36.5	42.2	54.6	57.1	67.1
Sri Lanka	72.6	80.0	41.6	49.8	25.9	40.2
Bhutan	23.1	34.3	38.6	42.9	38.6	43.0
South Asia	21.4	25.0	27.7	32.8	32.4	39.5
Developing countries	22.7	31.2	26.4	34.6	32.4	40.5
World	31.5	43.5	34.3	46.6	37.7	48.0

Source: UN 2019.

Figure 2.12 Red List Index* of species survival in the world by region, 1993-2019



Note: *: The index represents an aggregate survival probability (the inverse of extinction risk) for all birds, mammals, amphibians, corals and cycads, weighted by the fraction of each species' distribution occurring. The value ranges from 1 (species are classified as least concerned) to 0 (all species are classified as extinct).
Source: UN 2019.

deforestation and invasive alien species. Other factors are the overexploitation of natural resources, high levels of pollution and change in weather patterns.

Degradation of marine ecosystems

Oceans, along with coastal and marine resources, are central for sustainable development and the SDGs. SDG 14 aims at conservation and sustainable use of the oceans, seas and marine resources for sustainable development. The sustainable use of marine resources is essential for food security, the livelihood of coastal communities and for environmental sustainability. Marine protected areas contribute to poverty reduction by enhancing fish catches which bring income, thus improving health. In particular, it benefits women who do much of the work at small-scale fisheries.

South Asia's impressive economic growth, increasing population and unsustainable resource use have put pressures on its marine resources. Overfishing, marine pollution and adverse impacts of climate change are putting more pressures. This, in turn, has a negative impact on people's empowerment and human rights, especially the poor and the deprived. For instance, the low-lying Sunderbans, a coastal area between India and Bangladesh, are becoming a more difficult place to live for its mostly poor population, that is exposed to sea-level rise, salinization of soil and water, cyclonic storms, and flooding.[56]

Use of fish stocks within sustainable limits: Fisheries contribute significantly to employment, exports and food production. In South Asia, the fisheries sector is a source of employment for about 7.5 million people and produces around 8.5 million tons of fish annually. Its contribution in GDP varies from 11 per cent in the Maldives to 1.1 per cent in India. The sector is also a source of trade with annual exports reaching US$ 2.6 billion.[57] Besides this, the sector is an important source of nourishment, especially for poor communities. In Bangladesh, people get 60 per cent of their dietary animal protein from fish. The equivalent value for Sri Lanka is 52 per cent, Pakistan 32 per cent and Nepal 10 per cent.[58] To maintain a healthy balance, the fish stock must be used within biologically sustainable limits: however, the proportion of global marine fish stocks within biologically sustainable levels declined from 81.4 per cent in 1990 to 66.9 per cent in 2015.[59] In contrast, the percentage of stocks fished at biologically unsustainable levels in the world increased from 18.6 per cent in 1990 to 33.1 per cent in 2015. Biological overfishing in result has led to significant economic losses in the world; an annual economic loss of about US$ 83 billion in 2012.[60] The rebuilding of overfished stocks has the potential to produce higher yields as well as substantial social, economic and ecological benefits.

Protection of marine ecosystems: The expansion of protected areas for marine biodiversity is crucial for the preservation of the marine ecosystem. In 2018, only 0.7 per cent of marine waters under national jurisdiction—that is, 0 to 200 nautical miles from shore—were covered by protected areas in South Asia which is the lowest in the world. The average global value for this indicator is 16 per cent and varies from 1.3 per cent for North Africa and Western Asia to 22 per cent for Oceania. The mean coverage of marine KBAs that are protected has also increased in South Asia from 37.5 per cent in 2000 to 43.9 per cent in 2018, while the global values increased from 30.1 per cent to 44.3 per cent.[61]

Waste management

South Asia generated 334 million tonnes of waste in 2016. About three-fourths of the generated waste in the region is openly dumped.[62] Poorly managed

About three-fourths of the generated waste in the region is openly dumped

waste threatens human health and causes environmental degradation and GHG emissions. It affects everyone, however, the most affected are the most deprived sections of society. In slum areas, solid waste collection is non-existent; as such areas are not covered by municipal services, putting the poor living there at risk.

Waste generation: With an average generation rate of 0.52 kg per person daily, the annual total waste for South Asia was estimated at around 334 million tonnes in 2016, accounting for 17 per cent of the world total. New and complex waste streams like e-waste, food waste, construction/demolition waste, disaster waste and marine litter are emerging. Per capita waste varied from 1.4 kg per person daily in the Maldives to 0.17 in Nepal in 2016 (see figure 2.13). Waste in South Asia is projected to double (661 million tonnes) by 2050 compared to an estimated 70 per cent increase in the world, owing to population growth, urbanization and economic growth.

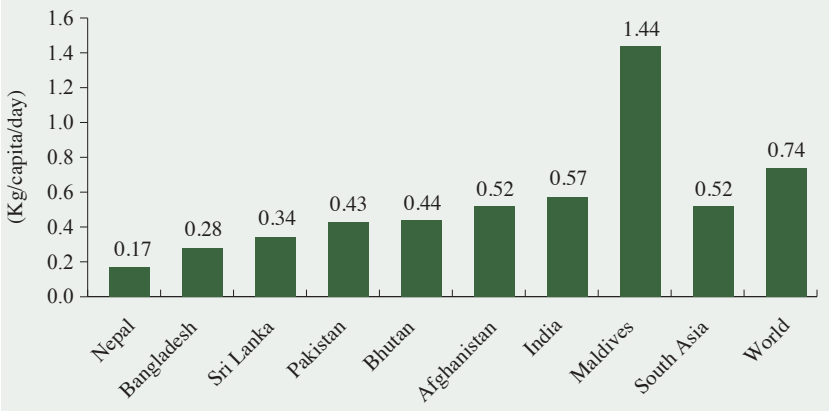
Waste collection: In South Asia, the waste collection rate is 51 per cent, which is lowest in the world only after Sub-Saharan Africa. Waste collection rates are higher for urban areas (77 per cent) than for rural areas (40 per cent), as waste management is typically an urban service.[63] The ratio varies from 20 per cent in Bangladesh, 35 per cent in Sri Lanka and 51 per cent in India to 55 per cent in Pakistan, 72 per cent in Bhutan and 94 per cent in Nepal.[64] Informal waste collection and materials recovery activities are common in South Asia. Dhaka and Delhi reported 120,000 and 90,000 active waste pickers, respectively. Uncollected waste is often managed by households and may be openly dumped, burned, or less commonly, composted. This creates a number of environmental problems in the form of water pollution, soil contamination, air pollution and GHG emissions.

Waste treatment and disposal: Open dumping is prevalent in South Asia. About 75 per cent of waste is burned or dumped on roads, open land, or waterways in South Asia which is the highest in the world; whereas only zero per cent of waste is dumped in North America and 18 per cent in East Asia and the Pacific. Whereas only 4 per cent of waste is deposited in landfills in South Asia, about 68.5 per cent, 54.3 per cent and 46 per cent of waste are sent to landfills in Latin America and the Caribbean, North America and East Asia and the Pacific respectively. South Asia recycles 5 per cent of waste for material recovery compared to 33 per cent in North America.[65]

The piles of garbage that clog street drains contribute to floods during the rainy season, putting at risk the health of people living in surrounding areas. For instance, in Surat city of India in 2004, floods resulted in an outbreak of a plague-like disease, affecting 1,000 people and killing 56 individuals.[66] The city incurred a daily loss of INR 516 million and a total loss of INR 12 billion during the plague period. A similar situation has been found in Dhaka. Seventeen out of 43 canals around the city have been totally filled with waste.[67] This has increased the likelihood of periodic flooding in the city.

As has been discussed in detail in the annual report on *Human Development in South Asia 2014*, South Asian cities need to follow an integrated solid waste management (ISWM)[68] approach

Figure 2.13 Per capita waste generation in South Asia, 2016



Source: World Bank 2018d.

to address the issues of solid waste management in a sustainable way.[69] Such an approach includes the incorporation of more environmental friendly concepts of source separation, use of the 3R (reduce, reuse and recycle) approach, the legitimization of the informal sector and public-private participation. This can change solid waste from a problem to a source of growth, prosperity and employment as can be seen in box 2.5.

Climate change

Climate change is a reality and is one of the biggest threats to development. Its widespread, unprecedented impacts disproportionately burden the poorest and most vulnerable. South Asia is among the most vulnerable regions of the world due to greater exposure to natural disasters, its geographic location and high population density. High level of poverty and inequality also makes it more vulnerable to global warming. SDG 13 calls for urgent action to combat climate change and its impacts. It also aims to build resilience in responding to climate-related hazards and natural disasters.

Natural disasters, many of which are exacerbated by global warming, have increased in frequency and intensity and are a constraint to sustainable development. They have increased in South Asia over time, with massive losses for people and the economies. Between 1990 and 2000, 48.4 million people were affected annually by natural disasters in South Asia, with the number reaching 65.2 million annually between 2000 and 2017. The average economic losses from natural disasters also increased from US$ 3.3 billion to US$ 8.1 billion during this time period (see table 2.16). The situation varies within the region with improvement in Bangladesh due to its effective mea-

Box 2.5 Waste management in Alappuzha in Kerala, India

Till 2012, Alappuzha, a tourist city in Kerala, had a severe garbage problem. The city was struggling with an overfilled landfill and polluted canals. Roadsides and canals filled with stinking garbage were threatening coastal Alappuzha's status as a tourist destination as well as exposing residents and visitors alike to clouds of flies and disease-spreading mosquitoes. Through a decentralized system, the city has successfully and sustainably managed its urban waste and has become a model for other cities of the world. The United Nations Environment Programme (UNEP) has recognized it among the top five cities of the world to successfully manage solid waste. Moreover, three times it won the Kerala State Pollution Control Board Award and was also presented as a zero-waste model at the Paris Climate Conference in 2015.

Alappuzha addressed the problem by introducing a decentralized waste management system. This separates out biodegradable waste at the ward level, treats it in small composting plants, and provides many of its 174,000 residents with biogas for cooking. People segregate and compost their waste while non-biodegradable waste—paper, plastic and metal—is recycled by waste pickers. The municipality set up biogas plants, pipe compost units in households and aerobic composting units in public places. The composting bins and biogas plants were provided with at a 90 per cent and 75 per cent subsidy respectively. Currently, there are 3,000 biogas plants and 2,800 pipe compost bins in about 70-80 per cent of the homes in the city. For those who do not have their own bins, there are 33 aerobic units present at a distance of a kilometre from each other where garbage can be dumped for composting in community bins.

The municipality has also set up the waste disposal protocol for restaurants and market, they have to segregate their dry and wet waste, the collection of the waste is done by the private contractor, who then takes the wet waste to piggeries and fish farm and dry waste is given for recycling to private vendors. The municipality charges people and restaurant owners with hefty fines who are seen disposing of garbage in the open.

The waste deposited at the aerobic compost plants in public places is converted into organic fertilizers and distributed to the public free of cost. Each unit, comprising two bins, processes 2,000 kg of waste and converted it into fertilizer within 90 days.

Doing away with the door-to-door collection has helped the Alappuzha municipality save a substantial amount of money too. This includes money saved on diesel used for operating trucks to transport waste to the dumping yards (INR 50 lakh), and money earned after selling the produced biogas (INR 60 lakh) and manure (fertilizer) fetches (INR 30 lakh).

The success of Alappuzha's decentralized waste management model has inspired several other municipalities and village *panchayats* (village councils) in Kerala to adopt it. While 20 municipalities and 300 village *panchayats* have already launched the project, the others have started the process.

Sources: Bhatia 2017 and Alappuzha Kerala 2017.

Table 2.16 Total number of affected persons and economic losses from natural disasters in South Asia, 1990-2017

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia
The annual average number of natural disaster-affected people (thousands)									
1990-2000	37,774	1,920	7,870	315	102	374	22	24	48,401
2001-2017	54,149	3,226	5,921	345	621	896	10	10	65,179
Annual average economic losses from natural disasters (US$ millions)									
1990-2000	1,809	272	1,035	17	40	48	4	30	3,255
2001-2017	3,655	2,146	844	29	658	314	0	470	8,117

Source: CRED 2018.

sures to address natural disasters. The country is currently a leader in its institutional framework for disaster risk reduction and sustainable development, with several core government policies and programmes incorporating risk reduction from their earliest stages.

As has been analysed in the annual report on *Human Development in South Asia 2013*, People are experiencing the significant impacts of climate change in the form of melting of glaciers, extreme weather events, heavy and untimely rainfall and sea-level rise. The poorest and deprived people are more likely to be adversely affected by climate change. Compared to the total population, they are at high risk of natural disasters, food insecurity and increased risks of climate-related diseases.

- *Poverty and inequality*: According to the World Bank, globally, climate change is projected to cause a larger decrease in the incomes of the bottom 40 per cent of the population compared to the average income of the entire population. In Pakistan, by 2013 the income of the poorest 40 per cent of the population is projected to decrease by 8 per cent in the 'high impact climate change' scenario. In Bangladesh, after the 1998 Great Flood, 48 per cent of the poorest 20 per cent of households were estimated to be food insecure compared to an average of 16 per at national level and 0.9 per cent among the richest 20 per cent of households.[70] Global warming is also projected to increase poverty. Globally, climate change could put more than 100 million people into extreme poverty by 2030 which can be avoided if inclusive and climate adaptive development model is followed.[71]
- *Agriculture and food security*: In South Asia, increases in temperature and resulting water stress are expected to decrease crop yields by 30 per cent by the mid-21st century.[72] In Pakistan, the 2010 floods destroyed 2.1 million hectares of farmland, decreasing food production and increasing wheat prices 50 per cent higher than the pre-flood prices.[73] The impact will be higher on the urban poor who will pay more for food.
- *Health*: Climate change poses a major threat to human health, especially for the poor. In Bangladesh, more than 17,000 cases of diarrhoea were registered after the 2004 floods. In May 1995, a major heatwave across India caused more than 1,100 deaths, most of them were either elderly or low-income workers. In Pakistan, the incidence of infectious disease and diarrhoea increased after the 2010 floods.[74]
- *Migration*: In 2010-11, more than 3.5 million people were displaced in South Asia by climate-related disasters.[75] Low-lying coastal cities in South Asia including Karachi, Dhaka, Mumbai, Kolkata, Chennai and whole of the Maldives could be affected by coastal impacts of climate variability and can result in massive displacement of the population.

Conclusion

The chapter explains key patterns and trends in economic growth, natural resource use, equity and environment since the early nineties, when the UN Conference on Environment and Development, also known as the Rio Earth Summit, was held in 1992.

An analysis of economic growth in South Asia over the last two and half decades show the sustained trend of economic growth, making it the second-fastest-growing region in the world. The region's HDI has also improved shifting the region from 'low human development' to 'high human development' category. However, there remains a disturbing picture of the progress as well. The region's contribution to global GHGs emissions has increased by one-half. Development activities have been characterized by high natural resource use and energy intensity and increasingly evident resource shortages, resulting in an increase in global warming, air pollution, water pollution, deforestation, land degradation and loss of biodiversity. Moreover, development has also featured high levels of inequities across dimensions of human development, income, health and education.

Today, the region has the challenge of achieving a sustained rate of economic growth to improve people's well-being while fulfilling the basic needs of all and reducing the pressure on scarce natural resources. This is also the primary objective of the SDGs (see box 2.6).

Box 2.6 Organic agriculture in India: Kedia (village) model

In 2014, the Kedia village in Jamui district of Bihar in India started its journey away from agrochemical farming (based on chemical fertilizers and pesticides) to organic farming. In just two years, Kedia became an ecological agricultural role model, not only for moving away from chemical fertilizers and pesticides but also for its water conservation and management practices.

Kedia village, with about 100 families, is a completely rain-fed and drought-prone area (representing 60 per cent of India's farmers) and comprises of small or marginalized farmers (except just one family) (representing 80 per cent of India's farmers).

With the financial help from the state government under its plan to promote organic farming in at least one village in every district, the farmers of Kedia are laying vermicomposting beds, using biogas units and also setting up an eco-friendly model toilet. The Kedia farmers have developed indigenous ecological pests which they call *Amritpani* and *Agniastrya*. They have also developed a rainwater harvesting system and a system for watershed management. This has been complemented by solar-powered cold storage that will be used to store the produce to better control the timing of their sales. Consequently, dependence on chemical farming inputs is reduced, cows have returned, biomass has increased, the soil is becoming fertile, water resources are well managed and farms are thriving. Today, the village has 282 vermicompost beds (to convert 'waste' into nutrient-rich, organic fertilizers), 11 biogas plants (providing a safer, healthier alternative to the burning of biomass as cooking fuel), 5 rainwater harvesting ponds, 5 pukka cow sheds, 1 solar cold-storage unit and 20 ecosan toilets.

The process has benefited enormously by increasing food security, empowering communities and reducing the carbon footprint. The biomass-based ecological fertilizers have improved the water retention capacity in the soil therefore water required for irrigation has come down by 50 per cent. The cost of farming inputs has reduced by almost 40 per cent. Pesticide usage has gone down by 100 per cent. Fertilizer usage has nearly halved. Reduced agrochemicals and increased soils nutritional capacity indicate safe and healthy food with vast implications for human health. The population of earthworms and other soil organisms has increased and natural predators like birds and snakes have returned back thereby improving the environmental bio-diversity.

Seeing the success of the Kedia model, and with the intention of increasing farmers' income and climate resilience, the government of Bihar State has announced the replication of such organic farming models in all the districts and developing organic farming corridors along with the state and national highways under its third Agriculture Roadmap.

Sources: Shah 2016, Ahmed 2018 and Agriculture Information 2017.

CHAPTER 3

Environmental Sustainability with Equity in India

Introduction

India is one of the pioneers among developing countries in formulating a national environmental policy. The adoption of the Wildlife Protection Act 1972, the Water (Prevention and Control of Pollution) Act 1974 and the Environment Protection Act 1986 indicated the state's response to address environmental problems. Yet, the relationship between environmental goals and developmental goals in India has been fraught with historical omissions, macroeconomic errors, political oversight and injustice. This chapter argues that sustainability and equity will remain unachievable if the prevalent pace of environmental injustice continues.

"It is the extensive use of resources for commerce by the rich, involving energy-intensive and extractive industrial methods that is primarily responsible for degradation.[1] *Today's question is different: can environmental management work if it does not address inequality?"*[2]

In India, with millions still lacking basic food, health, shelter, education and job security, the demands of the environment, which has no political voice, are relegated to the back burner. However, as environmental conditions have worsened, the impacts of this worsening environment on millions of Indians are leading to disastrous consequences. Strangely, it is the development aspirations of the people over the past couple of decades that has given the environment a political voice. The maturity of Indian environmentalism is evident in ground zero, in hundreds of struggles, and the state's responses to these struggles. It is marked by struggles right from the 1970s, the '*Chipko* movement', Silent Valley crisis, and *Rajaji* National Park, and is evident over the past decade, in the state cracking down on any environmental protest, or increasingly on questions about or laws for conserving the environment. The fact that clamp down of environmental protests is common to all political parties (right-wing, left of centre and mainstream) is worrisome. What is it that unites all political parties in their disavowal of any environmental affinity, and violence against environmental activists and the poor who raise their legitimate concerns about environmental loss?

Sustainability and equity will remain unachievable if the prevalent pace of environmental injustice continues

This chapter describes the challenge of environmental sustainability in India when iniquity is built into our development policies and programmes. For instance, it is acknowledged that the neglect of the hilly and tribal areas 'was not a historical accident' but was 'rather a policy-engendered man-made disaster'.[3] Our policies have not matched our agro-ecological, hydro-geological and ethnic plurality.[4] Our policies—formulated to address one particular sector (say, agriculture or industry) and one particular production sub-set or consumption within these (say, textile industry or agricultural prices or access to food)—are the very antithesis of our understanding that ecological, social and economic systems shape each other.

The increasing social metabolism—bio-physical material extraction and use—in India is an important indicator of developmental and environmental changes.[5] Grouped into four broad categories—metal ores and industrial minerals, fossil fuels, construction minerals and biomass—, it is clear that India has moved on from the 1960s when three-quarters of its material consumption was biomass-based.[6] Starting

with the first phase of industrial growth and structural change in the 1980s, and through the post-liberalization era, India's material and energy flows into the economy have increased significantly. From 3.0 tons per capita per year in the 1960s, material consumption increased to 4.3 tons per capita per year by 2004. In the phase of rapid economic growth (2008-2015), material consumption in India increased to over 5.0 tons per capita per year and is still growing rapidly.[7] That this is not alarming compared to the consumption of the European Union countries, about 15 tons per capita per year, is no excuse for India to continue extracting its natural resources and producing more and more material for economic growth. This has led to poverty alleviation in some pockets, but increasing inequality and increasing poverty and violence in many other parts of the country. With the increasing human appropriation of net primary production, for a particular kind of fossil fuel and material intensive economic growth, there is less and less left of the bio-physical resources for the livelihoods and habitats of millions of people and flora and fauna that are part of the country.

One per cent of Indians owned 73 per cent of the wealth generated in 2017

In India, the environmental trajectory is replete with tragedies, planned transgressions and positive transformations. A narrative on a chronological progression on these aspects will be informative. However, such a narrative will not bring out the relationships between the environment and the drivers of change; particularly among the environment, the environmentally-conscious state and the judiciary. Inequality is both a driver and a consequence of environmental degradation. This crucial dimension of complex relationships between the environment and its drivers demands a narrative that is more tuned to the people-people interactions than to the people-nature interactions, or more specifically the impact of human activities on the environment. Climate change may have enabled the first transformative moment from the imagination of the 1980s of the poor as polluters. But in the 21st century, it is a surge in inequality (though accompanied by some improvement in poverty alleviation) that has oriented our attention to the rich and industrialized, as the consistent polluters, whose extraction, exploitation and effluent dumping in the environment is legitimized and actively aided by the state because it brings economic growth and development.[8]

It is not surprising that even serious concern about rising inequality is rarely expressed as driven by environmental loss and degradation. Pointing out that one per cent of Indians owned 73 per cent of the wealth generated in 2017, an Oxfam report also came up with recommendations for social and economic policy changes.[9] In accordance with the environmental Kuznets Curve, the empirical evidence of alarming levels of inequality in India is seen as part of a larger and longer process of economic growth. The growth process is bound to increase inequality for some time and then, upon reaching a tipping point turn towards increasing per capita income with increasing environmental quality and economic growth. Recent evidence, however, points to the relentless exploitation of the environment to foster economic growth. Development interventions in the form of industrial areas, urban settlements, deforestation for mining, highways and renewed investments in dams for agricultural and power needs continue unabated. What is most alarming, however, is that innovations in environmental governance, ecological justice, post-growth thinking and feminist environmental movements—that are asking fundamental questions about the relationships between the environment and development, especially equitable and sustainable development—are being raised only by a few environmental activists and even fewer academics in India. Even the most learned of our politicians believe that economic growth will lead India to sustainable environmental and

developmental outcomes.[10]

Material and energy resources from the environment are crucial inputs for economic growth and development. Ecological justice is one of the key elements missing in the conceptualization of development, and the achievements of development as freedom. An important debate about the hegemonic development discourse points out that the lack of development or the many 'unfreedoms' associated with under-development are not just questions of inequality or unfreedoms, but are also questions of justice.[11] Development, reinforced by non-political and technical meanings and contents, uses reparations for colonialism (in the form of aid), holds back the possibilities for cosmopolitan world order, and ignores the absence of ecological justice.[12] In India, the demands and options for development and sustainable environments are being promoted as alternatives to the prevalent development thought and models,[13] as capacities to organize and report and fight cases of environmental injustice,[14] as territorial integrity and democratic community safeguards against pollution.[15] The very articulation of environmental sustainability as questions of justice, values and larger planetary well-being, and not merely a question of income inequality, is a promising shift. However, India, as we will see in the following sections, is going ahead with a state-centric, centralized and bureaucratically controlled environmental governance, where neither social nor economic inequality matter, and justice is still a far cry.

Following a brief introduction, the chapter presents the status and trends of environmental change as intertwined with human well-being and equity (section 2). This section is organized on the fundamental basis of our material existence on earth (land, water and air). It presents the current status and changes in these bio-geophysical bases and the social and economic dimensions of its use in specific bio-geophysical bases. It highlights the relationships between these fundamental material base of our existence in India and the mutual and cumulative causation of impacts on these fundamental systems. That the state seems unaware of and indifferent to these relationships is alarming. Section 3 brings out a brief set of evidence that painfully reinforces our predicament, of knowing but not addressing or only partially confronting the deteriorating material and energy flows that sustain our livelihoods and life. It points out several alternatives that are practiced by communities, and have even changed the state, ensuring both environmental benefits and livelihoods benefits together (as opposed to the mainstream environment versus development that the 'haves' popularise). But the institutional morass that worsens both the environment and human development outcomes daily still prevails (section 4). The institutional apparatus for environmental governance—especially the legal, regulatory and policy/programme initiatives—seems to favour a centralized bureaucratic control by the state. This favours a particular class of actors who stand to gain from environmental governance that worsens the prevalent inequality. The institutions, rules and policies that understand the material, energy and information flows that keep India's environment and its citizens alive and well are constantly violated ignored or subverted by the intermediate regime. In a brief concluding section, this chapter presents the current Sustainable Development Goals (SDGs) as enablers to see and perchance to act upon the much-needed institutional reform, including and led by institutional changes for sustainable and equitable development.

Ecological justice is one of the key elements missing in the conceptualization of development, and the achievements of development as freedom

Environment-equity: Vicious cycles reinforced by development policy

Work, environment and inequality

Unemployment is a major problem in India. Structural infirmities have reinforced

the difference between those employed and those who are unemployed.[16] Structural unemployment has been a major problem for decades in India. The resulting inequality has been a consequence of lopsided development and questionable technological choices.[17]

Over 50 per cent of the workforce is employed in agriculture and allied sectors (forestry, livestock and fisheries) and mining in India (see table 3.1). This is central to an understanding of India's environmental status. Any impact, positive or negative, on the environment has a disproportionate impact (both positive and negative) on the livelihoods and lives of primary sector producers and workers—the poorest segments of the population.

There is a growth of environmentalism among citizens and within the state. The '*Chipko* movement'[18] that marks the birth of the environmental movement and the massive literature on the 'environmentalism of the poor' have been around for decades.[19] However, there is a consistent refusal from the privileged and the state, to acknowledge this environmentalism, the structural unemployment problem and the development processes that push the poor further into dependence on rapidly degrading environments. This response of environment-driven poverty and inequality as a consequence of the relentless demand for economic growth has received the least amount of attention from environmental studies and policies in India.[20]

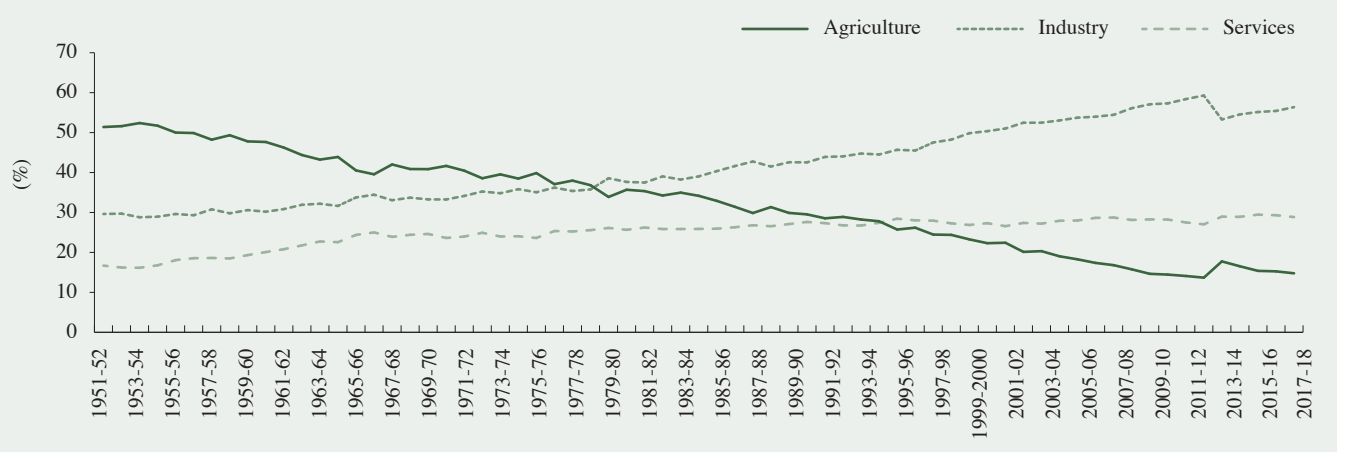
India has witnessed rapid economic growth over the past two decades; though limited gains in employment in the industrial and the service sectors have occurred, agriculture still employs more than half of the country's workforce. A marginal decrease in the share of the workforce dependent on these direct environmental stocks and flows from over 73 per cent of the total national workforce (1960-61) to 44.6 per cent (2016-17) can be considered a good development indicator if the workforce in agriculture was gaining a commensurate increase in share of the national income, and if the workforce that had left agriculture had moved on to more gainful and less arduous work. The fact that the share of agriculture in the nation's GDP has declined much more rapidly [from over 51.4 per cent in 1951-52 to 14.8 per cent in 2017-18 (see figure 3.1)] means that a massive share of the workforce in India lives on a steadily thinning share of the

Table 3.1 Workforce in India's population, 2012-2017

	2012-13	2013-14	2014-15	2015-16	2016-17
Population (millions)	1,232	1,250	1,268	1,285	1,302
Workforce (millions)	505	517	528	540	551
Workforce (per 1,000 population)	410	413	417	420	423

Source: GOI. *Employment and Unemployment Situation in India* (various issues).

Figure 3.1 Sector-wise contribution in GDP, 1951-2018



Source: GOI 2018c.

economic pie. This fact is acknowledged in a rather ironic fashion, by the nation's decisionmakers. They have elevated the environment as one of the key drivers of the agricultural sector by devoting exclusive attention to 'climate change' in the *Economic Survey 2017-18*.[21] The workforce that has moved on to other sectors in the economy does not seem to have gained much, as indicated by the limited increase in industrial employment and the marked increase in inequality.

The massive share of informal and unorganized work—be it in agriculture, manufacturing or services—is a major indicator of inequality itself. A major reason for the low value-addition and consequent persistence of poverty in the economy, and the alarming increase in inequality is the informalization of the workforce.

In the unorganized workforce (82.7 per cent of the total), the proportion of informal workers was 99.6 per cent in 2011-12, a share that remained constant over two and a half decades (see table 3.2). India's rural workforce in 2011-12 was estimated as 336.9 million workers, out of a total of 474.2 million workers in the country.[22] The unorganized and informal work makes rural workers vulnerable to a range of changes in the macroeconomic policy, market shifts, as well as persistent environmental degradation.[23]

The unorganized workforce is classified into four categories through occupation [farming, *beedi*-rolling (unprocessed tobacco wrapped in leaf), dairying, etc.,], nature of employment (bonded labour, migrant workers, etc.,), by extent of distress (head-load workers, scavengers, etc.,) and services provided (maids, fruit and vegetable vendors, etc.). Each of these categories reveals a direct dependence on the environment; whether as unorganized daily-wage manual work in urban construction sites or industry, or as *beedi*-rollers or dairy sub-sector, or as bonded labour in sugarcane fields or mines. Any impact on the environment, be it on forests or groundwater or urban pollution, leads to a direct impact on this informal workforce that constitutes 91.9 per cent of the nation's workforce. That many sectors like forestry depend on the informal segment (a total of 99.6 per cent) of the total unorganized workforce, marked by extremely high gender, caste and other spatial, social and political discrimination highlights the vulnerability of a massive section of India's population to any environmental change. This distress is manifested in the form of farmers' suicides, drinking water crisis and direct environmental conflicts.[24]

There is a clear segmentation of the informal economy by earnings, sex and poverty risk.[25] While earnings of actors in the informal economy are a fraction of the formal sector, internal differentiation of earnings and environmental dependence add to the vulnerability of both the poorest and most resource-dependent among the informal economy workers. The most vulnerable are the (i) unpaid family workers, (ii) industrial outworkers/houseworkers (predominantly women), (iii) informal wage workers (casual), and (iv) own account operators

Table 3.2 Informal unorganized workforce, 1999-2012

(millions, percentage share)

Sector	Informal	Formal	Total
1999-00			
Unorganized	341.3 (99.6)	1.4 (0.4)	342.6 (100)
Organized	20.5 (37.8)	33.7 (62.2)	54.1 (100)
Total	361.7 (91.2)	35.0 (8.8)	396.8 (100)
2004-05			
Unorganized	393.5 (99.6)	1.4 (0.4)	394.9 (100)
Organized	29.1 (46.6)	33.4 (53.4)	62.6 (100)
Total	422.6 (92.4)	34.9 (7.6)	457.5 (100)
2009-10			
Unorganized	385.1 (99.4)	2.26 (0.6)	387.3 (100)
Organized	42.1 (57.8)	30.7 (42.2)	72.9 (100)
Total	427.2 (92.8)	33.0 (7.2)	460.2 (100)
2011-12			
Unorganized	390.9 (99.6)	1.4 (0.4)	392.3 (100)
Organized	44.7 (54.6)	37.2 (45.4)	81.9 (100)
Total	435.7 (91.9)	38.6 (8.1)	474.2 (100)

Sources: GOI 2007, 2011b and 2014a.

(both men and women); they account for 390.9 million workers (table 3.2). The other two groups (i) informal wage workers (regular) and (ii) the employers, at the top rung of the hierarchy in the informal economy, are predominantly men and their direct dependence on the environment for their livelihoods is relatively low.

The significant share of the most vulnerable livelihoods directly dependent on the environment or natural resources is best reflected in the increasing inequality in the country. Globally, the richest one per cent of the population owns 48 per cent of global wealth (2014); but in India, the richest one per cent of the population owned 73 per cent of the country's wealth (in 2017).[26] This inequality and the regional concentration of poverty has been thriving for some time. It has been known for over two decades that the 'two Indias' were broadly the seven states: Bihar, Madhya Pradesh, Rajasthan, Odissa, Uttar Pradesh, Chhattisgarh and Jharkhand, which have a relatively lower per capita GDP than the national average, and the seven states namely Punjab, Haryana, Gujarat, Andhra Pradesh, Tamil Nadu, Karnataka and Kerala which enjoy a higher GDP per capita than the national average.[27] The seven poorer states are predominantly primary producers—predominantly agrarian—and are home to almost all the extractive industry in India, ranging from minor minerals and gemstones to the major ores and mineral deposits. The link of the lower wages of the informal workforce with failing or weaker environmental conditions escapes the attention of India's policymakers.

The per capita income of Delhi is 2.9 times more than the national average and 7.9 times more than that of the poorest state, Bihar

It is not surprising that this trend has not changed in over a decade. In 2014-15, Delhi had the highest net state domestic product (NSDP) per capita among 33 Indian states and Union Territories (UTs). NSDP per capita of Delhi was estimated at INR 249,004 in 2014-15 at current prices. Goa came at a close second with per capita income of around INR 242,745, followed by Chandigarh, Sikkim and Puducherry at third, fourth and fifth respectively. Bihar, Uttar Pradesh, Manipur, Assam and Madhya Pradesh are the five poorest states with Bihar and Uttar Pradesh having just INR 31,380 and INR 43,861 NSDP per capita respectively. At the national level, the per capita net national income was INR 86,454 for 2014-15. The per capita income of Delhi is 2.9 times more than the national average and 7.9 times more than that of the poorest state, Bihar.

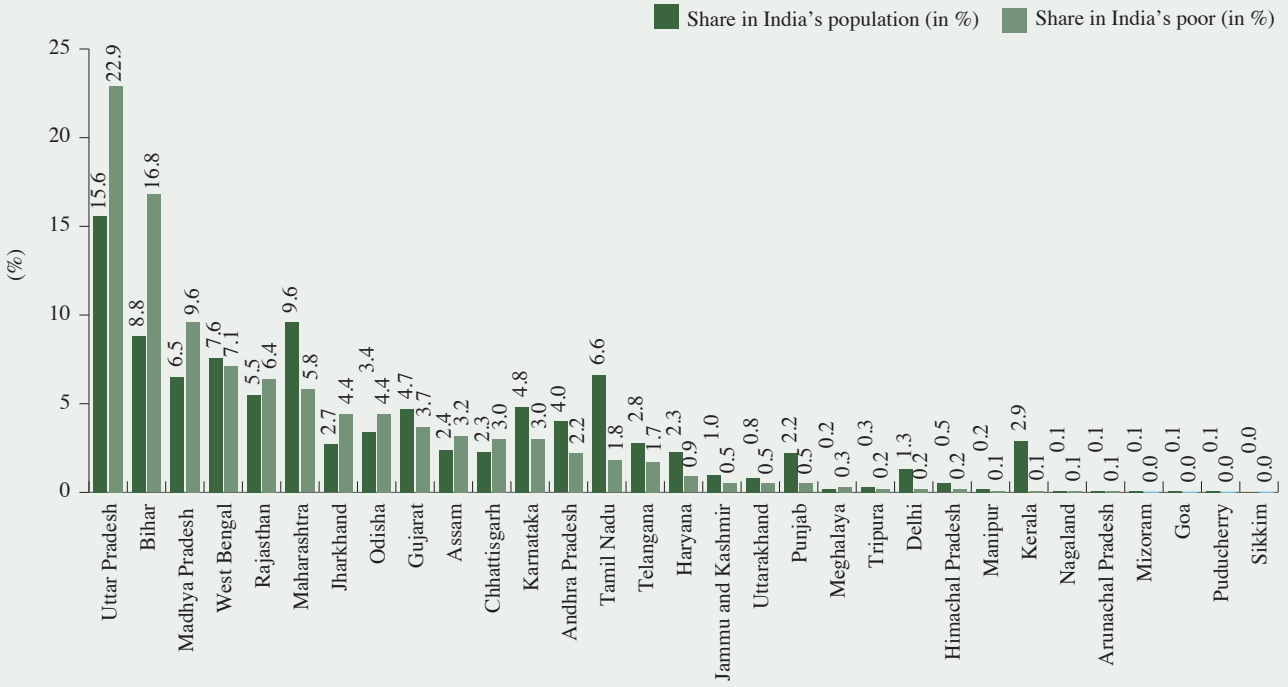
All five South Indian states have higher GDP per capita than the national average. The top ten states and UTs ranked by per capita income account for 21.8 per cent of the total population in the country.[28]

The state-wise distribution of the share in population and share of poor people for 2015-16 shows that Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh were states that stood out from a cluster of other states who had a lower share of both population and the poor (figure 3.2). These states (dubbed BIMARU in popular parlance) were also the ones with the highest share of primary producers and workers in their workforce, with livelihoods directly depending on natural resources.

Primary sector-based livelihoods and the rural poor as actors with limited control over resource use policy are simultaneously an environmental and developmental problem. The Green Revolution which did produce more food grain is now a source of concern, causing groundwater depletion in various pockets of major irrigated agriculture tracts, and water pollution and health hazards from fertilizer and pesticide use. The environmental costs are high within the agricultural sector and also within the industry with increasing energy use, chemical pollution, and imports of basic inputs for fertilizers and chemicals. See box 3.1.

In each sector of the economy, there are actors who extract and pollute with assured gains, and actors who bear

Figure 3.2 Poverty share high in states with more agricultural and natural resource-based work, 2015-16



Source: University of Oxford 2019.

Box 3.1 Industrial and service sector pollution: A glimpse

Industry

- 14,504 cases relating to illegal mining of coal and iron ore indicate the existence of unholy nexus between the mineral mafias and law enforcement agencies.
- Out of 88 industrial clusters studied by the Central Pollution Control Board, 43 were critically polluted and 32 severely polluted.
- Coal-based thermal power is the predominant source of electricity in India, falling under 17 categories of highly polluting industries and managing large scale air and water pollution and disposal fly ash from it is a major challenge.
- Increased import of second-hand lead-acid battery and other similar waste and scrap products, processing of e-waste, etc.
- Recycling activities like ship-breaking come with grave environmental consequences.
- Presence of largely unregulated and dispersed unorganised manufacturing sector and the formal-informal gap considerably constrains the ability of the regulators to enforce sustainable production methods.

Services

- Concerns relating to unregulated growth in tourism have evolved over the last decade.
- Efficient disposal of increasing biomedical waste, and heavy metal contamination and toxic outputs from the rapidly growing information technology industry, are emerging as major concerns.

Source: Mukherjee and Chakraborty 2015.

the loss or live with the negative environmental consequences of these economic activities. When we see the livelihoods of the poor, some actors who gain from extraction and pollution and the overall economy as sub-systems of the environment, we question the relationships between poverty and environmental degradation beyond the sectors of the economy. Recent work on climate change has shown that economic growth has to take fossil fuels and several other high greenhouse gases (GHGs) emission sectors into consideration; an idea of 'limits to growth' that has been around since the 1970s.[29] In this chapter, we look at the economic activities through the lens and context of the natural endowments, the environmental base that India has.

Status of the environment

Following the lead taken by the Centre for Science and Environment (CSE) with its publication of the *State of India's Environment* report (starting 1982), the Ministry of Environment, Forest and Climate Change started publishing a report on the *Status of Environment Report*. The first one, appearing in 1999 appeared to be a response to the report on the *State of India's Environment* published by CSE in 1982.

The annual cost of environmental degradation in India was estimated as US$ 80 billion, roughly six per cent of India's GDP

Many scholars have documented these changes, noting that the state of India's environment continues to deteriorate.[30] A World Health Organization (WHO) report in December 2014 notes that of the 20 most polluted cities in the world, 13 were in India, and the number of rivers polluted by sewage and increasingly by industrial effluents had increased from 121 to 275 in just five years.[31] There are increasing environmental conflicts in urban areas over pollution and disposal of solid waste.[32] Rural areas are also facing similar clashes over diversion of resources (land and water) for industrial development, and conversion of forest tracts for extraction of resources and infrastructure development.[33]

The persistence of degradation (land, air, water and biodiversity) is evident in the *National State of Environment Reports* of *1999, 2001* and *2009*.[34] The purpose of development as the major driver of environmental loss and degradation is also evident:

"Since Independence, a fifth of India's land has consistently been under forests. The population has increased more than three times since 1947, and from 1951-1980, a total of 42,380 square kilometres (sq km) of forestland was diverted, 62 per cent of it for agriculture."[35]

The impacts of this environmental loss and degradation on production systems, on health and the overall economy were also known by the turn of the century.

"Unstable use resulting in loss of vegetation from (deforestation, cutting beyond the silvicultural permissible limits, unsustainable fuel-wood and fodder extraction, shifting cultivation, encroachment into forest lands, forest fires and over-grazing) and inappropriate land management practices (extension of cultivation to lands of low potential or high natural hazards, non-adoption of adequate soil conservation measures, improper crop rotation, indiscriminate use of agro-chemicals such as fertilizers and pesticides, improper planning and management of irrigation systems and extraction of groundwater in excess of the recharge capacity) are the major reasons for changing intensity and different types of degradation. In addition to these, there are a few fundamental pressures like land shortage, short-term or insecure land tenancy, open-access resource, economic status and poverty of the agriculture-dependent people which are contributing significantly in the degradation of land."[36]

There is little doubt in the minds of the policymakers, about the impacts of these environmental degradation processes on human well-being and ecological health. Yet, many estimates of loss and impacts estimated as monetary costs have failed to convince the policymakers to reverse the trend of increasing environmental deterioration evident over the past decades.

More recently, the annual cost of environmental degradation in India was estimated as INR 3.75 trillion (US$ 80 billion), roughly six per cent of India's GDP in 2009.[37] Not surprisingly, nothing much has changed over a decade (1999-2009) and beyond.[38] Arguably, the reason is that (i) much of the direct negative livelihoods impact is on the poor—mainly rural agricultural and artisanal poor and forest dwellers, and urban slum dwellers—, (ii) much of the direct livelihoods gains are for the urban formal organized workforce—in the industrial and

the service sectors jobs—and (iii) the indirect gains to the health and pharmaceutical industry, construction industry, automobile industry and the service sector become value-added in these sectors, adding to GDP growth.

Land

As a ubiquitous resource and the base for all human activity, the land is the worst affected part of our biosphere; a recipient of water and air pollution and mute witness to the plunder of biodiversity. Land within India's national boundary amounts to 329 million hectares. The fact that land under the plough—as total sown area (gross sown area and net sown area), area not available for cultivation, and area under forest cover—has increased over the past three decades is not surprising. There have been massive investments made by the state and private capital to enable this agricultural, urban and industrial land use and conservation of forests. But the nature of increase of forested area and a massive decline in the area under pastures and grazing lands, under miscellaneous trees, groves and culturable wastelands are more than just puzzling. Further deterioration in the quality of land (soil degradation in arable land in particular) directly affects the lives and livelihoods of the poorest and largest segment of the population. In this sub-section, we explore these changes in forests and farmlands.

FORESTS: GAINS, LOSSES AND REVISIONS

Forest cover in India has been 21-22 per cent of the total land area over the past decade (see table 3.3). The average national level forest cover masks the extreme diversity in the nature and magnitude of forests distributed among the states in India. That the area under very dense and open forests has increased has directly to do with the conservation measures at the national level. But regionally, the picture is different. To understand how the dominant development demands bear upon forests and marginalized communities in the country, a state-wise picture of change in forest cover reveals massive deforestation in some states and afforestation in some.

Table 3.3 Forest cover in India, 2015-2017

	Area (sq km)		Percentage of geographic area	
	2015	2017	2015	2017
Very dense forest	85,904	98,158	2.6	3.0
Moderately dense forest	315,374	308,318	9.6	9.4
Open forest	300,395	301,797	9.1	9.2
Total forest cover*	701,673	708,273	21.4	21.5
Scrub	41,362	45,979	1.3	1.4
Non-forest	2,544,228	2,533,217	77.4	77.1
Total geographic area	3,287,263	3,287,469	100	100

Note: *: It includes 4,740 sq km area in 2015 and 4,921 sq km area in 2017 under mangroves.
Sources: GOI 2015b and 2017b.

In Kerala, the forest cover is inflated largely because the canopy cover pictured due to the massive tracts of plantation and commercial crops (coconut and rubber in particular) is included in forests. In all the states of the East—ranging from Odissa to all the North-eastern states—with forest cover way above the national average, the decline in forest area is because of mining and dam building. The poverty profile evident in figure 3.2, coincides with the area under hill districts and area under forests.

The alarming rate of deforestation in the North-eastern states is legitimized by the demand for more electricity for development, specifically more hydro-electric power. From 549 sq km of forests lost in 2011, the pace has steadily increased to 658 sq km of forest cover lost in 2016-17.[39] This rapid pace of deforestation in the North-eastern states is causing livelihoods losses as well as the massive displacement of people.

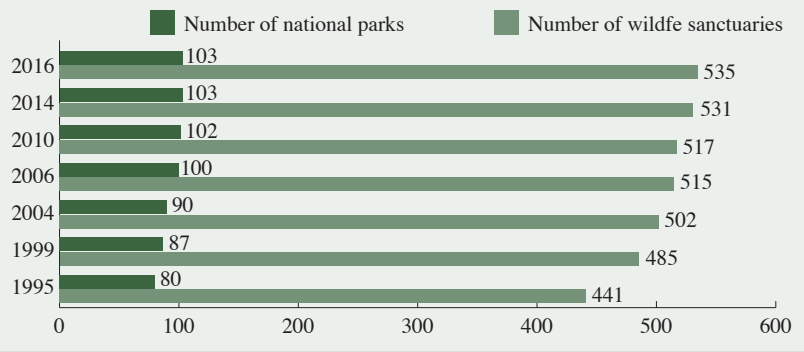
Among the greatest losses within forests and due to conversion to non-forest (infrastructure or agricultural) use is the loss of biodiversity. India today has expanded its list of threatened plants and

Table 3.4 Number of threatened species in India, 2015

	Number of known species in the world	Number of known species in India	Percentage of global species occurring in India	Number of threatened species in India
I. Flowering plants				
a. Gymnosperms	1,021	78	7.6	7
b. Angiosperms	268,600	18,259	6.8	1,700
II. Non-flowering plants				
a. Bryophytes	16,236	2,550	15.7	80
b. Pteridophytes	12,000	1,288	10.7	414
III. Others				
a. Virus and bacteria	11,813	1,120	9.5	…
b. Algae	40,000	7,331	18.3	…
c. Fungi	98,998	15,053	15.2	580
d. Lichens	17,000	2,479	14.6	…

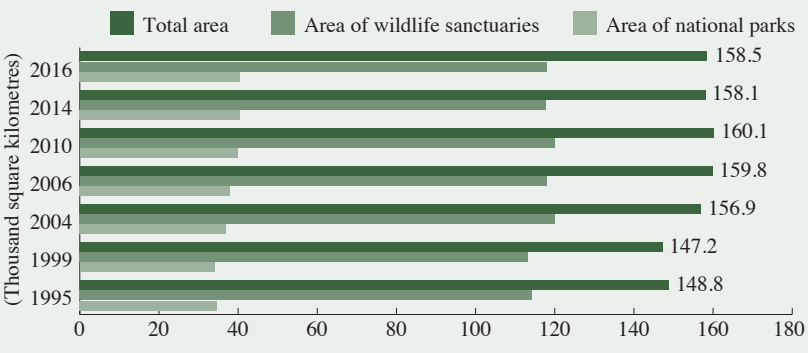
Source: GOI 2017a.

Figure 3.3 Number of national parks and wildlife sanctuaries in India



Source: GOI 2017a.

Figure 3.4 Area under national parks and wildlife sanctuaries in India



Source: GOI 2017a.

animals; some that are severely threatened to extinction soon and some that are exposed to various levels of threat but can, with a revision of existing policies and pro-active conservation measures, be rehabilitated in their normal habitats (see table 3.4).

In comparison with the rest of the world, we find that 3.7 per cent of the world's threatened species are in India. Of the vascular plant species in India, 7.7 per cent are threatened.[40] The fact that many of these threatened species are now protected in biosphere reserves—and areas where the species (flora and fauna) interactions are the highest—designated as national parks in India, has made a difference to conservation and protection measures. But these national parks, unlike the wildlife sanctuaries,[41] are areas where human interference is not allowed at all.

Over 23 national parks (figure 3.3) have come up over the past two decades. This reveals the state's efforts to conserve and protect threatened species of plants and animals, fulfilling its global responsibility of conserving unique habitats and maintaining environmentally non-negotiable areas (where no human activity is allowed). At the same time, it also reveals the steady narrowing of and increasing state regulation over the livelihoods of the tribal.[42] The state can effectively destroy forests for development, for urban and industrial consumption of goods and services; and has legitimized increasing deforestation, consequent loss of habitat and biodiversity.

The highly restricted boundaries of national parks [over 40,500 sq km in 2016 (see figures 3.3 and 3.4)] translate directly as limits to forest-based livelihoods options for tribal people and indigenous population groups that have inhabited the land and co-evolved with the flora and fauna in these lands. The recent escalation of tensions in Kaziranga National Park, with rangers using drones

and sophisticated surveillance techniques to shoot and kill suspected rhinoceros poachers, has led to several human rights activists and environmentalists pleading with the state and forest officials to understand the relationships between indigenous communities and forests.[43] This state action is despite the acknowledgement that communities can identify poachers much better than drones can!

There are 44 indigenous tribes in India.[44] India's forests yield livelihoods for millions of people. There are around 1.7 lakh villages in forests and the forest fringes, with over 350 million people depending on forest produce for their livelihoods. Though this estimate by the Ministry of Environment, Forest and Climate Change is considered an overestimate by many, there is no denying the fact that forest produce contributes to as much as 40-60 per cent of the total household income of over 350 million people.[45] Many livelihoods demands on forests, like grazing, collection of firewood and shifting cultivation, are said to degrade forests (box 3.2).

Many tracts in the North-eastern states of India, where shifting cultivation was practised, have lost similar traditional methods, access to forests and NTFP, and are facing a decline in nutritional quality.

Following the demands for conservation and the formation of joint forest management (JFM) committees, communities in the forests and forest fringe villages had gained from some control over the sustainable management of forests. India today has 0.1 million JFM committees, with 24.6 million members who collectively manage 23.0 million hectares of forest land. The collection of forest produce (mainly NTFP) and sale to a range of middlemen and other enterprises continues. Enterprises use these products in a wide range of products like locally brewed liquor and tendu leaf products to de-waxed lac for high-end cosmetics. This does not seem to provide a decent livelihood for millions of poor in these forest fringe villages; livelihoods that have co-evolved with these forests over centuries.

The recent eviction of tribal people and forest fringe villages by the government, and perversely using the Forest Rights Act and the Compensatory Afforestation Fund Management and Planning Authority (CAMPA) Bill, in the name of development and carbon sequestration, is an indicator of injustice built into India's environmental policy. There is a striking contrast between access to forests for strip mining or urban development, and for the livelihoods of the poorest tribal populations.[46] The latter are informed by their knowledge of the forests and its flora and fauna, none of which have been threatened to extinction by the tribal populations. India's forests are living proof of the gross injustice embodied in the policymaking mechanisms for development. The injustice continues, starting with the demands for justice from native forest dwellers and thousands of voiceless species under colonial rule, continues into the modern concerns about uni-

Box 3.2 Tribal livelihoods and forest health

In a study on trends in farming and livelihood activities among forest-dwelling *Adivasi* farmers (*Soligas*) in a tiger reserve from 2008 to 2015, it was found that traditional mixed-crop farming was being replaced by cash crops such as coffee, maize and cotton. While the declining supply of non-timber forest produce (NTFP) and the subsistence cash it provided were pushing tribal farmer's to these livelihoods shifts, the younger *Soligas* were themselves going through increasing aspirations and facing inadequate state support for mixed-crop farming. *Soligas* consistently maintained that increased wildlife depredation of food crops, reduction in supplies of wild foods, and the decline in NTFP was due to poor forest health. The transition to cash crops improved cash flows but exposed the *Soligas* to market risks. While food availability and access improved, the nutritional quality of diet declined.

Source: Mundoli *et al.* 2016.

versal rights.[47] The problem is not one of inequity either with the Indian Forests Act 1927 or the Forest Rights Act 2006; it is a question of injustice.

AGRICULTURE VERSUS THE ENVIRONMENT

In this sub-section, we present the relentless pressure of Indian agriculture on the environment. It highlights some crucial changes in the relationships between agricultural production, environmental quality and resource availability and human well-being. These are, as in the case of forests, changes that have affected the poor the most. But these are also changes that have now affected the entire nation—with the persistence of poverty and hunger and increasing malnutrition. Here again, it is the perpetuation of injustice in the name of development that becomes evident, as agriculture compounds the pressure on the environment and the poor, persistently.

India's child wasting rate of 20.8 per cent is the highest in the world

Settled agriculture has been proclaimed the biggest success and the biggest mistake made by humanity.[48] The anthropocentric history of settled agriculture is just beginning to acknowledge that it was wheat that domesticated man and not the other way round.[49]

Tribal India has legitimate reasons to corroborate that settled agriculture was a mistake. The steady conversion of forests to arable land, massive public capital formation in dams and irrigation structures leading to displacement and loss of livelihoods for tribal populations, legitimize this argument. But the Green Revolution (the late 1960s to early 1980s)[50] and the more recent attempts at the second Green Revolution continue to pressurize the poorest.[51] The list of those who have lost livelihoods and lives to Indian agriculture includes farmers in predominantly rain-fed farming tracts and the heartland of irrigated farming (in Punjab).[52]

Industrial agriculture started in India with the Ford Foundation's supported Intensive Area Development Programme (irrigation and chemicals) of the 1950s and the Green Revolution (with high yield variety seeds added to irrigation and chemicals) of the 1960s. It was legitimized by the 'Lewis Path', the Nobel Prize-winning theorization of labour productivity and capital mobilization for modernization of agriculture for further industrialization. But the theory did not play out as expected in India. However, the country is spiralling into a 'Lewis Trap' with agriculture still home to more than half of the workforce.[53] India, with abundant rural labour and little increase in productivity of land and labour since the first Green Revolution (ending early 1980s), is living through a Lewis Trap. Agricultural policies that are tuned to local agro-ecological regimes, local knowledge and labour using technologies are necessary, especially, in the highly diverse rain-fed farming tracts of the country.[54]

While the debates about the Green Revolution are still on, specifically asking if it was a 'blessing or a curse',[55] the fact that it did increase food grain productivity per unit of land and overall food grain production remains unquestioned.[56] The fact that there were some environmental and social costs to be paid, is also taken for granted.

"Even after 50 years of food security policy instruments based primarily on life-science led production knowledge (technologies and inputs) and increase in food production to mark the national food self-sufficiency level, these selective modern technological interventions co-exist with increasing hunger and malnutrition. Though production of food was the major policy instrument deployed, the average rate of growth of yield per year fell from 4.4 per cent (between 1980-1990) to 2.8 per cent (between 1991-1998) and further to 0.6 per cent (between 1999-2009)."[57]

India's child wasting rate of 20.8 per cent is the highest in the world, while only 9.6 per cent of children, aged

6-23 months, are fed a minimum acceptable diet.[58] The Global Hunger Index (GHI) 2019 ranks India at 102 in a total list of 117 countries, the lowest among South Asian countries.[59] That the GHI measures not just lack of food, but as a combination of factors that drive undernourishment, makes it an important indicator of well-being. There has been an increase in per capita food availability; net availability of cereals and pulses per capita per day (in grams) rising from 395 in 1951 to 510 in 2000 and declining to 438 in 2010 and rising marginally to 506 in 2017.[60] But there is an increase in undernourishment.

Despite much progressive legislation regulating the conversion of arable land to non-farm uses, the net sown area has declined (2.0 per cent) in India, while the gross cropped area has increased (6.6 per cent) over the period 1990-2015. Increasing pressure on the land under cultivation is evident in the increasing cropping intensity on the lesser net sown area. Ever since the end of the first Green Revolution in the late-1960s to the early-1980s,[61] and the post-liberalization (1991) opening of markets for input-intensive agriculture, there has been a 42.4 per cent increase in net irrigated area and a 52.6 per cent increase in gross irrigated area (1990-91 to 2014-15).[62] This increase in irrigation intensity (let us recall that over 68 per cent of Indian arable land is still under rain-fed farming), is accompanied by a steady increase in input use. Many of inputs and products of formal agricultural research reach farmers through agricultural development schemes or programmes. They are displacing labour and demanding more energy (fossil fuels) use in agriculture.[63] This adds to the problems of access to food due to limited purchasing power in households facing un- and under-employment. Those dependent on wage labour with the least purchasing power, are the worst affected.

Irrigation is the best risk proofing practice known to man since the dawn of agriculture. India's history of canal colonies and dams in the West, massive river valley corporations for irrigation and power in the East and the South, is well known. It is no surprise that over 90 per cent of public capital formation in agriculture in the latter half of the 20th century has been in irrigation; dams and canals. The main purpose was risk proofing crop production and energy generation. It goes without saying that this has led to increasing irrigation inequality, and is a contributor to the distress faced by farmers in the rain-fed districts of the country. The increasing risk, faced by the bottom 20 per cent (least irrigated) of India's districts with only 11 per cent assured irrigation in the entire year in the late 2000s, compared to the early 1960s when they had 29 per cent assured irrigation throughout the year (table 3.5), reflects a well thought out discrimination. The planned discrimination pushing farmers in rain-fed districts to suicide is evident in the faulty policy focus on beefing up the irrigation supply to the top 20 per cent of the districts [up from the 49 per cent of gross cropped area (GCA) in the early1960s to 90 per cent of GCA in the late 2000s].

The increasing irrigation intensity in 56 districts (up from 49 to 90 per cent of GCA in a matter of four decades) is driven by the logic of the 'supply syndrome' that marks the Green Revolution.[64] These districts also consume a significant share of the agricultural in-

Table 3.5 Irrigation inequality, 1962-2008

	Percentage (%) share in			Average
	Gross irrigated area (GIA)	Gross cropped area (GCA)	Value of production	GIA/GCA %
1962-1965				
Top 20% (56 districts)	54	21	29	49
Bottom 20% (56 districts)	2	21	15	29
2006-2008				
Top 20% (56 districts)	37	18	25	90
Bottom 20% (56 districts)	5	20	16	11

Source: Himanshu *et al.* 2014.

puts—chemicals and machines—including irrigation equipment.

The fact that irrigation brings with it the capacity of agriculture to suppress the natural features of ecosystems, is one of the prime reasons why irrigated-chemical intensive agriculture is now identified as a major driver of the disruption of planetary boundaries.[65] But in India, the state continues to aggressively push the chemical intensity of irrigated agriculture. There has been a steady (though slower) increase in agricultural production growth rates overall. But the increasing pressure of irrigation intensity and chemical fertilizers have led to a steady decline in the output per unit of input use—both water (irrigation inputs) and chemical fertilizers.[66]

The decline in productivity per unit of chemical fertilizers has been known in the agricultural sciences, since the late 1970s.[67] The state's answer to this problem has been the supply of more chemical fertilizers which reveals that the technology treadmill is characteristic of modern industrial agriculture (see table 3.6). There is awareness of increasing and wasteful use of fertilizers on croplands and the burden of fertilizer subsidies (amounting to 3-4 times the public investment in agriculture).[68] But the policy reforms like the 'nutrient-based subsidy' and pricing changes have not helped. The consumption of fertilizers, even with increased prices, has only increased (table 3.6). The only positive environmental impact (table 3.6) is in the reduction in the consumption of pesticides in agriculture. But the increasing fertilizer consumption (of urea and other nitrogenous fertilizers) has created other problems like nitrate leaching into drinking water sources, mindless extraction of scarce groundwater for irrigation, and increasing indebtedness of farmers who access loans for more irrigation equipment, fuels and fertilizers, and since the 1980s increasing incidence of cancer in the input-intensive agricultural tracts.[69]

Expressing concern about the Bringing Green Revolution to Eastern India (BGREI) scheme, farmers in Punjab had asked the Government of India to reconsider extending the environmental and social stress to the Eastern Indian states. *"Punjab is now called the cancer capital of India. The Green Revolution has given farmers only three things: debt, serious illnesses and polluted and scanty water sources,"* said Balwinder Singh, a farmer.[70] But the BGREI programme has been rolled out and has increased the yield of crops—especially, that of rice, wheat, potatoes and vegetables in the Eastern states. This success does have

Table 3.6 Use of agricultural inputs, 1991-2015

Programme	Unit	1991-92	2000-01	2010-11	2011-12	2012-13	2013-14	2014-15	Percentage change (1991-2015)
1. Seeds									
. Production of breeder seeds	Thousand quintals	34.9	42.7	118.9	123.4	110.2	82.3	86.2	147.0
. Production of foundation seeds	Lakh quintals	3.8	5.9	17.5	21.9	16.2	17.4	15.8	320.3
. Distribution of certified seeds	Lakh quintals	57.5	86.3	277.3	294.9	313.4	301.4	303.1	427.2
2. Consumption of chemical fertilizers									
. Nitrogenous (N)	Lakh tonnes	80.5	109.2	165.6	173.0	168.2	167.5	169.5	110.6
. Phosphatic (P)	Lakh tonnes	33.2	42.2	80.5	79.1	66.5	56.3	61.0	83.6
. Potassic (K)	Lakh tonnes	13.6	15.7	35.1	25.8	20.6	21.0	25.3	88.2
. Total (N+P+K)	Lakh tonnes	127.3	167.0	281.2	277.9	255.4	244.8	255.8	100.9
. Per hectare	Kilogrammes	69.8	89.6	142.5	142.3	130.8	125.4	128.1	84.3
3. Consumption of pesticides	Thousand tonnes	72.1	43.6	55.5	53.0	45.6	60.3	57.4	-20.5
4. Area under soil conservation	Lakh hectares	…	4.4	7.5	4.7	5.5	5.5	…	25.2

Source: GOI 2017a.

tremendous environmental and social costs. The expansion of groundwater irrigation in Eastern India has led to increasing evidence of heavy metals like arsenic in rice grain and not just in irrigation water and drinking water.[71]

Modern agriculture is one of the major contributors to land degradation.[72] This is, however, in the context of increasing conversion of arable land to urban developers and industry, and continuing industrial pollution. Different estimates place the area under severe to moderate land degradation as 40 to 57 per cent of the land area in India.

Increasing deficiencies in micro-nutrients and minerals in India's soils, largely in irrigated tracts, had been reported in the late 1990s.[73] But it is evident now that the micro-nutrient and mineral deficiencies are prevalent nationwide; in predominantly rain-fed agriculture tracts as well as in irrigated tracts. Many studies reveal how the replacement of draught animal power with mechanization and plant breeding that of selected varieties for grain yield only (instead of dual-purpose crops that served as fodder-cum-grain crops) in the post-Green Revolution period led to a sweeping change in crop-livestock systems which were the hallmark of Indian agriculture. Monocrops of the two staples, rice and wheat, and milch animals bred only for dairy development marked this shift. In the soils of the country, the missing micronutrients and minerals are caused by a sharp decline in farmyard manure or organic matter added to the soils.

It is now well established that India's geographical endowment will not allow expansion of irrigated agriculture beyond a maximum of 50 per cent of its arable land of 142 million hectares. Currently, less than 40 per cent of arable land is under assured irrigation, leaving 62 per cent of agriculture open to the variability and risks of rainfall. Highly diverse and spread predominantly over nine major states, rain-fed agriculture tracts also have the poorest and most undernourished populations in the country. It is not surprising, that the maximum number of farmer's suicides over the past two decades and the 150 districts listed as extremist affected regions by the government are also in the rain-fed farming tracts of the country.[74] Rain-fed farming in India, covering more than 60 per cent of the arable land, accounts for a significant share of agricultural production and receives less than seven per cent of all public investment made in agriculture.[75] The state can plan what it intends to and can supply for development through its centralized and consolidated research and administration of agriculture and/or subsidies for the same; it is understood that certain actors (industries and services) will gain from the supply of these critical inputs and services for agriculture.

Rain-fed farming in India, covering more than 60 per cent of the arable land, receives less than seven per cent of all public investment made in agriculture

What this means for nutrition and increasing inequality is most evident in the states that still receive more than 30 per cent of their NSDP from agriculture, and where agriculture still hosts more than half of the workforce. States with 60 per cent or more of their workforce engaged in agricultural work are the states that rank the lowest in per capita income and the highest in the poverty ranking. The economically richest states host the least share of the female workforce in the farm workforce, and the poorest 10 states host the maximum female workforce in total farm workforce. It is alarming to note that the poorest states also happen to be resource-rich states, and are home to significant tribal populations. Increasing inequality, degradation of soil and land quality, the feminisation of poverty and social disruption are most painfully a part of India's planned agricultural development.

A crucial environmental impact of land use, due to the rapid urbanization and land grabbing, has implications for the entire economy. Municipal solid waste generation has gone up from 5,355 tonnes per day (1999-2000) to 11,000 tonnes per day (2015-16) in Mumbai and from

400 tonnes per day (1999-2000) to 8,700 tonnes per day (2015-16) in Delhi—two of India's biggest metros. The pace of increase in waste generation in Madurai or Vishakhapatnam (two towns) has been much smaller, say from 370-450 tonnes per day in the former and 300-350 tonnes per day in the latter, during the same period.[76] With increasing awareness, many cities (like Kochi in Kerala and Chennai in Tamil Nadu) have been facing waste disposal problems with the 'Not in My Back Yard' (NIMBY) movement.[77] The peri-urban and rural hinterlands of these cities are refusing to become solid waste disposal grounds for these metros and cities. The fact that much of this solid waste (especially household and food waste) can be composted with minimal investment or transformed with some investment into manure and other material useful for agriculture, is part of the larger industrial ecology designs. There are material relationships between the problems of increasing chemical use in agriculture and the potential solution to the solid waste generation problem. While there are some on-going experiments, India's environmental policy is far too centralized and far removed from the decentralized community mobilization and information/databases required to plan and operationalize the closed-loop zero-waste models available in industrial ecology and ecological economics.[78] But the rising hills of waste dumps, costs of waste collection and environmental damage demand that India shift to more integrated thinking about land, and land use for production, consumption and waste dumping.

More than 60 per cent of irrigated agriculture area in the country depends on groundwater

Water

The governance of water in India is increasingly one of response to crisis and violence. This is the case whether it is an elderly man in Delhi, killed fighting to get a bucket of water from a tanker supplying water, or inter-state disputes between Karnataka and Tamil Nadu over their share of water from the Kaveri River. In this sub-section, we focus on water in its natural bio-physical formats and explore what the country does to these natural water bodies and systems, through its watershed development schemes, groundwater development schemes or dams. It is worth noting that the word 'development' concerning water, means more extraction of or the potential to extract more or impound more. Water development thus marks the conceptual foundation of injustice, as a concept that challenges the natural flows and harmony of water.[79]

Roughly 45 per cent of India's freshwater is supplied from surface water sources, the rest, about 55 per cent comes from groundwater sources. Almost every conceivable use of water is now met from these two sources. There is concern that per capita water availability per day is decreasing.

Groundwater dependence is most evident in drinking water supply and irrigation. About 85-90 per cent of rural India depends on groundwater for drinking water, and about 48-50 per cent of urban drinking water comes from groundwater.[80] More than 60 per cent of irrigated agriculture area in the country depends on groundwater. The differentiation between regions and people with access to land and irrigation water, and without access to these, is worsened by the state's public investment in and public subsidization of private investments in irrigation and the chemicals and machines that are central to irrigated agriculture (figure 3.5).[81]

DAMMED RIVERS, PEOPLE AND ECOSYSTEMS

For a land created and fed by rivers, India's development decisionmakers have little regard for rivers. The country has 14 major rivers (with catchments >20,000 sq km), 44 medium rivers (with catchments

Figure 3.5 Area irrigated more than once since 1950-51

Note: *: P means provisional values.

Source: GOI 2017a.

2,000-20,000 sq km) and many small rivers, rivulets and streams (with catchments of <2,000 sq km).[82] With a long history of watersheds, barrages and river cascades to catch and store water for the dry spells, Indian agriculture, industrialization, trade and urban development are inseparable from the history of these rivers. Today, cities like Guwahati built into the floodplains of the mighty Brahmaputra, subject to regular devastating floods, stand testimony to the thoughtlessness and the sheer might of the political and bureaucratic decisionmakers. We acknowledge that the legacy of colonial capitalism has been an important driver of decisionmaking about rivers.[83]

There are 69 major dams and over 3,000 smaller ones that have been constructed in India since Independence. At the time of Independence, there were only 30 dams that were more than 30 metres in height (many structures were 15-20 metres at most). This meant that the dam displaced populations were minimal and often became part of the operation of the canals and development projects taken up within the constructed catchment area. Post-independence dam building has led to a massive population of dam displaced people in India: numbers range from a conservative estimate of 25 million to a reasonable estimate of 50 million. Not surprising again, that over 40 per cent of the people displaced by dams are tribal.

Most of India's major, medium and minor rivers have been dammed numerous times, thereby affecting the freshwater flows downstream from them, in non-monsoon months. According to a guideline in 1992 from the Government of India's Central Water Commission, *"the minimum flow in the river must not be less than the average of 10 days of a minimum flow of the river in its natural state."* However, this recommendation does not have a force of law and it is not implemented. In the year 1999, the report by the National Commission for Integrated Water Resources Development made available estimates of freshwater quantity needed for managing ecological standards for all water bodies. It projected requirement of 5, 10 and 20 billion cubic metres respectively for the years 2010, 2025 and 2050 for our environmental needs. This report candidly accepts that no basis is provided for these projections; the government has not taken any further action on the issue. In 2001, the government constituted the Water Quality Assessment Authority, with a mandate 'to maintain minimum discharge for the sustenance of aquatic life forms in the riverine system' and in 2003, a working group

was formed to advise the authority on it. Surprisingly, the authorities have repeatedly failed to ensure the continuous flow of freshwater in perennial rivers. It is only under Right to Information Act that Ministry of Water Resources—the nodal agency for implementing the above mandate—has responded that dam-building projects are planned, implemented and operated by respective state governments. However, most of these projects in the state are funded through central grants and practically have failed to do anything to maintain even a minimal environmental flow (see box 3.3).[84]

In recent years, with the Intergovernmental Panel on Climate Change (IPCC) reports and global concerns about GHG emissions, dams have become popular in the climate change scenario as safer and more climate-friendly than coal-based power plants. Given the legitimization of irrigation and hydro-electric power, 16 new dams in the Brahmaputra Basin and 11 new dams in the Ganga Basin have been approved between 2006 and 2017.[85] The Brahmaputra with 16 new dams approved by the Government of India since 2006, will soon be ranked among the most dammed rivers in the country (table 3.7).

Dams have escalated environmental conflicts in the respective river basins. There are cases where the government has seen reason and agreed to demands put forward by the local communities and environmental activists to stop construction of hydel power projects. The underlying reasons for these demands range from submergence of forests to displacement of people, and curtailment of the natural flow of the rivers. These disruptions speak volumes about the lack of consistency in the politics of development and environmental regulations. The latter is usually ignored when it comes to profit reaping projects. These, however, are rare instances where the state retracted in favour of people and the environment rather than the project.

Two cases in box 3.4 reveal the difference in the attitude of the nation-state to people's resistance or protests against dam building.

Decisions made in this decade (2010-2020) will be crucial to India's environment and development; the proposed dams on the Brahmaputra and the Mahakali rivers (Indo-Nepal border) are among the ones that are facing strong opposition from the locals who fear to lose everything—their habitats, livelihoods

Box 3.3 Absolute disrespect for rivers: Role of dams

The Gujarat government in 1970 demanded water for the river downstream from the proposed Narmada Dam site before the constitution of Narmada Water Disputes Tribunal. The government argued on behalf of sustaining navigation, water need of people staying on the banks of the river, and for arresting salinity and fisheries. But no such allocations were made.

***Uri-I*:** A hydropower project of 48,000 megawatts was funded and built by Swedish Aid. The project was built on river Jhelum in Jammu and Kashmir. The project mandated six cusecs of water flow downstream, through the fish pass. The implementing organizations, National Hydro Power Corporation (NHPC) and State Industrial Development Authority, failed to ensure minimum monitoring of water flow thus resulting in drying up of 11 km stretch of the Jhelum River.

***Uri-II*:** A hydropower station on river Jhelum is a run-of-the-river scheme with a capacity of 240 megawatts. The station has a 52-metre high concrete gravity dam, with a headrace tunnel of 8.4-metre diameter and 4.3 km long. With an underground powerhouse having four units, the station has a capacity of 240 megawatts and is designed to generate 1,124 million units in a 90 per cent dependable year. The project impacted 521 families, of which 173 were displaced, and faced social unrest due to which there was a complete shutdown at the site for 105 days. Further, a series of events raised a question on the site selection, appraisal, assessments, management and performance of the developing agency (NHPC), the government and the contractor.

***Ganga a national river*:** The Ganga River has been declared a national river on November 4, 2008, and a Ganga River Basin Authority has been set up for planning, implementing and monitoring of the river. At that time, it was decided to replace the current fragmentary efforts which were taken in selected cities with an integrated approach. Since 1985, till date, successive governments have not been able to ensure holistic and people-friendly management of the river.

Sources: Iyer 2015 and SANDRP 2014.

Table 3.7 Dams built and proposed to be built, 2006-2017

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total
Andhra Pradesh	…	1	…	…	…	…	…	…	…	…	…	…	1
Arunachal Pradesh	…	…	…	…	1	4	2	2	…	5	2	…	16
Himachal Pradesh	…	2	1	2	1	4	2	3	…	…	…	…	15
Jammu and Kashmir	…	…	1	…	…	…	1	2	…	…	1	1	6
Kerala	…	1	…	…	…	…	…	…	…	…	…	…	1
Maharashtra	…	1	…	…	…	…	…	…	…	…	…	…	1
Manipur	…	…	1	…	…	…	…	1	…	…	…	…	2
Meghalaya	…	…	1	…	…	…	…	…	…	…	…	…	1
Odisha	…	1	…	…	…	…	…	…	…	…	…	…	1
Sikkim	1	4	1	1	1	1	…	1	1	1	…	…	12
Tamil Nadu	…	1	…	…	…	…	…	…	…	…	…	…	1
Uttarakhand	…	6	3	1	…	…	…	…	…	…	1	…	11
West Bengal	…	1	…	…	…	…	…	…	…	…	…	…	1
Total	1	18	8	4	3	9	5	9	1	6	4	1	69

Source: Lok Sabha 2016.

Box 3.4 Changing attitudes towards dams and people

Environmentalist Dr GD Agarwal sat on his third fast unto death on July 20, 2010: Since 2008, Dr Agarwal has been trying to persuade the Government of India and the government of Uttarakhand State that river (Bhagirathi) Ganga must be allowed to flow in its natural state and work on Pala-Maneri and Bhaironghati and proposed Loharinag-Pala hydel projects on river Bhagirathi be scrapped. After completion of 36 days of fast, the Government of India agreed to his demands.

Buddhist monk among two killed in Tawang, Arunachal Pradesh on May 2016: With a massive show of strength, including a march by the Indian Army, the Government of India reinforced its decision to build hydroelectric power projects in the state. The local population demanding the release of Lama Lobsang Gyatso, a Buddhist monk who led the protests to stop a new dam and hydroelectric power plant, was fired at by the police.

Sources: Chopra 2010 and Basu 2018.

and local forests—and all the wildlife, medicinal herbs and biodiversity in the areas to be submerged. As of December 2017, the decisions on some of these are pending, some waiting for further environmental impact assessment studies.

MARINE ECOSYSTEMS

The coastal ecosystem running to 8,129 km, and covering a massive area of 42,808 sq km, has a rich and diverse population of people, plants and animals located in 13 states and UTs in India. With a surge in development investments, urbanization and infrastructure in coastal cities and towns, the coastal ecosystem has become a dumping ground for waste—urban solid wastes and toxic industrial waste. It is estimated that more than 50 per cent of towns and 3,827 villages are located along the coastal regions in India; this includes over 64 per cent of the slum population in the country, living in poverty in the nine coastal states of the country.[86] The coastal states host 68 per cent of the factories in India; the easy access to ports and the ease in dumping waste into the ocean are important drivers of this choice location. Despite documentation of the resultant impacts little has changed. Impacts range from loss of coastal habitats leading to a reduction in marine fish catch, livelihoods loss for fishing villages, and lasting impacts on phytoplankton and copepod populations, affecting the food supply of fish and mammals who feed on fish.[87]

Increasing urbanization and industrialization along the coastal zone has

led to reduced dissolved oxygen and increased the microbial load in marine waters. Of the sewage generation (33,215 million litres per day) from the states and UTs along the coast, only 12,673 million litres per day is treated. The rest enters the sea every day.

With climate change impacting coral reefs, through temperature rise and bleaching due to lower levels of dissolved oxygen, there is greater attention to ocean systems and its relationships with the land. Coral reefs in India are generally in a good condition except in the Gulf of Kuchchh where the sediment load and industrial effluents have drastically changed living conditions for the corals.[88] Gujarat coast is perhaps one of the most polluted coastlines in India; 162 municipalities in the state release sewage to the ocean, with only five per cent treated. The situation is no better in the eight Municipal Corporations, where there are sewage treatment plants which can handle 95 per cent of the sewage generated, but the treatment is inadequate (of a total 4,119 million litres per day of sewage generated, treatment capacity has been built for 3,063 million litres per day, of which only 359 million litres per day is treated).[89]

About 48 per cent of open defecation releases human waste into hundreds of local water bodies, rivers and wetlands and ponds

Roughly 35 per cent of sewage sludge and water is treated because much of India's faecal matter reaches water bodies directly and not through installed sewerage systems. About 48 per cent of open defecation that happens (higher than any other country in the world), releases human waste into hundreds of local water bodies, rivers and wetlands and ponds. New development programmes like *Swachh Bharat* (clean and tidy India), target a country without open defecation.

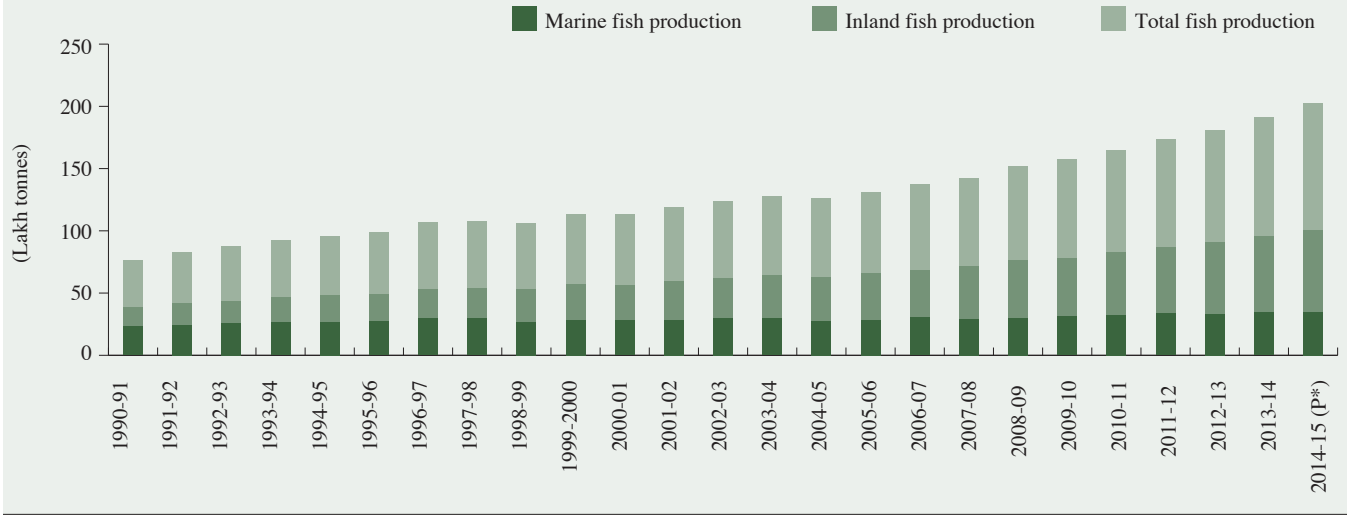
Water bodies serving as sewers are the undeclared assumption in India's urban planning. India's sacred rivers are nothing short of glorified sewers.[90] This is evident in the faecal contamination in the river water flowing through major cities in India. Delhi contributes the most, with the average annual faecal coliform content of 1.3 million most probable number (MPN) per 100 millilitres (ml) in the Yamuna flowing through the city.[91] The holy river the Ganges and other rivers in Uttar Pradesh stand second; though the maximum faecal coliform load in the Uttar Pradesh rivers is much lesser at 1.8 million MPN/100ml compared to the maximum load of 10.9 million MPN/100ml in Delhi's Yamuna.[92]

The lack of muscle or river flow power leads to several problems. The first being worsening of river water quality with all the effluents and human waste that flow into the river. The second is instant flooding during the rainy season because the river is full of sediments, which has raised the river bed. The poor, especially urban slums and farms along the river basin are the worst affected. But the long-term and long-distance problems are caused by dams built on India's major rivers. They have had a disastrous impact on the coastline, with a cut on natural environmental flows, leading to shrinking and ecological destruction of many a river delta. The consequence of limited sediments reaching the sea has been increasing saltwater incursion into coastal villages and freshwater sources.

"In South Asia, during the past century, there has been over 94 per cent reduction in Indus delta sediment, over 30 per cent reduction in Ganga-Brahmaputra delta sediment, 94 per cent reduction in Krishna's sediment, 95 per cent reduction in Narmada, 80 per cent reduction in Cauvery, 96 per cent reduction in Sabarmati (annual sediment loads), 74 per cent reduction in Mahanadi, 74 per cent reduction in Godavari, etc."[93]

Deltaic subsidence and effective sea level rise are now recognized as the downstream impact of dams.[94] Saltwater intrusion into coastal aquifers, increased rates of coastal erosion, increased exposure to storm surges, and the threat of food security, livelihood security and water security for millions and huge loss of biodiversity,[95] are threats that millions

Figure 3.6 Fish production in India: Inland fisheries dominate



Note: *: P means provisional values.
Source: GOI 2018b.

of people in coastal India are facing. This is because of upstream arresting of sediments in dams, which are to supply power and irrigation to the mainland.

Marine fisheries have been under threat from all the transgressions of marine ecosystems. The emergence of large scale fishing has resulted in higher incomes, but increased fishing has resulted in a decline in fish stocks and an increase in costs.[96] India's fisherfolk are among one of the poorest communities in the country. The decline of marine fisheries and the recent storm surges in the west coast of India bring some of these concerns into focus. India's marine fish catch has been stagnating at around 2.7 million tonnes (much like global marine fisheries has been yielding 82 million tonnes for the past 15 years).[97]

The stagnation in marine catch has been compensated by the rapid growth of inland fisheries which in recent years, account for about 65 per cent of India's fish catch (see figure 3.6). There is little doubt that this growth of inland fisheries has been a big income booster for millions of small farmers and has increased the diversity of crop-livestock-fisheries systems in the country. Some state governments in Eastern India and others like Haryana and Madhya Pradesh have taken a lead in promoting inland fisheries.

One conservation measure initiated by the state that has brought gains to the poor is the build-up of vast stretches of mangroves that had been destroyed due to coastal industrial and urban expansion. That mangrove conservation has received state patronage, and increasing participation of the local population is evident from the figures—a 194 per cent increase in a little over two decades (table 3.8). Yet, some of the major destructions like that caused by the Mundra

Table 3.8 State-wise mangrove cover assessment in India, 1987-2015

	Mangrove cover in sq km					Percentage change (1997-2015)
	1987	1997	2001	2011	2015	
Andhra Pradesh	495	383	333	352	1,057	176
Goa	0	5	5	22	61	…
Gujarat	427	901	911	1,058	3,207	256
Karnataka	0	3	2	3	9	200
Maharashtra	140	124	118	186	558	350
Odisha	199	211	219	222	656	211
Tamil Nadu	23	21	23	39	117	457
West Bengal	2,076	2,123	2,081	2,155	6,404	202
Andaman and Nicobar	686	966	789	617	1,836	90
Puducherry	0	0	1	1	3	…
Kerala	0	0	0	6	17	…
Daman and Diu	0	0	0	2	4	…
Total	4,046	4,737	4,482	4,663	13,929	194

Source: GOI 2017a.

port stand out as examples of faulty Environmental Impact Assessments (EIAs) and limited policy learning about the landscapes and ecosystem services. The Gujarat High Court, following petitions by the local communities, has ordered the *Adani* Group (Mundra port owners) to replant over 200 hectares of mangroves. It is a positive development. The proposed 14 Coastal Economic Zones (called the Sagarmala Programme) aimed at promoting the development of port-proximate industrial clusters, encourage port-led development, and reduce costs and increase the global competitiveness of Indian manufacturing is yet to go through EIA. But there is little doubt that the EIA will be granted—irrespective of the damage to mangroves, increase in industrial effluents, pollution loads and sewage in the sea.[98]

Roughly, 80 per cent of India's drinking water comes from groundwater sources

Given a rough estimate that coastal and marine ecosystems may provide two-thirds of the global ecosystem services, India with such a vast coastline should have more effective regulations and coastal zone management.[99] Several initiatives like eco-labelling of services from marine ecosystems, regeneration of mangroves, new sustainable livelihoods options for coastal communities and backwaters-marine system restoration are being planned and supported by the Government of India.

WATER PROBLEMS

A precarious and excessive dependence on groundwater marks India's development story. Over 82 per cent of irrigated agriculture uses groundwater, accounting for over 70 per cent of India's groundwater.[100]

A classification of India's districts using data from the Central Groundwater Board into high to low groundwater dependence of irrigation, reveals a rather alarming picture.

"Of the total 540 districts, 280 (52 per cent) are in the high dependence category while 260 (48 per cent) are in the low dependence category….163 districts are in the unsafe category in terms of groundwater development, of which 143 are also districts with high groundwater dependence."[101]

The stage of groundwater development[102] in some states in India reveals how precarious the situation is. Among the Green Revolution states (launched in regions with assured irrigation, in the erstwhile canal colonies), Punjab tops the stage of groundwater development at 149 per cent and Haryana comes a close second at 135 per cent.[103] Among the states that depend on water supplied from other states, it is an urban development in Delhi (at 127 per cent) and Rajasthan (at 140 per cent) that pushes the stage of groundwater development to dangerous levels.

Urban drinking water in over 56 per cent of Class I and Class II cities in India depend on groundwater, either fully or partially.[104] Roughly, 80 per cent of India's drinking water comes from groundwater sources.[105] This withdrawal from urban and peri-urban aquifers is now causing alarm even within the government. The *Atal Bhujal Yojana*, the first scheme of its kind focusing exclusively on groundwater and not the use or supply of water, is a much-needed programme launched by the Government of India in 2014.

While agricultural and urban domestic consumption data are available and are reasonably accurate, there is little information available on industrial water use in India. Among the few sources, there is little stated about the quality of water use and quality of water discharge.[106] While the projected demand for domestic and industrial water is 31.6 billion cubic metres in 2025, the projected demand for irrigation is 162.2 billion cubic metres.[107] Agriculture and food security stand accused of increasing groundwater development, though there are several alternatives to intensive irrigation-chemical based agriculture. These alternatives range from farm level soil moisture management and sharing

of scarce groundwater for critical irrigation to permaculture.[108] But they also demand a re-conceptualization of agricultural development, mainly shifting out of rice-wheat systems and bringing back the diversity of multiple cropping and crop-livestock systems that were specific to each region.[109] Groundwater development is a major problem because groundwater is central to a misplaced vision of agricultural development.

The other major water problem is pollution caused by the discharge of wastewater by industry. But in the absence of effective regulations, about 70 per cent of the wastewater generated by industries is discharged untreated. Further, it is estimated that each litre of discharged wastewater additionally pollutes 5-8 litres of water. This raises the share of water withdrawn for industrial water use to 35-50 per cent of the total water used in the country and not 7-8 per cent that is considered as industrial water use.[110] Estimates of water consumption and wastewater generated by different industries in India, place thermal power as the leading user and polluter.[111] A survey conducted by an industrial association, however, shows that over 80 per cent of industrial wastewater is treated.[112]

Despite documentation of widespread damage of ecosystems around industrial areas, there is little availability of statistics about organic and/or inorganic pollutants and their presence in food chains.[113] Similarly, there is little data and hardly any information of compliance around levels of stored hazardous waste, mine spoils, etc., in industrial and mine runoff.[114] India's industrial sector is growing rapidly. Industries such as the pharmaceutical industry are also a high polluter but are completely ignored in policymaking—both industrial policy and environmental policy. The latest reports of the pharmaceutical pollution crisis have found 'excessively high' levels of antibiotic and antifungal drug residue in water sources as well as high levels of bacteria and fungi resistant to those drugs in and around a major drug production hub in Patancheru area of Hyderabad, Telangana.[115]

The pollution by industrial effluents, sewage and domestic wastewater contaminate hundreds of wetlands and lakes in India.[116] All these wetlands are major sources of livelihoods for workers in the informal unorganized workforce in the country—whether collector of foods, flowers, fish, or as any service. Agricultural pollution, with fertilizers leading to eutrophication, pesticides in the food chain, and damaging nutrition balance in the oceans, has received little attention either academically or politically. India is a global leader in diarrhoeal deaths, a direct impact of polluted drinking water—with 0.1 million children aged 0-5 years succumbing to the disease in 2015.[117] That over 80 per cent of these children are from the poorest economic rung is a painful reminder of who is the worst affected by water pollution.

India is a global leader in diarrhoeal deaths, a direct impact of polluted drinking water

The fact that untreated sewage is a major pollutant of water—inland and oceanic—is now taken for granted in India's decisionmaking system. That it is the direct cause of the maximum number of deaths, especially among the poorest living in unclean surroundings, does cause some consternation. Much of this problem, of safe and decentralized treatment and disposal of faecal sludge, is resolvable if the right policies and infrastructure are in place. Industrial growth, especially of the pharmaceutical industry is considered a success of the Indian economy, and since the 1991 liberalization and economic reforms, is considered essential for double-digit growth rates of GDP. Morbidity and health care expenses by the population affected by polluted waters do add value to the economy; four of every five Indian rupees expended on health care by average India, goes to private health care, including increasing growth of the pharmaceutical markets. The poorest in rural and urban India lose years of income due to one episode of serious morbidity.[118] Could it be that the

rising health care costs that add value, and enable the growth of GDP from the health and pharmaceutical sectors, is appreciated by the state?

In a development decisionmaking regime where industrialization is held as the solution to employment, income generation and rapid economic growth, the decisionmakers are keen to provide all resources, water in particular, for industrialization and urbanization. Pollution of water is not even perceived as a risk for industrial development. Regulatory policy for allocation of water to industrial uses (15 per cent) and lobbying by environmental groups and communities (five per cent) are major risks perceived by the industry.[119] It is not surprising that the industry continues to pollute the water resource.

The pace at which water pollution from industrial activity is increasing is alarming.[120] Surprisingly, the industry does not perceive water pollution due to industrial effluents as a risk.[121] Availability of assured quantities and quality of resource ought to be and are the simple management issues that industry should appreciate and strategically plan for. But the need for such strategizing and planning is superfluous in India because water is made available by the state for industrial use at any cost. The environmental illiteracy of Indian industry,[122] seems to result from overall business illiteracy and environmental illiteracy of industry and the state.

Water accounts for 66 out of the 270 cases of environmental conflicts recorded in India.[123] These are mainly water 'development' projects for industrial use and urban consumption, diverting water from rural and agricultural use, dam construction and diversion of rivers. The fact that many alternatives are available to check and correct the prevalent decisionmaking about water pollution, emerges as the biggest opportunity that India has.

Several problem statements and solutions are available for the policymakers to make decisions about water in its multiple dimensions of nature, society and the economy.[124] The major problem in decisionmaking about water, which is life, is that it is treated as a commodity like any other, and values, access, use and even costs and payments for pollution estimated with assumptions about the scarcity of the resource. The fact that freshwater is not scarce, but is limited, and belongs to all living (human and non-human), is a much-needed reconceptualization in India's environmental policy.

Air

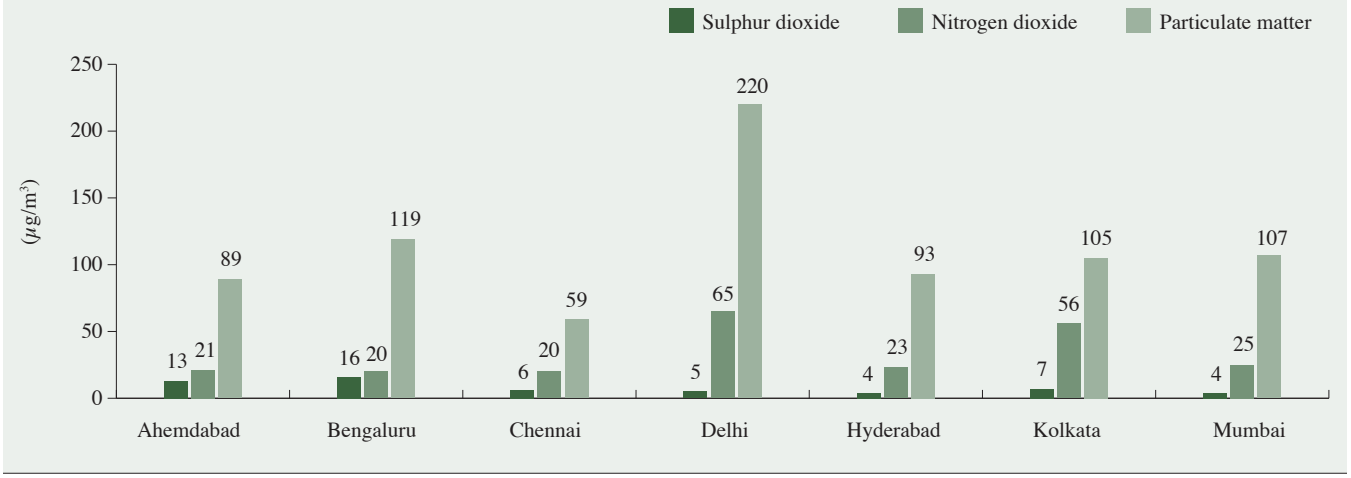
Pictures capturing air pollution through poor visibility of a major monument and people wearing masks appear in all the national dailies around November-December every year

Pictures capturing air pollution through poor visibility of a major monument[125] and people wearing masks appear in all the national dailies around November-December every year. This annual ritual also comes with headlines about crop residue burning in Punjab-Haryana and Western Uttar Pradesh, some accusing farmers, some blaming the state for not incentivising farmers to stop residue burning, some bringing technological fixes to remove and even use crop residue in the field. Ambient air quality in Delhi reported in November to December 2017 topped with particulate matter ($PM_{2.5}$) and PM_{10}, reached 999 micrograms per cubic metre.[126] The annual average ranges between 180 and 350, several times more than the safe limits estimated by the WHO. There is increasing air pollution-induced morbidity in the city.[127]

Vehicular traffic is one of the major drivers of air pollution in Delhi. In all the cities in India, road traffic, wood-burning, crop residue burning, diesel generators, construction dust and garbage burning are major drivers of air pollution, besides thermal power plants. Among all the major cities in India, Delhi does stand out in the annual average concentration (in micrograms per cubic metre) of major pollutants (figure 3.7).

Coal-fired thermal power plants are the biggest contributors to air pollu-

Figure 3.7 Ambient air quality in major cities, 2015



Source: GOI 2017a.

tion, emitting PM, sulfur dioxide (SO_2) and nitrogen dioxide (NO_2). A recent study estimates 32 per cent increase in SO_2 levels and 34 per cent increase in $PM_{2.5}$ levels between 2012-2017, contributing to the death of 115,000 Indians and an economic loss of US$ 4.6 billion (INR 29,500 crore).[128] The $PM_{2.5}$ and PM_{10} levels are way above the permissible safe limits in all the cities in India. The Central Pollution Control Board and the respective State Pollution Control Boards have installed air quality monitoring stations which offer little solace.

Among the industrial sources of GHG emissions, the energy sector (with fuel combustion activities in various sectors of the economy and fugitive emissions from fuels) contributes the most to GHG emissions. Energy combustion and fugitive emissions from fuels together account for over 70 per cent of the total carbon dioxide (CO_2) equivalents (in gigagrams) without accounting for the sinks offered by land-use changes and forestry.[129] With the sinks provided by land use, land-use changes and forestry, the share of energy accounts for 80 per cent of the national GHG emissions (CO_2 equivalents). Agriculture comes second in contributions to GHG emissions, with industrial processes and material use coming third.[130] Land use, land-use change and forestry remain major sinks, sequestering carbon and part of other GHGs like methane.

The rich are not spared the chronic respiratory diseases which are alarmingly high in India. With just 18 per cent of the global population, India has a disproportionate burden of 32 per cent of the global disability-adjusted life years (DALYs) lost due to chronic respiratory diseases.[131] Recent estimates put 1.24 million deaths (12.5 per cent of the total deaths) in 2017 in India, as attributable to air pollution.[132] While the DALYs due to ambient PM was highest in the North Indian states of Uttar Pradesh, Haryana, Delhi, Punjab and Rajasthan, household air pollution mainly from solid fuels, was the highest in states with low socio-demographic index—Chhattisgarh, Rajasthan, Madhya Pradesh and Assam.[133] The fact that these are states with a higher share of rural poor in the total population is painfully obvious.

While the air pollution in the North Indian states is pollution of affluence and industrial production, poverty and lack of development infrastructure are major drivers in the low socio-demographic index states. Some selected solutions like the shift from individual automobiles to more public transport (especially Bus Rapid Transport corridors and Metro Rail) have been recommended. But the automobile industry is

one of India's fastest-growing industries, contributing to economic growth, like the pharmaceutical industry. The other major contributor of PM pollutants in November every year is agriculture. With farmers burning rice stubble left in the field after harvest, November is the most polluted month in Delhi and the entire National Capital Region. The fact that this is also a consequence of agricultural growth, led by the successful Green Revolution states like Punjab and Haryana, makes it difficult to blame agriculture as the driver of pollution (see box 3.5).

There are, however, two major advantages associated with air pollution. It (i) brings out the reality of common-pool resources, and (ii) affects the urban middle-class and rich directly like it hurts the urban and rural poor. In other words, the transfer of pollution load to the poor population groups and remote regions does not seem to work with air pollution the way it does with extraction, deforestation, submergence and land and water pollution. Most importantly, though still not explicit to the average urban middle-class consumer, air pollution worsens with increasing social metabolism and highlights how land use and land-use change, forests and water pollution are closely linked with the quality of the air we breathe.

Few economists and planners are even aware that air, or the atmosphere and the winds, keep the forests alive. When urbanization, dams and mining destroy forests, they also distort and eventually destroy wind flows, bird migration paths and seed dispersal routes of trees. The centrality estimates of the forest patches in the Himalayas, especially between the Gangotri area and part of the Yamunotri watersheds, show that this area is a crucial 'centre of dispersal of species between the Kumaon region and the Himachal region'.[134] A robust movement of energy, information and materials across the ecological network is a prerequisite for the health, sustainability and resilience of ecosystem functions.[135] But this is not a concern in decisions made about environmental sustainability. Air is much more than a sum of gases: because of climate change our policymakers today are aware of that. What will it take for them to learn that air keeps land, water, biodiversity and our economic activities

Box 3.5 Agricultural growth, land, water and air pollution

India's irrigated agricultural production, to achieve food security, has been celebrated and critiqued. The semi-arid states of Punjab and Haryana (450-600 mm annual rainfall), with assured canal irrigation and low carbon soils, are the major rice and wheat producers (the two Green Revolution crops). These states are also home to extreme groundwater extraction, maximum irrigation induced salinity and alkalinity (clubbed together as sodic soils) and have various soil and water problems ranging from fluoride and selenium contamination to high levels of nitrates and pesticide residue in water.

"Chronologically, when irrigation and chemical-intensive production systems took off in these tracts in the 1960s, the build-up of alkalinity and salinity demanded the use of several technologies. Among them, gypsum application to leach out the harmful salts from the crop-root zone was found effective. This, in turn, demanded a crop that would tolerate the standing water requirement—an imperative if gypsum had to work to leach out the salts, and this technological demand, as well as price support for paddy—led Punjab and Haryana, arid/semi-arid states, to rice production since the mid-1970s. Following wheat, the Green Revolution technologies were applied most effectively in rice, bringing the rice-wheat production system (irrigated, chemical-intensive and state-subsidized) to stay in Punjab and Haryana."

Accompanying this shift in cropping pattern in the early 1970s, from 16-20 crops in the *Kharif* and *Rabi* seasons, to mono-crops of rice (*Kharif*) and wheat (*Rabi*), were the non-lodging short sturdy high yielding varieties bred for higher grain bearing capacity. As plant breeding selectively bred higher-yielding sturdier short varieties of rice, the level of lignin and silica content in the straw increased. With increased mechanization and the combine harvester leaving over a foot of this sturdy stubble, farmers found burning it to be the best solution. The stubble had become inedible for cattle and needed much more time to decompose if incorporated into the soil; time that these double and triple cropped lands could ill afford. Agricultural growth rates demanded this planned and scientifically guided ecological degradation and social disruption.

Sources: Raina and Sangar 2002 and Raina 2014.

going?

As we summarize this section, the biophysical networks and connectivity between land, water and air, and all the biological diversity sustained by these components demand critical attention. Agriculture and food when viewed as essentially located in and a key part of the environment, present a different worldview. Here, the extraction and use of resources for agriculture have a bearing on the quantity, quality and sustainability of production, availability and access to food, and nutrition. Agriculture *in* the environment is a worldview that is not popular among India's agricultural scientists and bureaucrats and is least acknowledged by politicians[136]. The return to power every five years for India's politicians depends crucially on the sops offered to farmers and rural India in general as free electricity, subsidies on fertilizer, irrigation, pesticides, machines and other inputs, loan waivers, and critical hikes in minimum support price for a few select crops.[137] The fact that this game of loan waivers, subsidies and free electricity, is used by all political parties irrespective of their ideology, is problematic. It shows how political sensibilities in India are impervious to the multiple mutual causalities involved in the relationships between environmental degradation, declining agricultural productivity and declining nutritional quality.

What is evident in the evolution of India's tryst with the destiny of the rivers that traverse the country is an increasing intent to dam and control their flows, irrespective of the immense cost (economic, social and environmental) that this control entails. Though the development argument has shifted more to dams for electricity, irrigation and the Green Revolution continue to dominate the public discourse, despite the evidence of declining yield response to every unit of irrigation water supplied to food grain production. With interlinking rivers becoming a major political commitment,[138] it is unlikely that decades of warning from environmentalists and social movements will even receive a decent hearing.[139] Freedom from colonial rule did not translate to intellectual freedom, it was tied to a larger transnational capitalist agenda of development for most newly independent countries of the mid-20th century.[140] There are several questions: are increasing inequality and worsening environmental situation a price to be paid for development? Or is it a capture of development by a few, with the assurance that other citizens in the country will pay the price? These are decisions that are not merely questions of equity but of justice.

Many alternatives in India ensure sustainable development; albeit in niche social and ecological systems. For them, measuring biodiversity as species loss or air quality as parts per million (ppm) of pollution load is infantile; mere numbers that say nothing about these direct and indirect drivers and the relentless pressure we place on the environment.

The biophysical networks and connectivity between land, water and air, and all the biological diversity sustained by these components demand critical attention

Alternatives in and by communities

The environment, with its flow of energy, information and materials, is considered a resource and a sink when the 'environment versus development' decisions are made. In India, as elsewhere in other nation-states, the environment is subsumed as a component of the economy. The policymakers are blind to the ecosystem functions that keep the essential ecosystem services that human beings and their economies need. But there are several communities and civil society-led alternatives that seem to be aware of these flows of energy and information within the environment and work with different frameworks. These are frameworks where the environment or the bio-geophysical reality is the base, within which all the social and economic activities are located and exchanges decided.

Community participation in government schemes and programmes

We begin with a brief look at how the prevalent environmental programmes and development programmes of the state work with communities.

The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) and the employment programmes implemented through the MGNREGS (Scheme) reveal how environmental gains do go hand in hand with livelihoods and developmental gains. Through increased availability of water for irrigation and sustainability of water bodies, soil fertility and quality through improvements in soil organic matter and reduction in soil erosion, MGNREGA has contributed immensely to livelihoods and the environment, in four states of the Indian union.[141] The MGNREGS works are almost always land and water-based, and improvement in groundwater table is reported as a major environmental and livelihoods gain. However, it is worrisome that the irrigated area has expanded in most of these districts studied.[142] This is because India has ample evidence of stress and unsustainability, from the environmental indicators and livelihoods indicators in its Green Revolution (irrigated) states.

There is increasing evidence of environmental gains and a corresponding reduction in the vulnerability of livelihoods due to local participation and democratic voice in MGNREGA

Community participation is perhaps limited in a scheme conceived and implemented by the government. But what the MGNREGS has achieved is radical in challenging the conventional delivery of rural employment, a sub-set of benefits supplied by the developmental state. It was following the murder of a young social activist (Vikas Sahyog Kendra) in Palamau, Jharkhand in 2008, just before a major social audit of the MGNREGA was to take place; community participation became evident as a challenge to the contractors and other intermediaries involved in the state's development schemes.

"Ever since Independence, rural development has largely been the monopoly of local contractors, who have emerged as major agents of exploitation of the rural poor, especially women. Almost every aspect of these programmes, including the schedule of rates that are used to measure and value work done, has been tailor-made for local contractors. These people invariably tend to be local power brokers. They implement programmes in a top-down manner, run roughshod over basic human rights, pay workers a pittance and use labour-displacing machinery."[143]

The fact that there is a class/group that works with the state and constitutes the state in the field that works against environmental and developmental gains is obvious. Much of what we see as informal and unorganized work, is necessary for this class of domestic businesses and local contractors to gain from the rural development programme investments made by the state.

More candid reporting of the norms or ways of working of the MGNREGA has led to awareness creation about their right to work. With this, there was an increase in the capacities of local populations to demand the kind of employment they need—*Kaam Mango Abhiyan* (Work Demand Campaign).[144] There is increasing evidence of environmental gains and a corresponding reduction in the vulnerability of livelihoods due to local participation and democratic voice in MGNREGA, though in selected states like Karnataka.[145] But overall, the MGNREGA has built durable assets[146] and given local populations a say in the kind of employment they need. People's demand for transparency and accountability of work and pay and indecent treatment of workers at job sites has shaken up the prevalent actors and their agency in delivering development schemes. The MGNREGA seems to suffer from the same problems that affect top-down state-designed programmes like the JFM which was designed for the building of spaces where stakeholders could protect, regenerate and develop de-

graded forests and their livelihoods. But the rural populations that have realized their social and political voice in JFM or MGNREGA have been able to articulate their demands for better environmental services, natural resource management and more equitable distribution of gains within the community.[147] Several civil society organizations (CSOs) led government programmes have changed and threatened the programme-parasitic livelihoods of thousands of middle-class contractors and domestic businesses.

Let us recall here, how public capital formation in agriculture changed during the Green Revolution (the late-1960s till 1980-1983). The public subsidization of private investment in agriculture also came with specifically designed schemes,[148] whether environment or development schemes. These state schemes had specifications of where and what type of interventions would be taken up, who should implement or manage the intervention, who should be the beneficiaries of the subsidy or sops disbursed, as well as the processes of actual disbursements of entitlements.[149] This class goes beyond the vested interests of the state or specific political ideologies; a cause for major concern. Gains for these businesses and actors within the state, losses for the environment and for development opportunities for the poor, are common to Singur and Nandigram where lush rice paddies were to be converted to industrial land by the (then communist) state, or in the Western *Ghats* where biodiversity hotspots that were to be left untouched by development programmes were re-assessed by a new set of experts to allow mining in all except a few (about 30 per cent) patches of forests.

What is more disconcerting is that the Government of India, is yet to acknowledge and question this class, domestic businesses, local contractors and large and middle peasantry, that feels threatened by the participation of the poor in environmental and development solutions. Any government programme, for environmental or forest or wildlife conservation where this class stands to gain significantly with the supply of artefacts and inputs, seems to be implemented despite technical and socio-economic and ecological misconceptions and negative consequences. The 'supply syndrome' of the state applies not just for agricultural development,[150] it has become the hallmark of several schemes, for example, the *Swachh Bharat Abhiyaan* (the state programme for sanitation, cleanliness and an 'open defecation free' India). Some states like Himachal Pradesh transformed its sanitation programme by formulating and implementing 100 per cent open defecation free villages, using the community-led total sanitation approach, without this state subsidy.[151] This success in people's participation in sanitation, with environmental gains, was possible without the supply of subsidised artefacts (toilets) that the intermediate class could gain from. It demonstrates that there are alternatives to the 'Green Revolution Mental Model' applied to all development programmes and environmental programmes.[152] In the programme formulation and implementation processes within the nation-state, the supply syndrome is a dominant and very weak commitment to working with the poor to build solutions locally.

Himachal Pradesh transformed its sanitation programme by formulating and implementing 100 per cent open defecation free villages, using the community-led total sanitation approach

All the programmes of the Union government place community as a recipient of environmental services or inputs. The community is not an intelligent and active participant shaping conservation and their livelihoods without damaging the environment. For instance, the *Namami* Gange Programme (to clean the river Ganga) which has components for sewage treatment, surface cleaning, handled by local investors and businesses, and community participation limited to workshops, seminars and awareness campaigns, follows the same 'Green Revolution Mental Model'. The *Swachh Bharat Abhiyaan* is reduced to a toilet supply and construction programme in most states. Even with other successes

like villages and towns in Meghalaya and Kerala, where community participation transformed the given programme guidelines and enabled location-specific adaptation and implementation, with an increase in employment generation and value-addition, there is little uptake of policy lessons by the state.

The struggle that alternatives for food sovereignty have been facing ever since the first articulations came up in the 1970s, falls into the same category of complete neglect or selective appropriation by the state. The latter happens when the state finds actors who can take on the supply of embodied technologies—most of it highly subsidised by the state. A future of democratic food sovereignty *Anna Swaraj* (food freedom/sovereignty), based on sustainable agriculture, as envisioned by an alliance of CSOs, demands not so much the training of farmers as changes in the macroeconomic policy, agricultural policy, and science and technology policy of the state.[153]

The Bhopal gas tragedy and the** Narmada Bachao Andolan **were strong movements, along with India's official environment policy

Community-owned and operated initiatives: With and without state support

Many cases of community participation in state programmes or schemes and many state programmes themselves have been designed and enabled by the efforts of CSOs and other environmental/social movements. Given that the state is the largest funder and has the widest reach to change prevalent environmental practices, many of these CSOs and the rural and urban populations working with them, do work with the state. There is a major difference between people participating in state programmes/schemes as target beneficiaries and people participating in CSO led or community-based programmes with support from the state or without any financial support. The latter have consciously built in their understanding about local ecosystems, the work and livelihoods that depend on these ecosystems, and inter-seasonal changes in both.

Several Gandhian initiatives on rural livelihoods and environmental movements were founded in the 1970s. It was the heavy price paid by the poor for development investments and industrial disasters in the 1980s that turned the tide for local environmental awareness and people's own initiatives. The Bhopal gas tragedy and the *Narmada Bachao Andolan* (Save the Narmada Movement) were strong movements, along with India's official environment policy. Both, the social movements and the official environment policy were alternatives to the mainstream development policy and focused on the inter-linkages between industrial growth induced accidents and effluents, and rivers, people, forests, heritage and livelihoods. Both pointed out how the poor are the worst affected by environmental loss or degradation. While the state's response was to pick up the obvious techno-fixes, the social movements demanded more engagement with and action on the drivers of large scale environmental loss.

Increasing corporate funding for environmental protection emerged as an alternative in the 1990s. It became mandatory after the Company (amendment) Act 2013 passed as the Corporate Social Responsibility (CSR) Bill in 2014. Though the first among developing countries to enact this as mandatory, there are concerns about how effective it is, and where corporate responsibility begins.

Some CSR initiatives address environmental problems and livelihoods problems, with a clear portrayal of how the two are intertwined and can co-evolve in mutually beneficial ways. Some like the Indian Tobacco Company Limited enable public investments that support social forestry, soil conservation, livelihoods and sustainability. Some like the Tata's support a whole range of habitat and species conservation projects. This is over and above the massive funding available from Tata Trusts, perhaps one of India's oldest philanthropic organizations, which funds water, energy

and rural livelihoods programmes. The Hindustan Computers Limited awards its CSR funding in several forms that arrest environmental degradation or loss; the environment is one of the three key themes (the other two being health and education) for the award. Public sector corporations like Indian Oil and the National Mineral Development Corporation also devote a share of their funds to afforestation, solar electrification, water harvesting and water and soil conservation, and wild habitat conservation. Though only a third of India's top 100 companies engage with CSR expenditure, the environment accounts for a third of all CSR in India.[154] Even with CSR, the corporate sector stands out as an actor that first needs to draw upon limited environmental resources to create wealth and then allocate part of it to reclaim the environmental damage done.

The model of state and corporate support to the environmental cause, after the damage is done, is a stark contrast to thousands of alternatives in the country, where eco-restoration, conservation, livelihoods and well-being go hand in hand. Community participation and design of these alternatives offer several lessons; the most important one being the democratic knowledge and policy-making at the site, in each location.

The CSO and community alternatives to mainstream environment-development trade-offs are all cases where the relationships between human needs and the needs of the environment are maintained by the communities involved.[155] Each CSO and each community has deliberated upon and has confronted internal and external conflicts when they arrive at the rules, norms and institutions that keep these relationships between human development and environmental functions alive. For instance, water harvesting structures and lake renovation systems built by the community in Bero Block in Ranchi, Jharkhand led by Simon Oraon, are essentially social-ecological system changes, that build resilience and sustainability. Simon Oraon, the waterman of Jharkhand, was given a *Padma Shri* (India's fourth-highest civilian award) by the Government of India. But he was not just building check dams and doing social forestry, but also building village committees, with rules and behavioural changes within communities.

Several regional and national movements ranging from the Kerala *Shastra Sahitya Parishad* (Kerala Science Literature Movement), the All India Peoples Science Network and the Peoples Science Institute have been spearheading the articulation of environmental costs and socio-economic costs of development. In addition, major academic inputs from the Centre for Ecological Sciences, Indian Institute of Science and the Centre for Interdisciplinary Studies in Ecology and Development which later merged with Ashoka Trust for Research in Ecology and the Environment in Bangalore, and the CSE in Delhi, have influenced major environmental policy changes. Many a change or alternatives that have now become mainstream in developing and delivering environmental gains or conservation, have emerged with the help of, or have been directly written and campaigned by CSOs.

India's CSOs, like the Foundation for Ecological Security, *Samaj Pragati Sahyog*, *Kalpvriksh*, *Sahjeevan*, and many others have made their mark building capacities within the communities they work with, building capacities and policy changes within the government, and publishing academic works and influencing pedagogic innovations in several educational institutions. Books like *India's Drylands*,[156] *Churning the Earth*,[157] and several topical reports and publications from the big environmental organizations like the CSE, Gene Campaign, *Navdanya*, and so on contribute to these academic engagements for sustainable environment and development. The Supreme Court ruling on a compulsory Environmental Science course for all un-

The CSO and community alternatives to mainstream environment-development trade-offs are all cases where the relationships between human needs and the needs of the environment are maintained by the communities involved

dergraduate students has been welcomed by all the universities and academic organizations, India's water policy, and programmes for sustainable agriculture, are the result of the work of these CSOs. Yet again, some conservation-cum-livelihoods initiatives like *Sahaja Samrudha* and *Basudha* that promote landraces of crops (rice, millets, pulses and vegetables), are not mere CSOs but are also thought leaders, producing academic papers and building capacities within local self-government and farmers organizations.

Environmental policy in India is a joint product, shaped significantly by environmental movements, academia, CSOs and the state

Alternatives to the conventional 'development versus environment' model, which are based on principles of social and ecological sustainability, are also political and economic alternatives. Some like the radical ecological democracy, deliberative democracy, Buddhist economics and Gandhian (JC Kumarappa) economy of permanence, and local self-governing social-ecological systems approaches available in India today, feature as post-growth alternatives that India presents to a highly unsustainable world.[158] Many movements like the *Narmada Bachao Andolan*, the South Asian Network on Dams, Rivers and People, the South Asia Consortium for Interdisciplinary Water Resources Studies and other social and ecological movements to conserve India's forests and water bodies, and protect tribal livelihoods and land in rural India, have been labelled anti-development for decades now. As voices are raised against a new nuclear power plant, genetically modified (GM) crops or a new dam that pose environmental and economic risks, these movements are also labelled anti-national.

Governing the environment: Selective gains and pains

Environmental policy in India is a joint product, shaped significantly by environmental movements, academia, CSOs and the state. The CSO and community-led alternatives discussed here reveal that the need for self-reflection and awareness of unsustainable thinking and practice is more crucial within the state and its privileged actors in development policy, economics and science.[159] All the decisions that lead to the unsustainable environment we face now, are made by the state and its formal organized natural and social sciences, economics in particular.

Broadly three notions, (a) polluter pays principle, (b) precautionary principle, and (c) the concept of intergenerational equity, have shaped much of Indian environmental policy.[160] We have seen that the state's development programmes, industries, agriculture, fisheries, and other modern input- and subsidy-dependent production activities, access to natural resources and livelihoods, threaten the very existence of natural resources (land, water, biodiversity and air). The state seems to articulate the environmental problem, the policy goal and the policy instruments to solve the problem, in ways that consistently harm the poor and the environment, to favour a specific class of people. The 'environmentalism of the intermediate regime,' is what happens in a state that is constituted by and enables gains for a specific class. The intermediate regime, a Kaleckian conceptualization of economic decision-making and politics, is the state shaped and constituted by a small fraction of the population.[161]

'Environmentalism of the intermediate regime' like the 'environmentalism of the poor', is concerned with livelihoods; both need the environment to be used according to their livelihoods requirements.[162] The major differences are that of nature and time.[163] For the intermediate regime, the environment exists to be valued economically and used for and traded for economic or other gains. For the rural and forest fringe poor and the tribal people, nature exists in its own right, has its principles; livelihoods that mimic these principles are

their best options for sustainability. For the intermediate regime, in their privileged position as part of the state, the time horizon is one of immediate and short term use and gains, whereas, for the poor, the long term conservation of the resource and co-evolution of livelihoods and natural systems are fundamental to any decision about livelihoods. The intermediate regime strives to maintain its environmentalism and presents development policies legitimized by science and new institutions, rules and norms required to achieve the policy goal(s). Environmental history offers insights into ways in which these forms of legitimacy and control are created and institutionalized.[164]

The penchant to visualize the state as the sole policymaker and regulator, and the norms to pick the most convenient legal and policy instruments that it ensures specific gains, are the hallmark of the 'environmentalism of the intermediate regime.' What is alarming is the recourse to more and more centralized regulations and policies, when there has been clear evidence that successful environmental governance is achieved with decentralized decision capacities and people's participation in the governance mechanisms.[165] Moreover, it is doubtful if concepts of environmental governance like the polluter pays principle, are adequate for environmental sustainability.

Environmental policies and laws: Design and purpose

It is difficult to discuss environmental policy in a country which has declared selected missions and programmes as sufficient instruments to achieve targets set by the government. The Government of India (in 2014) dismantled its Planning Commission, the fount of all policy intelligence that the country used for decades, and replaced it with National Institution for Transforming India (NITI) *Aayog*, an agency that supports development, through two hubs (i) for engagements with state governments, and (ii) for building NITI's think tank capabilities. As we present the environmental policies and laws, it is important to note that the capacities of state governments and their responsibility and accountability for environmental governance have perhaps never been brighter.

The environment has featured prominently in the history of planned development in India. The Union government has made the increasingly stronger articulation of policies and choice of policy instruments needed to achieve environmental goals.

The global shift from economic growth as a major driver of environmental degradation (presented in *The Limits to Growth*,[166] in the 1970s) to the reappearance of economic growth as a saviour of the environment through trickle down and poverty alleviation (in the 21st century), is effectively reflected in India's environmental plans and programmes (see table 3.9). Given the legacy of India's state-led industrialization and its 'licence *Raj*', the post-1990s saw an increasing number of industries being granted access to environmental resources.

In the unrelenting march of development, there have been legally mandated elements that favour the environment. While many legal provisions are available in India, the ways in which they have been subverted by industry and the executive (the state), point to the political power of these actors (the state, urban and industrial development actors). Most importantly, it highlights the mutually reinforcing relationship that exists between the industrial class (domestic businesses) and the state.

As discussed above, the environment has no place within the development, as articulated and shaped by the 'intermediate regime.' The intermediate regime is "*an intermediate class of domestic businesses, large and middle peasantry and the public sector workforce*"[167]—all focused on increasing value-added every year, using as much ecological or natural resources as possible. The fact that they exercise dispro-

While many legal provisions are available in India, the ways in which they have been subverted by industry and the executive, point to the political power of these actors

Table 3.9 The environment in Indian planning	
Plans	Emphasis on environment and development
First Five Year Plan (1951-1956)	• Recognized importance of forests, however, limited to percept only. • The practice remained confined to the exploitation of natural resources. • Large dams were considered to be temples of modern India.
Second Five Year Plan (1956-1961)	• A more-clearer picture emerged towards industrialization with a focus on heavy and basic industries. This was to be achieved with an emphasis on the extraction of natural resources. • Major objective consisted of achieving higher rates of investment and increasing the domestic savings growth rate.
Third Five Year Plan (1961-1966)	• It stated establishing greater equality of opportunity and bringing down disparities in income and wealth to create a more even distribution of economic power as one of its objectives. However, there was no reference to the need for environmental policy and a possible linkage between environmental conservation and poverty alleviation.
Fourth Five Year Plan (1969-1974)	• For the first-time plan document recognised the need to develop a structure in the government where environmental aspects receive attention in an integrated manner. This could remove deficiencies and provide a starting point for introducing environmental aspects in dominant policy discourse. However, it meant only to be seen as a symbolic gesture and the then Indian Prime Minister at that time following Stockholm Conference on Environment in 1972 asked 'Are not poverty and needs the greatest polluters?'
Fifth Five Year Plan (1974-1979)	• Focus continued to remain restricted to fight against poverty and self-reliance with the environment receiving an occasional mention.
Sixth Five Year Plan (1980-1985)	• Awakening of concerns with the regards to the environment within the Government of India during the decade of the 1980s. • A first major study from the Centre for Science and Environment (CSE) argued that environmental conservation must go hand in hand with economic development. • Setting up of Ministry of Environment and Forests in 1984 and enactment of Environment Protection Act 1986. • These developments remained centralized and viewed environment narrowly only consisting of wildlife, birds and beasts and at best water. • However, the real focus remained on increasing national income and modernization. Policy measures for decreasing poverty and unemployment in rural areas were initiated like Training Rural Youth for Self-Employment (TRYSEM), Integrated Rural Development Programme (IRDP), Rural Employment Programmes and controlling population explosion.
Seventh Five Year Plan (1985-1990)	• Implications of environmental degradation following economic development were still to be absorbed by policymakers even at the highest levels of decisionmaking. • Focus continued achieving higher economic growth rate and the creation of employment. The Indian economy recorded a growth rate of six per cent against the target of five per cent and eventually, the decade of the 1980s moved out of 'Hindu rate of growth of three per cent'.
Eighth Five Year Plan (1992-1997)	• The decade of the 1990s was a relatively good one from the viewpoint of focus on the environment. • Articulation of National Conservation Strategy and Policy Statement on Environment and Development and Policy Statement on Control of Pollution following Rio Earth Summit 1992.
Ninth Five Year Plan (1997-2002)	• Above policies spelt out in 1992 were perused in this plan. • It aimed to look for synergies between environment and development to ensure environmental sustainability through people's participatory institutions like *Panchayati Raj* (system of local self-government) institutions, cooperatives and self-help groups.
Tenth Five Year Plan (2002-2007)	• Conservation of environment accorded highest priority and plan also sought to tackle environmental degradation in a holistic manner. • Focus shifted to sustainable growth, meaning maintenance of high rates of economic growth. • The decade of the 2000s saw corresponding attention given to environmental issues.
Eleventh Five Year Plan (2007-2012)	• Aiming for sustainable growth and maintenance of the high rate of economic growth.
Twelfth Five Year Plan (2012-2017)	• Acknowledging a growth strategy which is consistent with the protection of the environment. • A clear distinction between sustainable development and sustainable growth. • Way forward for reaching sustainable development like the introduction of environmental taxes, funds and technology transfers, certificates and obligations. • Want for programmatic inter-disciplinary planning and inter-agency efforts at all level. • Hence, there has been a gradual increase in the policy space given to environmental issues over the last few decades.

Source: Chopra 2017

portionate powers of decisionmaking compared to the minimal size they have in the workforce, is evident from India's workforce (92.6 per cent of it) being in the informal unorganized sector to this day. Though discredited because it fails the Kaleckian drivers of economic decisionmaking,[168] the intermediate regime is evident in the decisions made about the environment and development after the 1990s liberalization of the Indian economy. Being part of the state and capable of shaping governance mechanisms, the intermediate regime derives its power from its legitimization of and stakes in development. The policy goals and instruments chosen are always those that lead to environmental loss, ensure accumulation and maintain the decisionmaking power of the intermediate class.

Contradicting the 'environmentalism of the poor' is the twisted environmentalism of the intermediate regime 'that of livelihood concerned almost exclusively with economic security' in the market, and also concerned with the non-market access to and control of environmental resources and services.[169] The latter, access to and control of environmental resources, in keeping with the essential nature of the intermediary regime is ensured by working through and with the state. The intermediate class is only concerned about its own livelihood; contrary to the poor for whom the environment is essential to ensure that the social-ecological systems are capable of reproduction of similar livelihoods for further generations. Unlike the poor, the intermediate class obfuscates the guarantees of insured and institutionally warranted privileges that their state offers them, using the very gains they obtain from the environment. Unlike the poor, they do not know the diverse social-ecological systems and causal relationships between different production resources and natural resources; they do not need to know.

In each of the environmental components, be it land, water or air, the intermediate regime pays scant attention to different time scales.[170] In its supply of knowledge to and design of the ways of working of the developmental state, the intermediate regime has no understanding of the location-specific differences in the relationships between society and the environment. Compared to the liberal market regimes or socialist regimes, where the role of the state in the sale of or appropriation of nature for economic uses is clear in its relationship with the user/industry, in the intermediate regime, the appropriation of nature is *enabled and legitimized by the state*, for a particular group or class of its subjects. This class also constitutes the state, and they enjoy gains of their labour and capital. The others outside the intermediate regime pay for these gains. Inequity is built into the development policies of the state.[171]

All the instances of environmental pollution, submergence of forests and displacement of people—especially tribal in India—happen despite the existence of legal instruments to safeguard and conserve the environment (table 3.10). There are multiple actors and sources of evidence that have exerted pressure, presented evidence to and campaigned for protecting the environment in India. What has changed since the first set of legal instruments were put in place in the 1970s, is the increase in 'expertise' devoted to drafting and campaigning for environmental protection. There has been a corresponding increase in the industrial associations and other professional bodies and their investments in environmental management and legal advice.

The role of law or more specifically the Supreme Court, in handling the environment, is best illustrated by India's legislations about forests. Following the establishment of its Central Empowered Committee on Environment in 2002, and the Expert Committee to recommend the net present value of forests converted to non-forest or development uses in 2005, academia felt elated about the incorporation of academic estimates of ecosys-

The role of law or more specifically the Supreme Court, in handling the environment, is best illustrated by India's legislations about forests

Table 3.10 Laws related to environmental protection in India	
Directly related to environment protection	Indirectly related to environment protection
• Water (Prevention and Control of Pollution) Act 1974 • Water (Prevention and Control of Pollution) Cess Act 1977 • The Air (Prevention and Control of Pollution) Act 1981 • The Forest (Conservation) Act 1980 • The Environment (Protection) Act 1986 • The Biological Diversity Act 2002 • Forest Rights Act [refers to Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Rights)] Act 2006 • Compensatory Afforestation Fund Act 2016 • The National Environment Tribunal Act 1995 • National Green Tribunal Act 2010	• Constitutional provision (Article 51A) • The Factories Act 1948 • Hazardous Waste (Management and Handling) Rules 1989 • Public Liability Insurance Act 1991 • Motor Vehicle Act 1991 • Indian Fisheries Act 1987 • Merchant of Shipping Act 1958 • Indian Ports Act 1908 • Indian Penal Code 1860 with amendments made over time • Biomedical Waste (Management and Handling) Rules 1998 • Noise Pollution (Regulation and Control Rules) 2000 • E-Waste (Management and Handling) Rules 2011

tem services into public policy. But this was short-lived. By accepting a diluted version of the recommendations of the Expert Committee 2006 and collecting payments (of net present value) as CAMPA funds for every forest tract stripped bare for development, and by re-distributing the CAMPA funds between the central and state governments, the state demonstrated a lack of understanding of the ecosystem services of forests and the possible economic estimation of these values. The state also gladly accepted the reinforcement of its centralizing and controlling technocratic norms applied again to environmental governance. It had chosen to ignore the fact that successful JFM and watershed management efforts across the country had proven decentralized community-based knowledge and location-specific policies in environmental governance. See box 3.6.

Many of India's progressive laws protecting its natural resources are tied to the state's desire for development for a few, even at the massive cost of loss of livelihoods for millions and environmental quality and biodiversity. Giving the 'development affected' communities a voice in development decisionmaking is still a far cry from practice. Even the Forest Rights Act 2006 enacted, has a record of three per cent implementation, even a decade after its passage. By voicing the tribal community's concerns about forest conservation and creating a convergence between forest-dwelling tribal people and the civil society networks, it is possible to implement a version of the Forest Rights Act which includes the management of land, conservation and enterprise. But the centralized bureaucracy of environment and forests gives little scope and space for these alternatives.[172]

The highly centralized administration of development sectors and the environment, centralized national environmental laws have further strength-

Box 3.6 The supply syndrome in forest management and conservation

One of the consequences of this happenstance was the continuing debate on the distribution of the funds collected under the Compensatory Afforestation Fund Management and Planning Authority (CAMPA) (as a consequence of the imposition of net present value for the conversion of forest land) between the states, the Centre and the local bodies. Local bodies were more or less left out of the reckoning and a great deal of attention given to the distribution between the Centre and the states. Meanwhile, the old mind set of focussing on fund distribution as a measure of success remained. The State CAMPA funds were set up as a result of the 2009 order being passed (amount collected at the Centre was INR 30,000 crore at that time), and the amicus curiae promptly told the court that the fund released to states was more than the combined budget of all state forest departments. The questions arise: Are we measuring success through money collected and dispersed? Or was net present value meant to be an economic deterrent to forest conversion? The original intention behind the collection of the funds in CAMPA had been forgotten.

Source: Chopra 2017.

ened the ease with which economic development has repeatedly been used to ignore or blatantly legitimize destruction and degradation of the environment for the gains for a few. In this context, the National Green Tribunal (NGT) Act 2010 with a mandate to review all public actions to effectively assess sustainable development, was considered a significant achievement. It was celebrated as a departure from the reductionist utilitarianism that had characterised the jurisprudence of the Supreme Court.[173] But the silence of the NGT, in the recent eviction of millions of tribal using the Forest Rights Act 2006, supported by the Supreme Court, takes us back to square one.

Acknowledging structural constraints

There are several structural and functional problems in environmental governance. For instance, a major hurdle in managing water use in the industrial sector is the involvement of a multiplicity of institutions. The Ministry of Water Resources is the principal agency responsible for water in India. But industrial use of water does not fall under its domain, the Ministry of Commerce and Industry is concerned with planning and development of water resources for industrial use but has no mandate to control or regulate water use by industries. Central Groundwater Board(s)/Authority(ies) are meant to regulate groundwater quality and quantity in the country but they have achieved little success in regulation. The Central Pollution Control Board and State Pollution Control Boards regulate industrial water pollution and charge water cess on the amount of wastewater discharged by companies but they have no command for controlling the sourcing of water from various sources. It is recommended that all water use by industry be regulated by fewer agencies or even a single agency to achieve pollution control in the sector.[174]

The Western *Ghats* Ecology Expert Panel (WGEEP)[175] and the High-Level Working Group (HLWG)[176] will certainly rank among the most miscalculated environmental governance issues that became a wrangle between academics, activists and the state. The latter was commissioned when the state (both the Union government and the six state governments along the Western *Ghats*) found the former unpalatable. The former headed by the eminent ecologist Madhav Gadgil and the latter headed by the eminent space scientist Dr K Kasturirangan led to debates about the environment, livelihoods, industrial and mining activities, and regulatory or management issues. There were different factions within academia and within industry arguing for different classifications or zones of human-nature interactions and differential access to forests and natural resources, for what they defined as development purposes and what exists as to rights that tribals and forest dwellers have had for ages. What emerged as acceptable and implementable (according to Sunita Narain, CSE and a member of the HLWG) was the HLWG recommendations that came with the prevalent institutions of the bureaucracy, with faith in technological and administrative efficacy. The argument was that there would be lesser opposition from the state governments to the HLWG recommendations. That the HLWG recommended lesser no-go areas with a ban on mining in only 37 per cent of the *Ghats* and the WGEEP recommended a more nuanced three-way classification of human-nature interactions with a ban on mining in almost 70 per cent of the *Ghats*, is immaterial. What was rejected was the WGEEP framework of habitat continuity, of human-nature interactions and social-ecological decisions where the community would have equal access to information and community knowledge would have a say in the decisions made.

A major hurdle in managing water use in the industrial sector is the involvement of a multiplicity of institutions

The most poignant finding of the WGEEP, that freshwater ecosystems and their lives were more threatened by development and further land-use changes in and around the Western *Ghats* than forest biodiversity, is the biggest spectre

that haunts development in the six states. Long term conservation of biodiversity-rich areas demands that land use and forests, water sources and flows, and industrial and urban pollution are regulated not just in so-called 'protected areas' but also in contiguous and related ecological systems. The fact that India's planners and politicians do not understand how long-term conservation and ultimately the survival of several development projects themselves, depend on the co-evolution of social-ecological systems with least disturbance to the environmental (material and energy) stocks and flows is not surprising. When communities, whose livelihoods have evolved with diverse forest systems and wildlife, are heard only as protestors about livelihoods issues and not as conservationists or ecosystem service providers, there is little scope for the state to learn about co-evolution, community knowledge and responsibility.

The latest in environmental governance, the High-Level Committee Report reviewed the legal and regulatory mechanisms in place for environmental governance in India

The latest in environmental governance, the High-Level Committee Report reviewed the legal and regulatory mechanisms in place for environmental governance in India.[177] The Committee demands centralized authority and control over environmental and livelihoods decisionmaking, perhaps environmental (versus development projects) decisionmaking. Further bureaucratization of the environment is reflected with the creation of the All India Environmental Service Institute and the National and State Level Environmental Management Authorities. While some of the recommendations like repealing the Water (Prevention and Control of Pollution) Act 1974 and the Air (Prevention and Control of Pollution) Act 1981, and bringing the provisions of both under a stronger revised Environmental (Protection) Act 1986, are indeed welcome, the overall emphasis on bureaucratic control and academic validation that rules out community knowledge and social-ecological memory is worrisome. But that seems to be acceptable for the state, the environmentalism of the intermediate regime needs this bureaucratic and professional control over resources that guarantee their wealth and further accumulation. All the alternatives that show how a perfect set of environmental services and economic services provided by local farmers, herders, artisans, women's groups and cooperatives, loose out to the extractive approaches of the intermediate regime. These actors stand to lose significantly if stringent environmental laws, supported by grassroots initiatives and local knowledge, enable access to resources, decent work and incomes for the poor who are the worst affected by the environmental loss.

We must recall it is not the first time India's experts have pronounced results that favour the statist decisions and actions. The age-old lament about poverty studies and the very definition of poverty that 'evade the basic issues of fundamental change in the system which generates and perpetuates poverty,'[178] echoes in many a study by natural (environmental) and social scientists who refuse to see the basic system that generates and perpetuates environmental degradation and irretrievable loss.

Conclusion

This chapter has major limitations in its omission of biodiversity as a specific environmental issue. Though biodiversity is addressed within the sub-sections on land, water and air, it is a clear concern for India's environment. The scope to include and highlight the gender dimensions of sustainability and equity is enormous, especially in a country where women are the largest group of producers and service providers. But both gender and caste as key determinants of environmental policy and action within communities and by the state have been barely mentioned here.

Beginning with a quote from Anil Agarwal,[179] this chapter discussed the status of the environment in India. The quote captures the essence of India's environmental crisis, where a few rich actors and organizations, with their

energy-intensive and extractive industry methods, have caused environmental degradation and increasing inequality. It also points out an unfinished agenda, not just in the formulation and implementation of environmental policies, but also in the very cognizance of the key drivers of environmental loss. Despite being well-intentioned, the state and its laws for environmental protection and conservation seem to enable further deforestation, dam building, and destruction of ecosystems for development and deny the poor, their voice and community knowledge base. The intention emerges as questionable, from the overview of the crucial ecosystems—land, water and air in India—and the biodiversity and livelihoods options available and destroyed in each of these ecosystems (section 2). Several alternatives in the field, mainly led by CSOs and local communities, reveal successes that reverse these trends of environmental degradation and socio-economic deprivation (section 3). Decisionmaking by the state favouring specific actors, whose extraction, production and consumption patterns have been proven to be environmentally unsustainable, continues (section 4). Decades after passing the pioneering laws and conservation programmes for the environment, forests, clean water and air, these state-centric laws seem to have achieved little. Our question now, is whether the state and the intermediate class that uses the state for its short-term gains can learn from these alternatives in the field. And this, we acknowledge is a loaded political question of how a state that has centralized and consolidated its knowledge and administration of all-natural resource extraction and investments and resource-based production activities, can learn to work with and support community-based knowledge and norms for environmental and livelihoods decisions.

The environment, the material basis of our existence, poses many complex problems, actors and their agency. These are evident as drivers of loss, degradation and irretrievable deterioration, as consequences of these very changes, and as conservation and improvement measures. India, like many developing countries, is subject to a common set of drivers of environmental degradation—population growth, unplanned urbanization, changing dietary patterns and global warming. Some drivers of environmental degradation like global warming, dietary changes and even population growth, are also consequences of past development investments. What we have seen here is that they come with deeply entrenched economic and political drivers, many unwilling to change. Because these drivers (direct and indirect) and the environment, are part of complex networks, their local spatial and temporal dimensions are not evident to many, especially not to the centralized and consolidated programmes and policies. When some state programmes and hundreds of CSOs and community-based organizations acknowledge and enable the sustainability of people's livelihoods and the environment, the decisionmaking processes appreciate and maintain the connectivity between different components, land, water and air, with least disruption. But when the state, the intermediate regime, turns a blind eye to or pro-actively facilitates the breakdown of the linkages, the connectivity that communities cherish, it sets off a vicious circle of environmental loss, worsening livelihoods and persistent poverty. Policies and laws enacted to control pollution, conserve the environment, and rehabilitate and rebuild the people and livelihoods lost, are well designed to ensure gains to the intermediate regime, a class that works with and stands to gain from the state. Increasing environmental degradation begets more temporary social security or development sops, and more development projects like dam building or urbanization results in more environmental loss, conflicts, displacement and distress.

International development goals like the SDGs do include environmental sustainability as a major pillar, but they do not seem to help national environmen-

Decades after passing the pioneering laws and conservation programmes for the environment, forests, clean water and air, these state-centric laws seem to have achieved little

tal decisionmaking by the intermediate regime. The SDGs were formulated in and will have to be achieved by changing existing contexts and processes of extreme inequality, exclusion and massive destruction of ecosystems. Several goals directly address the environment or have the environment and natural resources as the basis for achieving the goal. The SDG 2 (zero hunger), SDG 6 (clean water and sanitation), SDG 7 (affordable and clean energy), SDG 11 (sustainable cities and communities), SDG 12 (responsible consumption and production), SDG 13 (climate action), SDG 14 (life below water) and SDG 15 (life on land), are among the 17 SDGs, where environmental policies and actions are central to achieving the goal. From the trends of the environmental governance and practices, it is doubtful if any of these SDGs will be achieved in agriculture, forestry, water (dams, irrigation) or industrial and urbanization policies in India. What is more alarming is that uncritical acceptance of these SDGs as neat compartments and presentation of policies and implementation mechanisms to each of these goals in India and globally. That SDG 2 has serious implications (positive and negative) for SDG 12 and SDG 13 in the country, and that SDG 7 has a series of complex relationships with serious implications for SDG 12, SDG 13, SDG 14 and SDG 15, are not analysed in these reports. When human production decisions, involving labour and capital are central to these SDGs, it is important to consider the policies and practices, the rules, norms, and laws that govern these decisions, and the mutual dependence of these decisions across sectors and goals (SDGs). Adding a layer of new institutions or laws, rules and norms to achieve goals, whether developmental or environmental, may not help unless the prevalent ones are reviewed and assessed collectively. India's on-going crisis with millions of tribal people being evicted from the forests, the only homes and livelihoods they knew for ages, forests that they have nurtured for ages, is perhaps the best and most painful example of destroying both sustainability and equity with new state policies and laws that are written for the gains of the intermediate class.

Environmental justice and a harmonious development agenda demand that we think along with the bio-physical limits of our world, and locate national and sub-national economic agendas within these global limits

In India, there are several threats to achieving the SDGs or any semblance of climate change adaptation and mitigation soon. The increasing pace of environmental and social disruption are not justified by the poor performance of the economy, increasing inequality and violation of environmental and social justice. Ranging from the sheer magnitude and diversity of India's informal workforce, shameful national performance in global hunger and malnutrition, to the overall shrinking of multilateralism and global collective action with the emergence of strong nationalist states,[180] the scope for even a stronger normative position on environmental protection and conservation seems to be limited. There is a clear demand from development practitioners, environmental activists, academia and several policymakers, to bring some normative or new value positions to the SDGs. Deliberations about a deeper political engagement with the SDGs and global environmental agreements have emphasized the need to see them as an umbrella for inclusive and democratic environmental deliberation, and a domain for cross-national harmonization and ethical decisionmaking.[181] An important hypothesis demanding careful analysis is about nation-states, nationalism and national economic growth being inimical to environmental sustainability, equity and justice. Environmental justice and a harmonious development agenda demand that we think along with the bio-physical limits of our world, and locate national and sub-national economic agendas within these global limits. The strong agenda dating back to the 1970s plea to recognize the limits to growth is still being suppressed. Decisionmakers in the state, in industry and diverse communities, need to enable democratic deliberations and local governance of all environment-development decisions, with an understanding and acceptance of global limits and connectivity, environmental justice and ethics.

CHAPTER 4

Environmental Issues and Economic Development in Pakistan

Introduction

With 216.6 million inhabitants in 2019, Pakistan is the fifth most populous country of the world. The country contains a tremendous amount of natural resources and nine agro-ecological regions, ranging from the Karakoram Himalayas in the North to the coastal zone in the West, and the flood plains of Indus in the East. These regions are crucial for people's livelihood and the country's economic development. However, economic expansion along with increasing population, unplanned urbanization, and high levels of poverty and inequality have deteriorated the quality of the environment. This also has devastating consequences for the sustainability of economic growth and people's well-being. The country's focus has been on the quantity of economic growth, rather than on inclusiveness and equal distribution of economic benefits. The skewed economic growth model has led to inefficient and unsustainable use of the country's natural resources.

This chapter aims to analyse the role and impact of economic development on social inclusion and environmental sustainability in Pakistan. It attempts to establish linkages among environmental deterioration, equity and empowerment. It explains how environmental deterioration intensifies inequality as it adversely impacts the poor and the marginalized, thereby breading inequality, which further damages the environment. The chapter further suggests how promoting sustainable human development requires addressing economic, social and environmental challenges in an equitable and empowering manner.

The chapter analyses Pakistan's economic growth and the resultant disparities that have had adverse impacts on the environment of the country. Pakistan's economic growth has increased at an average annual rate of five per cent since the 1980s, however, the benefits of growth have not been sustainable as it failed to address human deprivation and environmental preservation. The unsustainable use of natural resources has resulted in a number of environmental issues and challenges.

Faisalabad and Lahore are among the 10 most polluted cities of the world

Over the last few decades, Pakistan has gone from being water abundant to becoming a water-scarce country. Natural resources such as land, forest, water and biodiversity are under a huge threat in Pakistan. Faisalabad and Lahore are among the 10 most polluted cities of the world (in 2018).[1] Similarly, the country's marine resources are also impacted by massive pollution. Climate change is further exacerbating the depletion of natural resources as Pakistan is the fifth most vulnerable country to climate change impacts.

Environmental deterioration has a detrimental impact on economic and social development. Worldwide, environmental pollution causes 9 million premature deaths annually which are 15 times more than the deaths caused by all wars and other forms of violence. Globally, Pakistan (with 0.22 million deaths) ranks third in terms of the total number of deaths caused by environmental pollution (air, water and soil contamination, and chemical pollutants) after India (2.5 million deaths) and China (1.8 million deaths).[2] In the country, such deaths account for 22 per cent of total premature deaths. It costs the national economy as

much as 6 per cent of its GDP.[3] The most marginalized (the poor, women, children, slum/peri-urban dwellers and rural residents) bear the consequences of environmental degradation directly.

Since the promulgation of the Constitution of Pakistan in 1973, the country has adopted a large number of laws, policies, strategies and action plans to achieve sustainable development and ensure environmental sustainability. The country has also taken various steps to meet its global commitments around Multilateral Environmental Agreements (MEAs) as well as Sustainable Development Goals (SDGs), by formulating laws and policies at the national level. These policies and laws have somewhat slowed down environmental deterioration but continue to remain inadequate. There remains a wide gap between these laws, policies and their implementation and impact on the conservation of natural resources and the life of people. This could be attributed to the constraint in financial and technical resources and lack of institutional capacities and political will to work towards environmental sustainability and sustainable development.

Sustainable development: Economic development, social inclusion and environmental sustainability

Sustainable development accelerates economic growth and translates it into improvements in human lives, without destroying the natural capital needed to protect the opportunities of future generations. It is an amalgam of economic prosperity, social inclusion, poverty alleviation and environmental sustainability. The SDGs were built under the very framework of sustainable development that calls for socially inclusive and environmentally sustainable economic growth.

Economic growth in Pakistan

A record of economic growth in Pakistan shows that the economy progressed at an annual rate of 4.8 per cent (between FY1981 and FY2018) despite being marred by terrorism, political uncertainty, and natural calamities (see figure 4.1).[4] In absolute terms, Pakistan's real GDP increased approximately six times between FY1981 and FY2018, from Pa-

Figure 4.1 Trend in GDP growth rate (2005-06 as the base year) in Pakistan, FY1981-FY2018

Sources: GOP 2015a and 2018b.

kistani rupee (PKR) 2.2 trillion to PKR 12.4 trillion. Real per capita GDP also increased by 2.3 per cent per annum, from PKR 25.6 thousand to PKR 59.6 thousand, while the population increased by 2.5 per cent per annum, from 84.3 million to 207.8 million. However, the rate of economic growth has been volatile in the country. The situation is explained by low domestic savings ratio and sluggish export performance.

A high level of average economic growth over the last few decades has been due to a strong rural farm sector, rising foreign remittances, extraction of natural resources, and a substantial informal sector. In 2018, Pakistani diaspora sent US$ 21 billion (or 6.8 per cent of GDP), making Pakistan the seventh-highest remittance-receiving country in the world.[5] The agriculture sector contributes 19 per cent to the GDP, employs 42 per cent of the country's labour force and contributes to the growth of several sectors of the economy.[6] The undocumented economy was about 90 per cent that of the documented economy, almost double the size of actual and per capita GDP.[7]

The share of agriculture in GDP decreased, while the share of the service sector increased, in accordance with the structural transformation of the economy. However, the striking factor is that the share of the manufacturing sector decreased (from 15.1 per cent in FY1981 to 13.6 per cent in FY2018) during this time period.[8] As the world's fifth-most populous country in the world, Pakistan needs to focus on the manufacturing sector owing to its employment elasticity. For every job created by the manufacturing sector, 2.2 additional jobs are created in other sectors.[9] This requires the country to focus on innovation and sustainable infrastructure with an equitable pattern that is in line with the country's commitment to SDG 9 'sustainable industrialization'.

Economic growth and social inclusion in Pakistan

Historically, the focus of economic policy in Pakistan has been on the reduction of deprivation. Since the First Five Year Plan (1956-1960), different governments have endeavoured to create physical and social infrastructure and undertake social protection measures for the poor, deprived and vulnerable. The Village Aid Programme (1952-1961), the Rural Works Programme (1963-1972), the People's Works Programme (1972-1980), the Five Point Programme (1985-1988), the *Tameer-e-Watan* Programme (1991) and Social Action Programme (1993) are a few examples.

In the 1980s, GDP increased at an annual rate of 6.1 per cent. This was mainly due to the successful implementation of the sixth Five Year Plan (1983-1988). The Plan involved major tax reforms, deregulation of the economy, and increased emphasis on education, health, access to electricity and poverty alleviation. During this period, the sixth Five Year Plan focused extensively on agricultural and rural development, education and the health sector. The government implemented various rural development programmes (such as the Prime Minister's Five Point Programme) that were successful: economic growth and human development improved, whilst poverty, hunger and malnutrition decreased.

However, ***during the 1990s***, the growth rates of GDP and per capita GDP declined. During this period, GDP increased at the rate of 4.3 per cent per annum, but showed a slight improvement in the 2000s, rising to 4.8 per cent. During this decade, the poverty reduction strategy was framed under the Structural Adjustment Programme (in 1993). Realizing the role of human development for sustained economic growth and poverty reduction, the programme aimed to in-

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crease public spending on health, nutrition, education, water and sanitation in rural and slum areas, and on population welfare with a special focus on women and children. Between 1993 and 2002, the programme spent about PKR 420 billion against the total budget of PKR 627 billion, yet failed in terms of coverage, quality and utilization of funds.[10] Public sector development expenditure also decreased from seven to four per cent of the GDP between the 1980s and the 1990s.[11] During this period, the growth rate of the GDP decreased, while poverty, inequality and child malnutrition increased.

In the presence of fiscal and current account deficits, the new government is finding it difficult to sustain the economic growth rate

In the 2000s, Pakistan followed the strategy of the Poverty Reduction Strategy Programme (PRSP). The country formulated its strategies in light of the interim-PRSP in 2001, the PRSP-I for 2004-2006 and the PRSP-II for 2008-2010 and beyond. The aim of these strategies was to achieve economic growth and macroeconomic stability, improve governance, invest in pro-poor sectors, and transfer growth benefits to the vulnerable. Poverty alleviation programmes were grouped into four categories: income and employment creation, social and human development, infrastructure and community development, and social protection schemes. Between 2002 and 2012, pro-poor budgetary expenditures increased at an annual rate of 28 per cent.[12] However, the share of expenditure on health, education, population planning, and water supply and sanitation in total pro-poor expenditure declined massively. Poverty, hunger and malnutrition decreased during the first half of the 2000s (due to the inflow of foreign aid and remittances) but rose during the second half.

In recent years, there have been indications of growth recovery in GDP and per capita GDP after a slump during the end of the 2000s. The government has made a number of efforts to make circumstances conducive to economic growth such as restoring investor's confidence, improving security, regional outreach and increasing energy security. These included military operations against terrorists, an initiative of China Pakistan Economic Corridor (CPEC), and resolving installation of renewable energy projects alongside exploring coal power projects. The government also formulated the Vision 2025 and the 11th Five Year Plan for inclusive and sustainable economic growth. As a result of these efforts, the economic growth rate gradually improved from 3.6 per cent in FY2011 to 5.8 per cent in FY2018. However, this recent spurt in growth is attributed to consumption, which accounted for 93 per cent of GDP in FY2018.[13] Higher consumption in turn also stimulated a higher demand for imports resulting in a decline in net exports. In the presence of fiscal and current account deficits, the new government is finding it difficult to sustain the economic growth rate. The GDP growth during the FY2019 decreased to a nine-year low at 3.3 per cent, mainly due to the slowdown of agriculture and stabilization measures to preserve macroeconomic stability. It is projected to fall within the range of 3.0 to 4.0 per cent in FY2020.[14] The government is planning to gradually make the growth process more sustained and inclusive in the draft of the 12th Five Year Plan (2019-2023), aiming to achieve annual GDP growth of 5.4 per cent.[15] Moreover, the government aims to introduce reforms to boost exports and investment. The success depends on the government's ability to convince the private investor to increase investment in the country. For this, the role of the local investor is crucial for restoring the confidence of the foreign investor.

The government is also providing support to the poor through subsidies on wheat flour, electricity, gas and oil, and other food items. Out of the total federal subsidies of (PKR 556 billion or 2.5 per cent of GDP) in 2013, the power sector accounted for 96.1 per cent, food and agriculture for 2.4 per cent, and oil refineries for 1.0 per cent.[16] However, most of the benefits go to the rich. In

2013, less than 30 per cent of electricity subsidies went to the poorest 40 per cent of the population, compared to 40 per cent of electricity subsidies which went to the richest 20 per cent.[17]

Rapid economic growth has brought many benefits to Pakistan such as a reduction in poverty, a boost in employment opportunities, increased educational and health achievements, and improvement in gender parity. Economic growth is necessary for poverty reduction and job creation; however, an evaluation of human development shows the prevalence of widespread poverty, inequality and deprivation in the country. A low level of human development makes people more vulnerable to the impacts of environmental deterioration. This is because these people have lower levels of resilience owing to lack of skills, knowledge and strength to cope with the challenges thus faced. This, in turn, results in unnecessary and inefficient exploitation of resources for survival.

- *Human development:* In 2017, Pakistan's Human Development Index (HDI) position was 150th out of 189 countries, thus falling in the bottom of the 'medium human development' category (after Cameroon). Within South Asia, Pakistan ranks higher than Afghanistan only. The country's female HDI value is 33.3 per cent lower than its male HDI value. The gap is 6.2 per cent for the world, 9.1 per cent for developing countries and 19.4 per cent for South Asia.[18] Moreover, the country has the lowest female HDI value in South Asia only after Afghanistan. The gender disparity in HDI is explained by gender differences in schooling and income.
- *Poverty:* In accordance with its commitment to SDG 1 'end poverty in all its forms everywhere' Pakistan observed a decline in the percentage of the population living below the national poverty line from 57.8 per cent in FY1999 to 24.3 per cent in FY2016. While 38.8 per cent of the total population of Pakistan (or 74 million people) was multidimensional poor in FY2015.[19] The rate of reduction in poverty has been slower than the rate of GDP growth in Pakistan. This is mainly due to the rising income inequality, sluggish agricultural growth, and economic policies that do not favour the poor. The poor are not only deprived of income or capability but are also vulnerable to disease, economic downturns, natural disasters and even violence. Women, children and elderly are the most vulnerable, given their marginalized status in the society.
- *Inequality:* SDG 10 focuses on 'achieving income equality globally'. The GDP growth composition has increased inequality in Pakistan. According to Dr Mahbub ul Haq, in 1968, a total of 22 families of Pakistan controlled 66 per cent of industrial assets and 87 per cent assets of the banking sector.[20] With every one rupee expansion in GDP, 36 paisas go to the rich and 3 paisas to the poor.[21] The tax system is regressive with indirect taxes accounting for 80 per cent of the total tax revenues. The richest 10 per cent pay 10 per cent of their income in indirect taxes, while the poorest 10 per cent pay 16 per cent of their income in indirect taxes.[22] As a result, income inequality has widened. The income share of the richest 20 per cent of the population increased by 12 per cent (from 43.5 to 48.7 per cent) between 1987-88 and 2010-11, while the income ratio of the poorest 20 per cent of the population decreased by 21 per cent (from 8.8 to 7.0 per cent) during this period. Pakistan's income inequality is rooted in the unequal access to assets.

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Forty-eight per cent of rural households in Pakistan are landless and this ratio goes up to 62 per cent in Sindh Province.[23]

- *Education:* In Pakistan, four out of every 10 children (42 per cent) were illiterate in 2015-16.[24] Out of the children enrolled in grade I, one-third drop out before reaching grade V. In 2016-17, 44.3 per cent (or 22.8 million) of children (aged 5 to 16 years) were out-of-school in 2015; 53.2 per cent of them were girls.[25] According to the *Global Competitive Report 2016-17*, Pakistan ranked 115th out of 138 countries in terms of the quality of primary education. To achieve SDG 4 'inclusive and equitable education', the country needs to improve the quality and quantity of its education system.
- *Health:* In 2015, Pakistan ranked 160th among 195 countries in health care access and quality, and was only ahead of Afghanistan in South Asia.[26] Similarly, Pakistan ranked 149th (276 deaths per 100,000 births) out of 179 countries on the Maternal Mortality Ratio Index in 2015.[27] In 2018, Pakistan was one of only three countries in the world with endemic polio alongside Afghanistan and Nigeria. In 2016, Pakistan ranked fifth with regards to the highest-burden of tuberculosis.[28] Moreover, Pakistan has the third-highest rate of infant mortality in the world.[29] Additionally, one-third (31.5 per cent) of rural households in Pakistan have no toilet facility at all. Only 20 per cent of urban and 1.5 per cent of rural households use appropriate measures to clean (drinking) water. Around 55 per cent of deliveries in rural areas are attended by traditional birth attendants and relatives. The government is spending only 0.97 per cent of GDP on health (in FY2018) compared to WHO's recommendation of 5 per cent, which could impede the achievement of SDG 3 on health.
- *Food security*: Four out of every ten (36.9 per cent) people in Pakistan are food insecure.[30] Despite being an agrarian economy, Pakistan ranked 77th out of 113 countries on the Global Food Security Index 2017.[31] Globally, Pakistan has the 2nd largest number of stunted children, the 3rd largest number of wasting children, and 3rd largest number of anaemic women.[32] Lack of adequate nutrition is the basic reason for food insecurity in Pakistan, which is a basic human right under SDG 2 'ending hunger, achieving food security and improving nutrition and promoting sustainable agriculture'.

Four out of every ten (36.9 per cent) people in Pakistan are food insecure

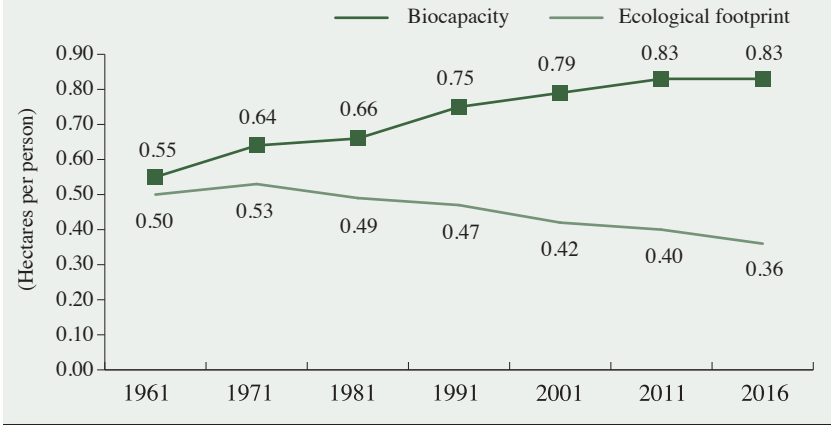
The widespread deprivation and extreme poverty in the form of lack of access to income, health care and education force people to engage in activities that harm the environment. Environmental deterioration in the form of polluted air and water and the loss of biodiversity along with the phenomenon of global warming increases the vulnerability of people while decreasing the productivity of the populous. This has not only put people in the vicious cycle of poverty and environmental deterioration but has also jeopardized the overall economic growth of the country. Therefore, policies should focus on people's empowerment as an essential part of environmental sustainability.

Economic growth and environmental sustainability in Pakistan

A safe and healthy environment, central to the concept of human development, translates into economic growth of the country. Environment sustainability is also important for eco-services and sustainable natural resources required by the local industry. In Pakistan damage to

the environment has reached a threshold which is not only threatening growth but also derailing the progress achieved under social indicators. In 1961, Pakistan's natural resource demand (ecological footprint) exceeded its natural resource supply (bio-capacity) by 12 per cent. The situation worsened over time and the gap increased by 60 per cent in 1991 to 129 per cent in 2016 (see figure 4.2). The situation represents a persistent increase in the ecological deficit in Pakistan over the last four decades. This implies that Pakistan's demand for the goods and services that its land and sea can provide has continuously exceeded the speed with which the ecosystems can renew/regenerate themselves.

Figure 4.2 Ecological footprint and biocapacity in Pakistan, 1961-2016



Source: GFN 2019.

Pakistan's environmental quality can be assessed by Environmental Protection Index (EPI) and other related indicators. Pakistan ranked 169th among 180 countries in its efforts to address environmental sustainability challenges, according to the 2018 EPI. The index ranks 180 countries on 24 environmental performance indicators covering ecosystem vitality and environmental public health. Table 4.1 provides a summary of the indicators and the corresponding performance of 180 countries in each category. This ranking helps show how far the environmental policy goals of a country have been achieved and also helps gauge the performance of a country against various other environmental indicators. A high EPI rank of a country indicates the need for national-level sustainability efforts on a number of fronts, especially on improving air quality, protecting biodiversity and decoupling GHG emissions from economic activity. Within South Asia, Pakistan has performed lower than Sri Lanka (70), the Maldives (111), Bhutan (131) and Afghanistan (168), but better than Nepal (176), India (177) and Bangladesh (179).

The EPI of Pakistan shows a downward trend whereby it falls among the countries with the highest levels and exposure to indoor and outdoor air pollution resulting in an increased risk of fatal respiratory diseases. According to the rankings presented in table 4.1, Pakistan has a high level of outdoor pollution with an acute issue of smog, however, it performs slightly better than India, Bangladesh and China. Household air pollution in Pakistan is rampant too. It is ranked 141st in this regard which is far worse than Malaysia which ranks 45th.

With regards to the quality of water, Pakistan only ranks better than India. Table 4.1 shows China and Malaysia perform significantly better than other countries.

Similarly, in the agriculture sector, nitrogen pollution from fertilizers has the potential to cause widespread damage if not managed appropriately. Pakistan leads 131 countries on the sustainable nitrogen management index, with negative implications for food security, environment and climate. Lead is a major environmental threat in Pakistan due to its penetration in soil, air and water, which has adversely impacted the health of children and pregnant women. Pakistan also continues to witness sharp declines in biodiversity.

In addition to the above EPIs, it is important to note that adverse impacts of climate change are widely visible on food, energy and water security in Pakistan—despite its meagre share of 0.8 per cent of the total global GHG emissions. The intensity of carbon dioxide (CO_2) is

Table 4.1 Environmental protection in Pakistan and selected countries from South and East Asia, 2018						
	India	Pakistan	Bangladesh	China	Indonesia	Malaysia
Environmental Protection Index	177	169	179	120	133	75
Air pollution and quality						
Household solid fuel use (DALY rate)	137	141	143	110	112	45
$PM_{2.5}$ exposure ($\mu g/m^3$)	178	176	178	177	141	148
$PM_{2.5}$ exceedance (% population)	178	176	179	177	138	149
Sulfur oxide (Mt/constant 2011 international $)	143	161	85	65	113	142
Nitrogen oxide (Mt/constant 2011 international $)	97	102	139	65	77	54
Water pollution						
Drinking water (DALY rate)	148	142	129	37	125	77
Sanitation (DALY rate)	144	137	127	56	119	46
Wastewater treatment (%)	107	139	143	66	140	58
Land pollution						
Lead exposure (DALY rate)	175	178	177	130	107	82
Sustainable nitrogen management index	125	131	52	61	51	79
Climate and energy						
Carbon dioxide total (kt CO_2eq/B$)	126	48	108	38	54	115
Carbon dioxide from power sector (g CO_2/kWh)	128	74	102	57	108	104
Methane (kt CO_2eq/B$)	35	134	68	15	69	65
Nitrous oxide (kt CO_2eq/B$)	55	130	59	4	69	24
Black carbon (kt CO_2eq/B$)	88	102	93	48	81	35
Biodiversity						
Marine protected area (% of Exclusive Economic Zone)	83	69	36	46	43	82
Terrestrial biome protection (national weights) (% of biomes)	143	122	89	87	100	1
Terrestrial biome protection (global weights) (% of biomes)	144	113	158	108	105	1
Species protection index	126	125	152	100	94	58
Protected area representativeness index	154	150	166	118	117	131
Species habitat index	83	85	41	132	150	161
Fish stock status (% of catch)	22	96	3	16	42	52
Regional marine trophic index	103	73	97	61	65	50
Tree cover loss (%)	68	6	98	72	135	136

Source: Wendling *et al*. 2018.

low in Pakistan, however, the intensity of methane, nitrous oxide and black carbon are among the highest compared to other countries in table 4.1.

Based on this analysis and background, major environmental challenges and threats are discussed in the next section in detail.

Environmental threats and challenges in Pakistan

This section presents detailed facts about imminent environmental threats faced by Pakistan and in this context, analyses overall impacts of these threats on equality, human development and economic growth in the country. It further suggests how improving the situation could help reap benefits for sustainable economic growth in the country.

High energy use

Energy is the backbone of an economy. Energy crises have resulted in economic crunches worldwide and fueled innovation so that new, affordable, sustainable

and cleaner means of energy production might be adopted. Pakistan is largely dependent on expensive imported oil and hydrocarbon reserves to meet its energy demands. The energy sector in the country is faced with multiple issues ranging from inefficient use and access to energy. The country's current access to clean fuel (gas) is estimated to be at 56 per cent.[33] To achieve inclusive and sustainable economic growth, Pakistan needs to undergo an energy transition whereby growing energy needs are met through an affordable energy mix coupled with a larger portion of renewables coming from domestic energy sources such as hydel, solar and wind.

On one hand, Pakistan depends on expensive imported oil and decreasing hydrocarbon reserves for energy. On the other hand, the country is facing the problems of inefficient use of energy and insufficient access to electricity. The country's current access to clean fuel (gas) is estimated at 56 per cent.[34] Moreover, the energy efficiency ratio is also very low. Pakistan needs to meet its growing energy needs by consuming domestic hydel and renewable resources at a reasonable price to achieve higher and inclusive economic growth.

Over the last three decades, the energy mix in Pakistan moved from one dominated by hydroelectric power to a fossil fuel-led mix. Currently, Pakistan is producing two-thirds (64 per cent in 2017-18) of its electricity from thermal, 27 per cent from hydro, 7 per cent from nuclear and only 2 per cent from renewable sources.[35] More reliance on non-renewable energy has aggravated the issues of air pollution and climate change, lowered industrial competitiveness due to rising costs, and increased current account balance due to volatility of prices in the global market. For instance, the share of energy in Pakistan's domestic greenhouse gas (GHG) emissions increased from 39 per cent in 1990 to 44 per cent in 2014.[36] Similarly, an increasing reliance on imported sources of energy (equivalent to US$ 14.4 billion in FY2018) contributed to an ever-expanding current account deficit (of US$ 18.1 billion in FY2018) with energy imports accounting for 24 per cent of total imports in FY2018.[37]

The country has the highest energy intensity in South Asia after Nepal, indicating the inefficient use of energy for the production of goods and services (see figure 4.3). The country uses 80 per cent more energy than Bangladesh, two times more than Sri Lanka, about four times more than Singapore and five times more than Japan, for each dollar of its GDP. This clearly indicates the inefficient production systems in the country. By increasing energy efficiency in industry, agriculture and services, Pakistan can not only address its energy crisis but can further reduce its current and future domestic GHG emissions. For instance, globally industry has the technical potential to decrease its energy intensity down by 26 per cent and emissions down by 32 per cent.[38] According to the National Energy Conservation Centre (ENERCON), annual energy savings of up to 25 per cent are possible in all sectors of Pakistan that approximately translate into US$ 3 billion in savings annually.[39] In this context, Pakistan needs to learn from successful initiatives implemented at the regional level by countries like India and China (see box 4.1).

Figure 4.3 Energy intensity in Pakistan and selected countries of Asia, 2015

Source: IEA 2017.

Box 4.1 Renewable energy revolution in India and China: Lessons for Pakistan

India: National Solar Mission is working to deploy 100,000 MW of solar power across the country by 2021-22 from a mere 36 MW in 2010-11, comprising of 40 gigawatts (GW) Rooftop and 60 GW through Large and Medium Scale Grid Connected Solar Power Projects. The expansion of solar power in India is projected to abate 170 million tons of CO_2 over its lifetime, create one million full-time jobs, bring clean energy to rural areas and boost economic growth. India's wind and solar sectors have already created 70,000 full-time jobs so far.

China: China is at the centre of a global energy transformation, which is being driven by technological change and the falling cost of renewables. According to the McKinsey Global Institute, with less intensive energy use and increased efficiency, energy productivity in the global economy could increase by 40 to 70 per cent over the next two decades. China has already made significant progress in reducing its resource intensity between 1980 and 2010; its economy grew 18-fold, while its energy consumption grew only fivefold, reflecting a 70 per cent decline in energy intensity per unit of GDP. China plans to reduce its energy intensity by a further 15 per cent between 2016 and 2020. This success is explained partly by its shift to renewables, it is investing US$ 100 billion annually in domestic renewables, which is more than the combined investment made by the US and the EU. Its experience in reducing energy intensity can serve as a road map for developing countries, especially Pakistan.

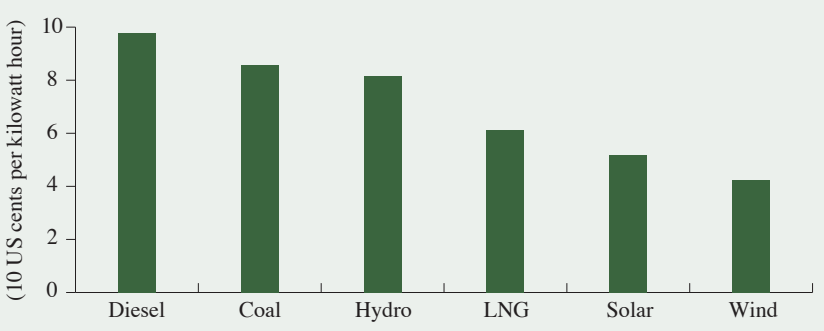
Sources: Jaiswal 2015 and Kejun and Woetzel 2017.

The poor energy mix and the low efficiency of the energy sector of Pakistan are attributed to poor implementation of energy policies. National targets on energy transition are either missing or lack coherence when it comes to various strategic documents such as that of Vision 2025, climate change policy and renewable energy policy. The massive construction of dams and reservoirs was deferred repeatedly, while expensive oil-based power plants were promoted, bringing the industrial sector to its knees because of the high cost of power generation. Instead of focusing on low-cost renewables such as wind, solar, biomass, algae and the hydro potential (see figure 4.4), inefficient thermal-based power generation was promoted.

With over two million new entrants in the labour force every year, the country needs to generate jobs. The economy requires energy to boost industry, agriculture and the service sectors. Rebalancing the energy mix towards renewable resources will not only reduce the cost per unit of energy production but also be environmentally friendly. Pakistan has a huge potential for energy generation from renewable resources; wind [(346,000 megawatts (MW)], solar (2.9 million MW) and hydro (100,000 MW).[40] Pakistan's future electricity demand is projected to increase from (maximum) 25,000 MW in 2018 to 49,000 MW by 2025.[41]

The government laid out ambitious goals under the Vision 2025 in accordance with SDG 7 'ensuring access to affordable, reliable, sustainable and modern energy for all' to increase access to electricity to over 90 per cent of the population and to reduce average cost per unit by over 25 per cent by improving the energy generation mix. The country's energy priority development plans under the CPEC inlcude: hydropower projects in Karot (of 720 MW) and Naran (of 870 MW) costing US$ 1.71 billion each, the US$ 1.3 billion solar power park of 1,000 MW in Bahawalpur, and 297 MW of five wind projects in Thatha costing US$ 0.65 billion.[42] However, the focus is on coal-based energy projects (with six projects of 7,920 MW total capacity in the cities

Figure 4.4 Energy cost by a source in Pakistan



Source: Khan 2018.

of Hub, Thar, Sahiwal and Karachi, and one project of 300 MW capacity in Gwadar) which needs to be monitored strictly in terms of their impact on the environment. In China, the demand for coal to generate electricity is on a decline due to climate policies and declining costs of renewable resources.[43] However, coal consumption for energy generation in Pakistan is on the rise.

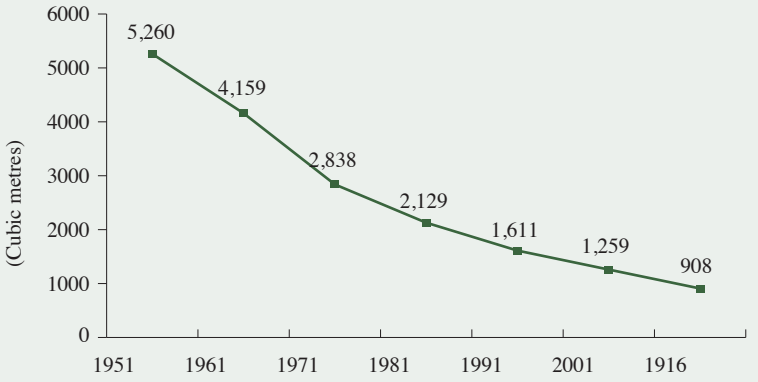
Water security: Issues and challenges

Sustainable and efficient management of freshwater resources is essential for human health, environmental sustainability and economic development, as has been reiterated by the SDG 6 'ensuring availability and sustainable management of water and sanitation for all'. However, this vital resource is under threat in Pakistan, mainly due to poor formulation as well as the inadequate implementation of water policies.

Pakistan is a 'water scarce' country with per capita water availability of less than 1,000 cubic metres (908 cubic metres in 2016). In 1951, Pakistan had an abundance of water with 5,260 cubic metres per capita, however, the country became 'water vulnerable' in 1981 with less than 2,500 cubic metres of water availability per capita to 'water-stressed' in 1991 with less than 1,700 cubic metres of water per capita (see figure 4.5).[44] By 2025, Pakistan could face droughts as its per capita water availability is going to become 'absolutely scarce' with less than 500 cubic metres.[45] The situation is attributed to rapid population growth, poor water governance and climate change. Such a situation has devastating consequences for the sustainability of the economy and the environment.

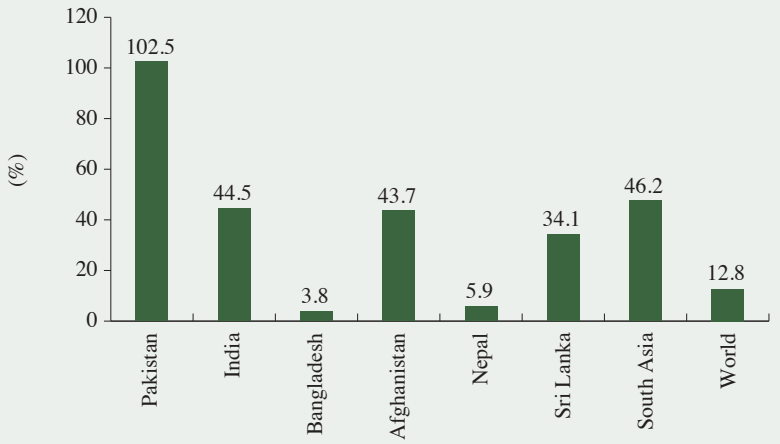
Pakistan ranks number 15 out of 190 countries in terms of water stress level, defined by the ratio of freshwater withdrawals to total renewable freshwater resources. The ratio reaches 102.5 per cent for Pakistan compared to 47.5 per cent for South Asia and 12.7 per cent for the world (in 2014) (see figure 4.6). According to the International Monetary Fund (IMF), Pakistan has the world's fourth-highest rate of water usage, but it is dependent on a single source, the Indus River Basin, with the monsoon rainfall steadily declining. The country's water intensity rate—water used per unit of GDP—is also among one of the world's highest, making the Pakistani economy the most water-intensive economies of the world.[46] More worrying is that Pakistan's groundwater supplies, the last resort of water security, are also depleting rapidly. NASA's satellite data (released in 2015) of global underground water aquifers reveals that the underwater aquifer in the Indus Basin, whose rivers and tributaries constitute Pakistan's key water resource, is second-most stressed in

Figure 4.5 Trend in water availability in Pakistan, 1951-2016



Source: APP 2017c.

Figure 4.6 Level of water stress: Freshwater withdrawal as a proportion of available freshwater resources, 2014



Source: UN 2019.

the world.[47] Demand for water is on the rise and is projected to reach 274 million acre-feet (MAF) by 2025, mainly due to increasing population, expanding cities and rising incomes, while supply is expected to remain stagnant at 193 MAF (143 MAF from river inflows plus 50 MAF from groundwater), resulting in a demand-supply gap of approximately 81 MAF.[48]

Pakistan's water sector is facing a number of challenges such as population growth, climate change, poor agricultural sector water management, inefficient infrastructure and water pollution.

Population growth: The biggest challenge to deteriorating water resources and decreasing per capita water availability in Pakistan is population growth and urbanization. Pakistan was the fifth most populous country in the world (after China, India, the US and Indonesia) in 2019 compared to 1990 when it was the eighth-most populous country and 1950 when it was 14th most populous global country.[49] Between 1998 and 2019, Pakistan's population increased from 134.8 million to 216.6 million, growing at an annual rate of 2.3 per cent. If the population continues to increase at the same rate, by 2050 Pakistan with a population of over 450 million would become the fourth most populous country in the world after India, China and Nigeria.[50] It would be an enormous challenge for the country to provide drinking water, to feed, to provide jobs and to provide electricity to the growing population because all these factors are linked to the availability of water.

Table 4.2 Water use by sector in Pakistan, 2016

	2016
Agriculture	91.6
Environment	3.3
Domestic	2.6
Industry	2.5

Source: UNDP, Pakistan 2016.

Climate change: Global warming is one of the greatest threats to water security in Pakistan. The Indus River Basin, Pakistan's chief water source, is seasonally fed by snow and rain in the western Himalayas. Global warming is going to have devastating consequences for the economy of Pakistan, especially the farm sector given that about 90 per cent of the country's agricultural sector output depends on the Indus Basin Irrigation System.[51] About 85 per cent of annual river flows along with monsoon rains occur during the months of June-September.[52] The glaciers are already thinning by up to one metre per year, and the glacial melt has increased by 25 per cent in recent years. The frequency of rains has decreased while the intensity of (monsoon) rains has increased. The Indus River has already shrunk into a canal in the Sindh Province where a large number of farmers have migrated to urban areas due to shortage of water. According to the World Bank, the river flows in the Indus Basin will increase during the first 50 years and decrease by 30 to 40 per cent during the next 50 years time. The change in surface water will also have consequences for the recharge of groundwater.

Inefficient use of water in agriculture: Pakistan's agricultural sector consumes 91.6 per cent of total available water resources, followed by the environmental (3.3 per cent), domestic (2.6 per cent) and industrial (2.5 per cent) sectors (table 4.2). However, the crop productivity of the country is very low. Pakistan's cereal crops productivity per unit of water is 0.13 kg per cubic metres which is only one-third that of India (0.39) and one-sixth that of China (0.82).[53] Similarly, Pakistan's water usage for wheat productivity of water (0.5 kg per cubic metres) is one-half that of India and one-third that of the US (California). However, in Pakistan, some farmers making efficient use of water technology have improved crop yields significantly. The average differ-

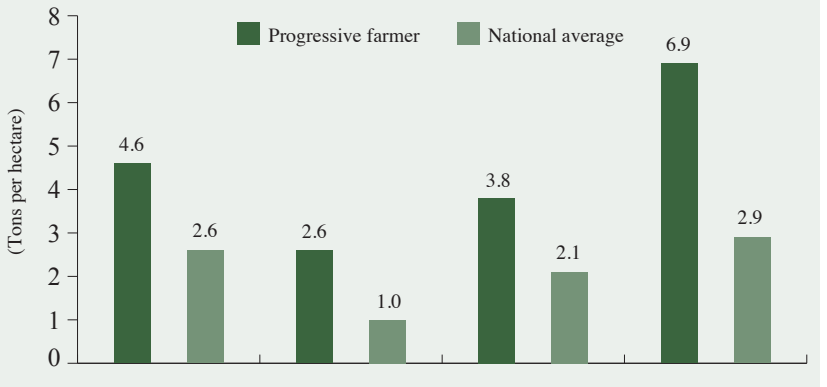
ence between the yields of progressive farmers when compared to the national average is 43 per cent greater for wheat and 62 per cent higher for cotton (see figure 4.7).

Inefficient water infrastructure: The crumbling of water infrastructure contributes to extensive water wastage. About one-fourth of water is wasted during the irrigation process in the fields due to the use of outdated irrigation techniques.[54] Moreover, canal water is immensely underpriced, recovering only one-quarter [24 per cent in the form of *abiana* (canal water charges)] of annual operating and maintenance costs, while the collection is 60 per cent of total receivables. Though the farm sector accounts for one-fifth of GDP and almost half of the country's employment, it contributes less than 0.1 per cent to total tax revenues, providing little finance for the maintenance of the irrigation system.[55]

Pakistan can save only 9 per cent (13.1 MAF out of 143 MAF total river flows) of the available water in the Indus River System throughout the year, compared to the minimum requirement of 40 per cent capacity of water storage. This provides the country with a stored water supply to meet its needs for 30 days only compared to 120 days in India and 1,000 days in Egypt. In terms of per capita water storage capacity, Pakistan has the lowest capacity in the world only after Ethiopia (see figure 4.8). This also shows Pakistan's failure to utilize its hydro potential. Of 50,000 MW hydropower potential from the Indus River Basin, the country has developed only 13 per cent.[56] Every year, around 28 MAF water is wasted in Pakistan due to poor storage facilities and accumulation of silt in the main water reservoirs of Tarbela and Mangla.[57] Similarly, about 70 per cent of the country's 291 millimetres of annual rainwater also gets wasted due to inadequate storage facilities and accumulation of silt in water reservoirs.[58] Increasing the cost of water consumption will not only push consumers to use water more judicially but also generate sufficient revenues for the government to repair and maintain the irrigation system. Repairing and maintaining the country's existing canal systems would free up about 75 MAF of water which is very close to the projected 83 MAF water shortfall by 2025.[59]

Water pollution: Besides water scarcity, the country also suffers from the rampant issue of water pollution due to contaminated agricultural run-offs and untreated industrial and the household waste being dumped into surface water. In 2015, 35.6 per cent of Pakistan's population used safely managed drinking water services

Figure 4.7 Crop yield gap of progressive farmers versus average farmer in Pakistan



Source: GOP 2012a.

Figure 4.8 Per person water storage capacity in Pakistan and selected countries of the world

Source: GOP 2017a.

compared to 56.2 per cent in South Asia and 71.2 per cent in the world—an improved water source located on-premises, available when needed and free from contamination (see figure 4.9). The ratio not only declined since 2000 but also varied from 32.4 per cent in rural to 40.7 per cent in urban areas in 2015, indicating inequitable access to clean drinking water. Similarly, 11.6 per cent of the population practiced open defecation, with the ratio increasing to 18.9 per cent in rural areas of the country in 2015.[60] Besides impacting water pollution, open defecation also contributes to diarrhoea and intestinal parasites, making children vulnerable to malnutrition. The situation varies in provinces as well. The ratio of the population with access to water from safe sources varied from 19 per cent in both Sindh and Balochistan to 35 per cent in Punjab and 53 per cent in Khyber Pakhtunkhwa (KP) in 2015.[61] The burden is the highest on women. According to the *Pakistani Rural Household Survey 2001*, women spent 60 per cent of their time in collecting water in rural Balochistan and 40 per cent in rural Sindh.[62]

An alternative to safely managed drinking water in the urban and peri-urban areas, albeit its cost, is the use of bottled water. However, 42 of the bottled water brands have been found to be selling unsafe drinking water in the country.[63]

In the absence of sanitation and waste management facilities, much of the wastewater, raw sewage and solid waste are discharged into surface water. Every year about half of the two million produced wet tons of human excreta go on to pollute water in Pakistan.[64] Globally, there has been a shift from recognizing wastewater as an unpleasant by-product of the water cycle towards recognizing its potential as a resource for different sectors. However, most wastewater still remains untreated. In 2011, in Pakistan 82 per cent of discharged wastewater remained untreated, flowing into surface water without any treatment and damaging the quality of groundwater as well.[65] The groundwater is also found to have arsenic fluoride and bacterial contamination. According to a study, in Pakistan 60 million people are at risk of exposure to high concentrations of arsenic in groundwater on the Indus Plain, which most likely contains more than 50 micrograms per litre, which is five times higher than WHO guidelines mainly due to extensive irrigation.[66]

Water-borne diseases are a leading cause of deaths and sufferings in Pakistan. Overall, about 60 per cent of people in Pakistan are suffering from one or more of the main diseases associated with inadequate provision of drinking water and improved sanitation.[67] They fill about one-third of hospital beds and account for about 40 per cent of all premature deaths in the country.[68] The burden is the highest on children, as 60 per cent of infant deaths in Pakistan are caused by water infections.[69] In 2017, 60 thousand people in Pakistan died prematurely due to inadequate water and sanitation facilities: half of them were children under-five.[70] Recently, Pakistan has also seen the emergence and resurgence of diseases like polio, dengue fever, and hepatitis A and E. Pakistan is among the top five countries of the world with the highest rate of diarrheal deaths.[71] Diarrhoea alone accounts for 54,000 deaths

Figure 4.9 Proportion of population using safely managed drinking water services, 2000-2015

Source: UN 2019.

among children under-five, which means every hour more than five children die as a result of diarrhoea.[72] Beyond human costs, the financial repercussions of dirty water and poor sanitation are immense. The economic costs to Pakistan of poor water and sanitation, floods and droughts are estimated to be four per cent of the GDP or about US$ 12 billion per year.[73] The burden is higher on the poor. In Pakistan, only 13 per cent of the poorest 20 per cent of the population has access to improved sanitation facilities compared to 80 per cent of the richest.[74]

Water policies: In 2018, Pakistan formulated its first-ever National Water Policy after facing delays in its approval for more than a decade. It acknowledges for the first time that water is a finite resource and that Pakistan has to learn to at least recover the costs of the irrigation system from water charges. The policy looks at the future impacts of climate change on water, talks about water pricing and mentions the need for regional cooperation challenges. Water experts, however, see a number of shortcomings in the policy such as the absence of a scientific basis for the policy, the neglect of water quality issues, the absence of comprehensible quantitative targets, the absence of clear references to the SDGs and a lack of gender inclusion. Such gaps need to be addressed during the implementation phase. Also, there is a need for clear timelines, capacity, political will and provision of financial resources.[75]

Moreover, a comprehensive framework is needed at the provincial level along with effective implementation. Some initiatives do exist such as the 'Clean Drinking Water for All' Project in Punjab, and the Balochistan Integrated Water Resources Management (IWRM) Policy 2006. However, the focus on irrigation and water resource management has been insufficient or non-existent, and the implementation has been weak and inadequate.

Air pollution

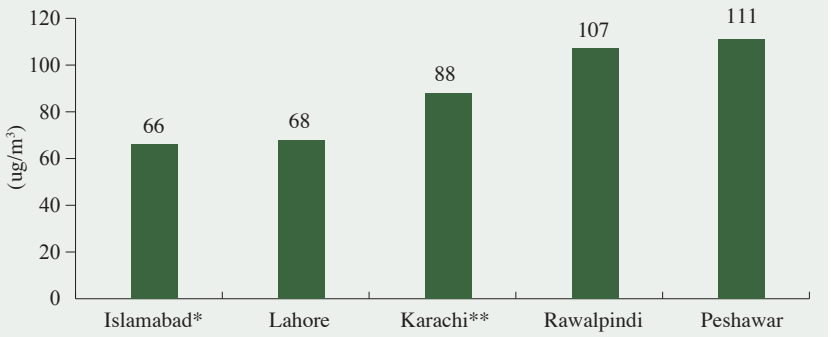
Air pollution is a major health, environmental and developmental risk in Pakistan. Reducing the level of air pollution will help the country to achieve several SDGs including SDG 7 'energy', SDG 9 'industry' and SDG 11 'cities'. The exposure to air pollution—ambient (outdoor) fine particulate matter, ozone pollution and household air pollution—was the fifth-largest leading contributor to early deaths in Pakistan in 2017, accounting for 15.1 per cent of total premature deaths and 11.1 per cent of total national disability-adjusted life years (DALYs).[76] The top four risk factors were malnutrition, dietary risks, high blood pressure and tobacco. The health impacts, in turn, have put a drag on the economic development of the country. Premature deaths due to air pollution in 2013 cost the Pakistani economy US$ 6.6 billion[77] (1 per cent of GDP) in lost labour income and US$ 47.7 billion (5.9 per cent of GDP) in welfare losses.[78]

Air pollution is especially higher in the fastest-growing urban areas of the country due to increasing economic activity. However, it is also a problem outside cities. Millions of people in the country continue to depend on burning solid fuels such as wood, charcoal, coal and dung for cooking and heating in their houses.

Urban air pollution: A growing challenge: Karachi, Lahore, Islamabad, Peshawar and Rawalpindi are among the top 117 cities of the world (out of 2,972 cities) in terms of the mean concentration of $PM_{2.5}$ (see figure 4.10). A most recent study in 2019 showed Faisalabad and Lahore among the 10 most polluted cities of the world in 2018.[79] On an average, the level of air pollution, measured by $PM_{2.5}$, in the urban areas of Pakistan (74 $\mu g/m^3$ in 2018) is over seven times higher than the WHO guidelines of 10 $\mu g/m^3$ and

In Pakistan, only 13 per cent of the poorest 20 per cent of the population has access to improved sanitation facilities compared to 80 per cent of the richest

Figure 4.10 The levels of fine particulate matter ($PM_{2.5}$) in selected cities of Pakistan



Notes: *: Data is for the year of 2011. **: Data is for the year of 2009.
Source: WHO 2017c.

five times higher than the Pakistani national standard of 15 μg/m^3.[80] It was the second-highest in the world after Bangladesh (97.1 μg/m^3). This situation is attributed to low-quality vehicular fuel and uncontrolled industrial emissions. Only three per cent of the country's industrial plants have been found to treat their waste and emissions according to commonly accepted international standards.[81] In 2017, long-term exposure to ambient $PM_{2.5}$ contributed to 63.7 thousand deaths from heart disease and stroke, lung cancer, chronic lung disease and respiratory infections. These deaths accounted for 7.5 per cent of all national premature deaths. It also caused a loss of 2.4 million years of healthy life (DALYs), numbering to 5.5 per cent of all national DALYs. Out of the top 10 most populous countries of the world and the EU in 2015, Pakistan had the highest age-standardized DALY rate at 3,100 per 100,000 people attributable to $PM_{2.5}$ that was 10 times the lowest rates, found in the US and Japan.[82]

Household air pollution: In 2017, a total of 108 million people (or 52 per cent of the total population) were exposed to household air pollution from solid fuel burning, making the country the fifth-largest in the world in solid fuel use.[83] They continue to depend on polluting fuels, including biomass fuels (wood, dung and agricultural residues), kerosene and coal, for their energy needs, resulting in high levels of household air pollution.[84] Exposure to household air pollution leads to acute lower respiratory infections in children under-five, and ischaemic heart disease, stroke, chronic obstructive pulmonary disease and lung cancer in adults. In 2017, household air pollution caused 59 thousand premature deaths, accounting for 7.0 per cent of national premature deaths. It also caused a loss of 2.3 million years of healthy life (DALYs), numbering 5.4 per cent of all national DALYs.[85] The burden of disease attributable to household air pollution falls more on the elderly. Of the total burden of deaths attributable to household air pollution in Pakistan, one-third (33.3 per cent in 2017) accounted for was that aged under-five.

Policies: Pakistan's air quality management framework dates back to 1993 when the National Environmental Quality Standards (NEQS) were introduced. The NEQS were revised in 1999 and implemented in 2000. The country does not have an air quality management policy: air is covered under the Pakistan Environmental Protection Act (PEPA) 1997 framework. Pakistan Clean Air Programme 2005 provided a list of interventions for improving air quality concerning vehicles, industries, solid waste burning and natural dust. In 2010, the federal EPA drafted and Pakistan Environmental Protection Council (PEPC) approved the National Air Quality Standards, which established NEQS for ambient air quality. It also revised emission standards for all new and in-use vehicles.

Besides the government's focus on promoting Liquid Petroleum Gas (LPG), the Pakistan Council of Renewable Energy Technologies is also developing solar cookers for mass dissemination. The government is also working on some wind and solar projects.

Several ministries are involved in air quality management. For instance, the Ministry of Energy is responsible for combating adulteration of fuel and

increasing standards, particularly by lowering sulfur content for refined fuel in the country. It is also responsible for clean fuel imports and encouraging the use of compressed natural gas (CNG) in vehicles. It along with the Ministry of Finance, Revenue and Economic Affairs are responsible for fuel pricing and subsidies. The Ministry of Industries and Production is responsible for regulating the types of vehicles that could be imported, potentially constraining imports of high-polluting vehicles at the gate. It is also responsible for measures aimed at modernizing the fleet of public service vehicles and scrapping older vehicles. And, the Ministry of National Food Security and Research is responsible for regulating the burning of sugarcane fields and agricultural waste. The 18th Constitutional Amendment devolved responsibilities for environmental management to provincial governments. However, the provinces have taken responsibilities in an *ad hoc* manner. While decentralization of environmental management responsibilities offers many benefits, including the capacity to respond more effectively to local priorities, there are also significant trade-offs and risks. For example, unequal definition and enforcement of environmental standards, as well as differences in the capacity of environmental agencies, could lead to more severe environmental degradation in different parts of the country.

Solid waste management

With an increasing population and uncontrolled urbanization along with unsustainable consumption and production patterns, solid waste generation is increasing in Pakistan. The country is facing serious issues including low waste collection rate, unsafe informal recycling practices and uncontrolled disposal. As a result, this is polluting air, water and soil, and harm sustainable development: 12 out of 17 SDGs are directly linked to solid waste management. The affected areas include living conditions, sanitation, public health, marine and terrestrial ecosystems, access to decent jobs, as well as the sustainable use of natural resources.

Pakistan generates about 48 million tonnes of solid waste annually, and that number is growing by over 2.0 per cent each year.[86] Wastes generated by manufacturing, hospitals and health-care facilities, and nuclear power and fuel processing plants are projected to more than double within 10 to 15 years.[87]

Pakistan generates about 48 million tonnes of solid waste annually, and that number is growing by over 2.0 per cent each year

Only 60 per cent of solid waste is collected by municipal authorities, and the rest remains uncollected. Even the collected waste is mostly dumped in open fields or is incinerated. The waste dumped at landfills often pollutes groundwater and creates other social problems, whereas incinerated waste creates air pollution. The major obstacles to proper solid waste management in Pakistan include bureaucratic hurdles, lack of urban planning, inadequate waste management equipment and low public awareness.

Open dumps of waste serve as breeding grounds for flies and mosquitoes creating health hazards. Uncontrolled waste dumping and informal recycling using obsolete technology have had harmful impacts on the health of workers, waste pickers and people living nearby. Jam Chakro in Karachi city of Pakistan is one of the largest dumpsites in the world, extending over 202 hectares. The dump 'serves' one of the biggest informal sector communities with more than 5,000 members and affects the life and health of an additional 5 million people living within 10 kilometre (km) of the site.[88] Waste dumps have become a source of child labour who besides being out of school also face severe hazards from the unsafe handling of waste. Every year, about 5.2 million people, including four million children, die from waste-related diseases in Pakistan.[89]

Some efforts are being made in the urban areas of Pakistan. The Lahore Waste Management Company has set up a safe waste disposal site and is

also working on the generation of energy from municipal waste. Similarly, Karachi is also working on similar initiatives for safe disposal and turning waste to energy in collaboration with a Chinese firm. Some civil society initiatives are also playing a very important role such as *Gul Bahao Trust* in Karachi (the city generates 12,000 tonnes of waste every day) which is working with scavengers to recycle and reuse industrial waste (especially plastic) to create mobile homes, mobile toilets and furniture out of garbage.[90]

Gul Bahao Trust in Karachi is working with scavengers to recycle and reuse industrial waste (especially plastic) to create mobile homes, mobile toilets and furniture out of garbage

Chemicals and waste management policies: Pakistan is a signatory to the three international conventions on chemicals and hazardous waste. The country ratified the '1998 Rotterdam Convention [on Prior Informed Consent (PIC) for certain Hazardous Chemicals and Pesticides in International Trade]' in 2005, the '1989 Basel Convention (on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal)' in 1994, and the '2001 Stockholm Convention [on Persistent Organic Pollutants (POPs)]' in 2008. The conventions together constitute a life cycle approach to the sound management of chemicals and wastes. The 2017 triple Conference of Parties (COPs) of Rotterdam, Basel and Stockholm Conventions took place in Geneva to review the progress thus far and to make decisions about the sound management of chemicals and wastes in the future. The decisions made were intended to protect human health and the environment from the harmful effects of toxic substances which is also crucial for the achievement of SDGs. All the three COPs adopted several decisions including listings of new chemicals to the annexes of the Rotterdam and Stockholm Conventions and the adoption of a series of vital Technical Guidelines on environmentally sound management of waste under the Basel Convention.

In line with its commitment to three global agreements, Pakistan has also developed relevant laws. PEPA 1997 prohibits any emissions or discharges above NEQS. Other laws include the Hazardous Substance Rules drafted in 1997 and updated in 2007 and 2009, the Import Trade and Procedures Order 2000, the Explosive Act 1884, the Factory Act 1934, the Customs Act 1969, and the Pakistan Nuclear Safety and Radiation Protection Ordinance 1984.

The country's rules related to the Basel Convention include Self Monitoring and Reporting Rules 1998, Industrial Pollution Charge 1998, Revised National Environmental Quality Standards 2000, Import Policy Order 2016 and Hospital Waste Management Rules 2005. Moreover, PEPA 1997 and the Import Policy 2016 also impose restrictions on the import of hazardous wastes. Section 13 of PEPA 1997 states, *"no person shall import hazardous waste to Pakistan and its territorial waters, Exclusive Economic Zone and historic waters."* Import Policy Order 2016, inter-alia, also bans import of hazardous waste. However, the country lacks sufficient technical capacity and adequate financial resources to impose the aforementioned laws.

In compliance with the obligations set under the Stockholm Convention, Pakistan executed the first National Implementation Plan (NIP) from 2006 to 2009 to lay out a road map for addressing specific issues of POPs. Currently, the Ministry of Climate Change is running the second NIP from 2015-2019 and is also implementing the 'Comprehensive Elimination and Reduction of POPs in Pakistan' Project. The government is also developing a national action plan to protect human health and to prevent the environmental risks of POPs by enhancing and managing policies and capacities. The successful implementation of all these initiatives depends on political will along with the provision of sufficient financial and technical capacity. Moreover, there is also a need for a comprehensive policy on the efficient management of chemicals and wastes.

Coastal and marine resources

Global warming, marine pollution and overfishing have put pressure on the conservation and sustainability of coastal and marine resources bearing a negative impact on the socio-economic development of the world. Careful management of this vital resource is essential for sustainable development, as has been highlighted by the SDG 14 on 'conserving and sustainably using the oceans, seas and marine resources'.

Pakistan's coastline is about 990 km long and the Exclusive Economic Zone (EEZ) has an area of about 290,000 sq km. The maritime zone of Pakistan, including the continental shelf, extends up to 350 nautical miles from the coastline.[91]

Pakistan's coastal and marine environment faces pollution threats from both land and sea-based sources, which may threaten the sustainability of marine flora and fauna with negative implications for fish and mangroves. Among the main sources of marine pollution are industrial effluent, domestic sewage and solid waste. In Karachi, about 90 per cent of industrial effluent and sewage is discharged into the sea either directly or via the Lyari and Malir rivers. About domestic sewage, Karachi produces around 550 million gallons per day of wastewater, almost all of which goes into the sea without treatment.[92] Besides this, Karachi produces 12,000 tons of solid waste every day excluding industrial and hospital waste, of which only 40 per cent is collected.[93] Due to lack of a scientific dumping site, waste is mixed up with wastewater and ends up in the sea. A major portion of urban waste comprises of plastic, which is the worst enemy of the ocean life. About two-thirds (65 per cent) of the garbage that litters beaches along Pakistan's coast consists of plastic.[94] The increasing pollution has not only reduced overall fish-catch but has also resulted in the disappearance of several indigenous species of fish along the Sindh coast.[95]

Fisheries contribute significantly to food security. Overfishing impairs the functioning of ecosystems and reduces biodiversity, with a negative impact on sustainable development. Almost 1,000 species of marine fish (and 198 species of freshwater fish fauna) have been found in Pakistan's coastal areas of Sindh and Balochistan.[96] According to the *Comprehensive Assessment of Pakistan's Marine Fisheries Resources 2015*, Pakistan's marine fisheries resources are very productive, but over-exploited and not managed scientifically. The long-term trend from the 1970s to 2015 for all commercial marine species showed that they are being seriously overfished and the long-term viability of the resource is in jeopardy. The study recommended a 50 per cent reduction in fish catch which will increase the fish size and double the economic value of fish resources.[97] Moreover, some fish species such as *galloand kalaki* in Pasni, Balochistan Province, *zardum*, *paplet*, and *kalgun* in other areas of Balochistan, and *palla* in Sindh Province have been wiped out entirely. Similarly, two species of sawfish, knife-tooth and narrow-snout, as well as Pondicherry and Ganges sharks are critically endangered in Pakistan, while the blue whale, the largest creature on earth, is an endangered marine mammal in Pakistan.[98]

Biodiverse marine resources require safeguarding to ensure sustainable use of natural resources. In 2018, protected areas covered only 0.77 per cent of Pakistan's marine environment compared to 17.2 per cent in the world.[99]

Policies for the conservation of the sea: Pakistan ratified the '1982 United Nations Convention on the Law of the Sea (UNCLOS)' in 1997. The Convention defines the rights and responsibilities of nations for their use of the world's oceans, establishing guidelines for businesses, the environment and the management of marine natural resources. In 2015 in response to Pakistan's request, the United Nations Commission on Limits of Con-

In 2018, protected areas covered only 0.77 per cent of Pakistan's marine environment compared to 17.2 per cent in the world

tinental Shelf (UNCLCS) under the UNCLOS completed its review and accepted the country's claim for extension of its continental shelf (Exclusive Economic Zone) limits from 200 nautical miles to 350 nautical miles. The total maritime zone of Pakistan is now 290,000 square kilometre (sq km) accounting for over 30 per cent of its total land area. Besides these, the Territorial and Maritime Zones Act 1976 (amended in 1997) protects the marine environment and prevents marine exploitation. While the National Institute of Oceanography has been established to undertake research for the exploration, exploitation, utilization and management of ocean resources, to provide guidelines for national ocean policy, and the provision of data for the protection of the marine environment and oceanic resources. Another major step is the declaration of all species of marine mammals as protected under the Balochistan Wildlife Protection Act 2014.

In 2016, just 1.9 per cent of Pakistan's land area had forest cover compared to 3.3 per cent in 1990

Biodiversity and natural resources management

Deforestation, desertification and loss of biodiversity have posed serious threats to environmental sustainability and sustainable development in the country, with severe consequences for millions of people. An increase in economic growth along with a rapid increase in population has put pressure on the sustainable use of natural resources, which has resulted in declined forest cover, decreased land productivity and has threatened natural habitats in Pakistan. Given that about two-thirds of the population will be living in cities in the next 25 to 30 years, the country needs to protect its biodiversity, manage land resources sustainably and manage its forests better. This requires the country to direct its efforts to meet the targets of SDG 15 'life on land' by not only aligning its public policy to protect natural resources at the grass-root level but also to focus on a more equitable distribution of resources.[100]

Deforestation

Forests and trees act as the lungs of the Earth. They offer watershed protection, prevent soil erosion, slow climate change and provide food and livelihoods. Ideally, a country should have 25 per cent forest cover for a healthy environment. However, Pakistan has one of the lowest forestation rates in the world. About 27,000 hectares of forests are cleared every year in Pakistan (out of which 50 per cent is used for cooking and heating in households who lack access to gas).[101] According to international estimates, in 2016 just 1.9 per cent (1.47 million hectares) of Pakistan's land area had forest cover compared to 3.3 per cent (2.53 million hectares) in 1990. National-level estimates show a forestation rate of 5.1 per cent. However, all estimates about Pakistan are significantly lower than the average value of 30.8 per cent forest cover across the world, 20.0 per cent in South Asia, 23.8 per cent in India and 11.0 per cent in Bangladesh (see figure 2.11 in chapter 2). Government officials acknowledge the severity of the problem and fear the worsening impact of deforestation in the form of floods, landslides, polluted water, climate change and air pollution. Owing to rapid population growth, rising urbanization, high poverty and shortage of energy, the forestation rate has declined in the country over time. Timber mafias and locals have chopped down immense swathes of forests. People, who do not have electricity or do not get it regularly, use wood fires for lighting, cooking and warmth. In large urban areas, such as Lahore and Islamabad, infrastructure development and construction of large roads structures for individual mobility have taken a toll on forestation. Mass transit could have helped avoid this disaster but the priorities of the subsequent governments have been calamitous. According to projections in the *Worldwide Fund for Nature (WWF) Living Forests Report*, the amount of wood taken from forests and plantations each year may need to

triple by 2050 even with increased recycling, reuse and efficiency.[102]

A look at countries and their total number of trees show that countries with the highest landmass have the highest totals. Russia (642 billion) has the highest number of trees in the world followed by Canada (318 billion), Brazil (302 billion) and the US (228 billion). Pakistan is among the countries with the lowest number of trees in the world with less than one billion trees.

The situation can be explained in a better way by using the indicator of tree density. Pakistan has 1,131 trees per sq km and only five trees per person, which is only higher than Afghanistan in South Asia (see table 4.3). A desirable tree level for sustainable development requires 900 trees per person. Any gap in the desired and actual level of trees per person reflects an impediment to the long-term sustainable development of a country.

The KP government through its Billion Tree Tsunami campaign has committed to reverse the high rate of deforestation. However, the efforts are insufficient to ensure that the country's tree cover meets the minimal requirements of a developed nation. Pakistan needs to plant between 1.5 and 2.0 trillion saplings to reverse the deforestation since Independence in 1947.[103] In this context, Pakistan can learn from the success of community forest management in Nepal, which not only reversed the deforestation trend but also improved rural livelihoods (see box 4.2).

Table 4.3 Trees in South Asia, 2014

	Total tree count (millions)	Trees per square kilometres (sq km)	Trees per person
India	35,181	11,109	28
Pakistan	992	1,131	5
Bangladesh	962	6,863	6
Afghanistan	363	563	12
Nepal	3,355	22,641	119
Sri Lanka	2,437	36,777	118
Bhutan	1,851	47,572	2,418

Source: Crowther *et al.* 2015.

Policies for forestation: Pakistan has formulated several policy initiatives to address the issue of deforestation. The most important among them is the National Forest Policy 2015 which aims to protect and promote the wise use of national forests, protected areas, natural habitats and watersheds, and enhance forest cover. Increasing access to renewable energy is one of the main aims of the policy. However, what the country requires is a mechanism for increased coordination among provinces to address deforestation.

Other initiatives include the Billion Tree Tsunami Project and the Green Pakistan Programme. The KP government's 'Billion Tree Tsunami Project' was initiated in 2014, to plant one billion trees by the end of 2017. The project has been recognized as the fourth biggest initiative of afforestation and reforestation

Box 4.2 The success of community-based forest management in Nepal: Lessons for Pakistan

Pakistan can learn from the successful community forest management example in Nepal which has promoted sustainable livelihoods and focused on food security, good nutrition and improving quality of life of the poor.

Nepal has an estimated total forest area of about 5.8 million hectares, 40 per cent of the country's total geographical area. Although this area was decreasing at an annual rate of 1.9 per cent during the 1990s, this decline was reversed, leading to an annual increase of 1.4 per cent over the period 2000 to 2005.

The government recognized the need for active citizen participation in the design process for natural resource management by including community organizations in the Eighth Five Year Plan (1992-1997). While the state retained ownership of the forests, it gave community groups (under the Forestry Act of 1993 and Forest Regulations of 1995) the right to manage their forests.

The community forests management in Nepal has directly benefited about 2.2 million households, or about over one-third of the population, organized into 17,685 Community Forestry User Groups (CFUGs) that manage 1.6 million hectares of land, or over one-fourth of Nepal's forested areas.

There is evidence of significant improvement in the conservation of forests (both increased area and improved density) and enhanced soil and water management. About 74 per cent of the forest areas managed by the CFUGs have been found in good condition.

Sources: Upadhyay 2016, Manandhar and Shin 2013 and UNEP 2017.

in the world by the Bonn Challenge—a global partnership aiming to restore 150 million hectares of the world's deforested and degraded lands by 2020 and 350 million hectares by 2030. It was the Bonn Challenge's first pledge to reach its restoration goal. Under the project, the KP government added 350,000 hectares of trees both by planting and natural regeneration, to restore the province's depleted forests and fight the effects of climate change. It created more than half a million green jobs mostly to rural women and the unemployed youth.[104] By scaling up the Billion Tree Tsunami Project, the federal government has announced a five-year (2019-2023) 10 billion trees afforestation project, known as the Clean and Green Pakistan Project.

The Government of Pakistan launched the five-year (2017-2021) Green Pakistan Programme to increase forest cover at a total cost of PKR 3.7 billion in 2017. The programme aims to plant 100 million indigenous tree species to conserve and promote flora all across the country. So far, 27 million plants have been planted nationwide.[105]

Land degradation and desertification

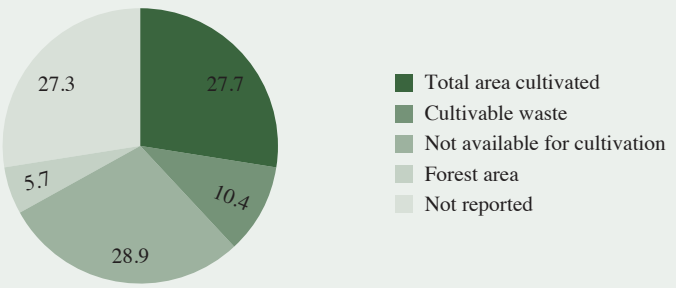
Out of Pakistan's total geographic land area of 79.6 million hectares, only 22 million (or 27 per cent) was cultivated in 2016. Twenty-three million hectares (or 29 per cent) were not available for cultivation, 8.3 million hectares (or 10 per cent) were a cultivable waste, which could not be cultivated due to lack of water or desertification, and 4.6 million hectares (or 5.7 per cent) were forests (see figure 4.11). The country is predominantly a dry land: about four-fifths of its land areas are arid or semi-arid, 12 per cent is dry sub-humid and 8 per cent is humid.[106]

With an increase in population, per capita availability of cropped land in Pakistan has decreased by about three times between 1971 and 2017, from 0.32 hectares to 0.11 hectares (see figure 4.12). The current level of per capita cropped land in Pakistan is less than half of the world average of 0.21 hectares (in 2016).[107]

An increase in population, rising urbanization and faster industrialization are going to put a further constraint on the availability of land for food and non-food crops with implications for food security, rural livelihoods and economic growth. The process of land degradation, affecting arid and semi-arid land, has put further pressure on the limited availability of land resources in Pakistan.

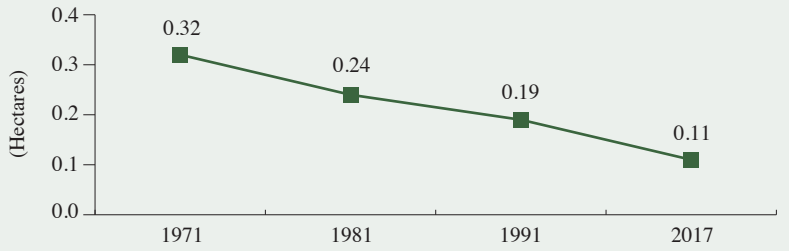
Pakistan has been severely affected by desertification, land degradation and land erosion. About 80 per cent of the country's area is dry land and is getting severely affected by desertification, land degradation and recurring droughts. Out of the total population of 216.6 million in the country, two-thirds

Figure 4.11 Land utilization (%) in Pakistan, FY2018



Source: GOP 2018b.

Figure 4.12 Trend in per capita availability of cropped land in Pakistan, 1971-2017



Source: GOP, *Economic Survey of Pakistan* (various issues).

depend on the country's dry land, arid and semiarid, for their livelihoods.

Overall, land degradation in Pakistan is caused by four factors: water erosion, wind erosion, salinity and sodicity, and water-logging.

Both wind and water erosion have reduced the productivity of Pakistan's land by 1.5-7.5 per cent per year.[108] About 11.2 million hectares of the area (in KP, Sindh and Gilgit Baltistan) is affected by water erosion, bringing about 40 million tons of sediments into the Indus Basin every year. This reduces land productivity, shortens the lifespan of major upstream reservoirs (Tarbela and Mangla) and reduces the efficiency of hydropower generation and irrigation systems. Similarly, about 3-5 million hectares of land are affected by wind erosion, mostly in the arid regions of Punjab (Cholistan), Sindh (Tharparkar) and Balochistan (Chagai Desert and sandy areas along Mekran Coast).[109]

Waterlogging, salinity and sodicity are major problems in irrigated areas of Punjab, Sindh and Balochistan, and have reduced fertility of land and crop yields and increased loss of biodiversity. In Pakistan, water logging is estimated to affect 11 million hectares, while salinity and sodicity affect 5.3 million hectares. The problem has reduced over time due to prolonged drought and excessive mining of groundwater.[110]

LAND DEGRADATION AND DESERTIFICATION POLICIES: Pakistan ratified the '1994 United Nations Convention to Combat Desertification (UNCCD)' in 1997. The Convention aims to improve land productivity, preserve land, establish more efficient water usage, introduce sustainable development in affected areas, and improve the living conditions of those populations affected by drought and desertification. As part of its commitment to the Convention, Pakistan developed the National Action Programme to Combat Desertification in 2002. With the assistance of the United Nations Development Programme (UNDP), Pakistan also launched the Sustainable Land Management Programme for combating land degradation and desertification in 14 dryland districts in the four provinces. Initiated in August 2015, the project will result in the successful application of sustainable land management over an area of 800,000 hectares in 14 districts covering more than 200 villages by June 2020. For acquiring privately owned land the country has the Land Acquisition Act 1894 which was amended in 2017 to ensure that the entire process of land acquisition will be completed within one year from the issuance of the notification and would otherwise be revoked.

Loss of biodiversity

The conservation of biodiversity is crucial for sustainable development. Its loss can compromise livelihoods, ecosystem services, natural habitats and food security, and has the greatest impact on the poor. Pakistan is home to several endangered species including the Indian pangolin, snow leopard, the Indus River dolphin and the green turtle. Habitat loss, environmental degradation, illegal trade and climate change are among the most alarming challenges faced by wildlife in Pakistan.

Pakistan is home to several endangered species including the Indian pangolin, snow leopard, the Indus River dolphin and the green turtle

LOSS OF ECOSYSTEMS: Pakistan contains two of the world's eight biogeographic realms (Indo-Malayan and Palearctic) with their distinct biotas and spans four of the earth's ten biomes (desert, temperate grassland, tropical seasonal forest and mountain). Increasing pressure on natural resources has resulted in a loss of ecosystems. The Biodiversity Action Plan of Pakistan 2000 identified at least 10 valuable ecosystems enriched with a diverse species of animals and unique communities of flora and fauna that are threatened due to habitat loss and degradation (see table 4.4).

Between 1990 and 2010, Pakistan lost two-fifths (41 per cent) of its to-

Table 4.4 Threats to major ecosystems in Pakistan

Ecosystems	Characteristics	Significance	Threats
Indus Delta and coastal wetlands	Extensive mangroves and mudflats Inadequate protected area coverage	Rich avian and marine fauna Diverse mangroves habitat Marine turtle habitat	Reduced freshwater from diversion upstream Cutting mangroves for fuelwood Drainage of coastal wetlands
Indus River and wetlands	Extensive wetlands	Migratory flyway of global importance Habitat for Indus River dolphin	Water diversion Agricultural intensification Toxic pollutants
Chagai Desert	A desert of great antiquity	Many endemic and unique species	Proposed mining Hunting parties from the Gulf
Balochistan Juniper Forest	Huge and ancient junipers	Largest remaining Junipers forest in the world Unique flora and fauna	Fuelwood cutting and overgrazing Habitat fragmentation
Chilgoza forest (Sulaiman Range)	Rock outcrops with shallow mountain soils	Important wildlife habitat for several species at risk	Fuelwood cutting and overgrazing Illegal hunting
Balochistan sub-tropical forests	Mid-altitude forests with the sparse canopy but rich associated flora	Very few areas now remain important wildlife habitat	Fuelwood cutting and overgrazing
Balochistan rivers	Not concerned with the Indus River System	Unique aquatic fauna and flora with the high levels of endemism	Water diversion/drainage Overfishing
Tropical deciduous forests (Himalayan foothills)	Extended from Margalla Hills National Park east to Azad Jammu and Kashmir	Perhaps the most floristically rich ecosystem of Pakistan	Fuelwood cutting and overgrazing
Moist and dry temperate Himalayan forests	Important forest tracts now becoming increasingly fragmented	A global hotspot for avian diversity important wildlife habitat	Commercial logging Fuelwood cutting and overgrazing
Trans-Himalayan alps and plateau	Spectacular mountain scenery	Unique flora and fauna centre of endemism	Fuelwood cutting and overgrazing Illegal hunting Unregulated tourism Habitat fragmentation

Sources: GOP 2012a and 2014a.

tal forest cover, mainly due to the illegal cutting of trees by local people for fuel and illegal logging operations undertaken by the timber mafia.[111] Infrastructure development and expansion of roads also took a toll on the loss of forest cover, especially in cities.

The rangeland area of Pakistan covers 52.3 million hectares, accounting for 60 per cent of the country's total geographical area.[112] However, rangeland resources are depleting due to overgrazing, improper land use, climate change and mismanagement. Most of Pakistan's rangelands have lost 50 per cent of their potential productive capacity due to persistent overgrazing.[113] This process reduces the diversity of flora and changes the vegetation cover of forests.

The arid coastal lands and mangrove forests are under increasing environmental stress due to reduced freshwater flow, sewage and industrial pollution. The mangrove forest area decreased from 207 thousand hectares to 158 thousand hectares between 1992 and 2001, representing about five per cent of the country's forest areas.[114]

THREATS TO SPECIES: In Pakistan, out of 1,675 reported animal species in 2017, 131 were threatened (extinct, endangered and vulnerable). These threatened animals comprised of 25 mammals, 32 birds, 12 reptiles, 44 fishes and 18 other inverts. Similarly, out of 345 reported plants, 12 were threatened.[115] Overall, according to the International Union for Conservation of Nature (IUCN), Red List Index value of species survival in Pakistan has decreased from 0.95 to 0.85 between 1993 and 2019, indicating an increase in biodiversity loss.[116]

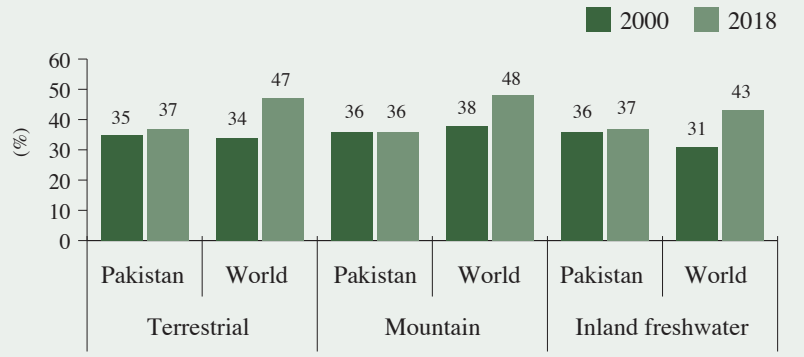
A similar situation is evident in the loss of genetic diversity. Pakistan is rich in indigenous crop diversity with an estimated 3,000 taxa of cultivated crops. However, the genetic diversity of crops is low due to the extensive use of high yielding varieties (HYVs) of crops. Similarly, 75 to 80 per cent of domestic livestock in the country are cross-bred leading to a loss in genetic diversity.[117]

PROTECTED AREAS: Twelve per cent of Pakistan's total area is classified as a protected area to conserve ecosystem services. In this context, protecting key biodiversity areas (KBAs) is essential for the conservation of biodiversity and natural resources. In Pakistan, between 2000 and 2017 classification of terrestrial, freshwater and mountain KBAs as protected areas increased from 38.5 to 40.3 per cent, from 38.2 to 38.9 per cent, and from 39.6 to 39.7 per cent, respectively. This ratio of protected areas is higher compared to other countries in South Asia but has mostly remained stagnant since 2000 unlike, the significant increase in the average value of protected areas across the world (see figure 4.13). Moreover, some representation, ecological and management gaps have been found in the protected areas of the country.

POLICIES FOR BIODIVERSITY: In line with its global commitments, the Government of Pakistan has formulated several policies, laws and strategies to conserve biodiversity. Pakistan has ratified the global '1992 Convention on Biological Diversity' since 1994, which aims to develop national strategies for the conservation of biodiversity, the sustainable use of its components, and fair and equitable sharing of the benefits arising from the utilization of genetic resources. As part of its commitment to this Convention, the country developed the Biodiversity Action Plan 2000 to implement the 2010 Global Biodiversity Targets. However, the country failed to make sufficient progress in achieving the objectives of the plan due to the shortage of finance, lack of human resources, insufficient institutional capacity in the Federal Biodiversity Directorate, and a lack of effective coordination between provinces and the centre. Pakistan has recently prepared the second National Biodiversity Strategy and Action Plan (2017-2030), in line with the Aichi Biodiversity Targets (2011-2020) and SDGs. This Plan aims to check and mitigate the loss of biodiversity by conserving wildlife and plant species, restoring ecosystems and promoting sustainable use of natural resources for the well-being of the present and future generations. In line with the national level plan, the provincial government of KP has also formulated the Biodiversity Strategy and Action Plan 2016.

Pakistan also ratified the '2000 Cartagena Protocol on Bio-safety' in

Figure 4.13 Average proportion of each terrestrial, mountain and inland freshwater KBAs covered by protected areas, 2000-2018



Source: UN 2019.

2009, which is a supplementary agreement to the 1992 Convention on Biological Diversity, and developed the Pakistan Bio-safety Rules 2005 to avoid the adverse effects of using Genetically Modified technology on health and the environment. However, the implementation of these rules has been ineffective. In 2015, Pakistan ratified the '2010 Nagoya Protocol' on access to genetic resources and the fair and equitable sharing of benefits arising from their utilization, which is another supplementary agreement (in 2010) to the '1992 Convention on Biological Diversity'.

The issuance of hunting permits to Arabs for the hunting of Houbara Bustards in Sindh and Balochistan shows the state-sanctioned killing of the scarce bird

To effectuate the global '1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)' (ratified by Pakistan in 1976) and the '1979 Convention on the Conservation of Migratory Species of Wild Animals' (ratified by Pakistan in 1987), the country promulgated (the Wildlife Protection Ordinance 1972 and) the Pakistan Trade Control of Wild Fauna and Flora Act 2012, intending to control the smuggling of endangered species. However, an increase in the smuggling of wildlife, particularly of turtles and tortoises shows the ineffective implementation of the law owing to inadequate interagency coordination and capacity gaps among provincial wildlife departments. Furthermore, the issuance of hunting permits to Arabs for the hunting of Houbara Bustards in Sindh and Balochistan shows the state-sanctioned killing of the scarce bird. The country has recently adopted the use of deoxyribonucleic acid (DNA) barcoding to control illegal wildlife trade. It is a taxonomic method that uses a short genetic marker in an organism's DNA to identify which particular species it belongs to. The country used the DNA testing method in March 2015 when customs officials confiscated a shipment of nearly 2,000 kilogrammes of freshwater turtle meat worth US$ 60 million.[118] The government is also working to prepare draft Amendment Rules for the Pakistan Trade Control of Wild Fauna and Flora Act 2012 to help regulate wildlife trade and control its illegal trafficking.

In 1976, Pakistan ratified the global '1971 Convention on Wetlands of International Importance (or the Ramsar Convention)'. The Government of Pakistan formulated the draft of the National Rangeland Policy in 2010, but it has not been passed yet. The government of KP Province formulated the rangeland policy in 2014, which focuses on sustainable management of rangeland resources with the participation of local and indigenous communities. The goal is to improve their livelihoods and economic condition in conjunction with environmental protection.

Climate change

Pakistan is at a risk of facing severe consequences of global warming. According to the (long-term) Global Climate Risk Index 2020 by the think-tank Germanwatch, it is the fifth most vulnerable country in the world to climate change impacts even though its emissions contribute to less than one per cent of total global GHG emissions.[119] Between 1999 and 2018, the country lost 9,989 lives, suffered economic losses worth US$3.8 billion and witnessed 152 extreme weather events. The most vulnerable regions to climate change in the country include drought-prone areas in Sindh, Balochistan and Punjab; flood-prone areas in Sindh, Balochistan and Punjab; and mountainous areas in KP, Azad Jammu and Kashmir, Gilgit-Baltistan and parts of the Federally Administered Tribal Areas (FATA) where lack of security has affected the population's capacity to cope with climate change effectively.[120]

The floods of 2010, 2011 and 2012 not only incurred human loss but also caused widespread economic costs, resulting in an average economic growth of 2.9 per cent in the country which is much lower than its potential rate of 6.5 per cent.[121] Similarly in 2015, more than 1,200 people were killed from the heat-

wave and over 65,000 were treated for heat illnesses.[122] In May 2018 the temperature of Turbat, situated in south-western Pakistan, reached a staggering 54°C, the highest temperature ever have been recorded globally.[123] The prolonged drought between 1999 and 2003 also caused loss to human life and livelihoods in Balochistan, southern Punjab and the interior of Sindh. The average temperature in Pakistan has increased by 0.6°C between 1901 and 2000, and the annual rise in sea level is estimated at 1.1 millimetres.[124] The country has observed a shift in the summer monsoon trend which has shifted from north-east to north-west by a distance of 80-100 km, making an additional 25 districts of KP and Punjab increasingly vulnerable to climate change.

The economic, social and environmental costs of climate change are expected to increase in the future due to a projected increase in global warming. For instance, one-fourth of Pakistan's total population lives in areas that will become a 'moderate hotspot' by 2050 under the carbon-intensive scenario.[125] Potentially, the most important climate change threats to Pakistan are identified as:

- Increased variability of monsoon;
- Rapid melting of Himalayan glaciers threatening water inflows into the Indus River System in the short to medium term, and the depletion of glaciers in the long term;
- Increased occurrence of floods and droughts;
- Increased siltation of major dams;
- Severe water-stressed and heat-stressed conditions leading to reduced productivity of food and non-food crops;
- Increased upstream intrusion of saline water in the Indus Delta, adversely affecting coastal agriculture, mangroves and fisheries;
- Threat to coastal areas including the city of Karachi due to a rise in sea level and increased cyclonic activity; and
- Increased demand for energy to cope with extreme weather conditions.

Impacts on people

FOOD SECURITY AND AGRICULTURE: Global warming has various consequences including increased temperature and decreased water availability. This is expected to reduce the productivity of food and non-food crops and harm food security and agricultural production. Floods in Pakistan in 2010 caused the loss of 0.5 million tonnes of wheat, while flooding in 2011 affected 881,000 hectares of crop growing land.[126] The country's agriculture sector accounts for 19 per cent of GDP and contributes to overall employment by 42 per cent.[127] An increase in food prices will have a disproportionate impact on the poor who already spend around three-fifths of their income on food. The country ranks 94th out of 117 countries in the 2019 Global Hunger Index, performing better than India (102nd) and Afghanistan (108th) in South Asia.[128] Four out of every ten persons (36.9 per cent in 2018) in the country were undernourished.[129] The situation is most alarming for children. In 2018, some 40.2 per cent of children under the age of five years were suffering from stunting and facing the problem of impaired body growth due to poor nutrition. While 17.7 per cent were suffering from wasting that is having a low body weight for height, and 28.9 per cent were underweight.[130] Pakistan's trends in these indicators concerning the 2025 'World Health Assembly' targets and the SDG 2 'zero hunger' are viewed to be regressive and off track.

One-fourth of Pakistan's total population lives in areas that will become a 'moderate hotspot' by 2050

Furthermore, global warming will increase net crop water requirements, putting stress on already scarce water resources, which will further be exacerbated by climate change. As a result, the overall productivity of different

food crops will decline as long as water conservation technologies, drought-resilient and high-yield crop varieties, rainwater harvesting programmes and direct seeding technologies are not deployed. According to a study, in Pakistan, a 6 per cent decline in rainfall will increase net irrigation water requirement by 29 per cent.[131] According to the Global Change Impact Study Centre's (GCISC) projections, wheat crop yield will be reduced by 3.4 to 12.5 per cent in semi-arid irrigated areas including Faisalabad and Sheikhupura, and 3.8 to 14.5 per cent in arid areas including Hyderabad, Badin, Bahawalpur and Multan towards the end of the current century. Additionally, rice crop yields are likely to register a fall of 12 to 22 per cent in almost all rice-growing areas of the country by the end of this century because of the rising global temperatures.[132]

Entire communities from Badin, Sajiwal and Thatta districts migrated to Karachi permanently after the cyclones and floods of 2010 and 2011

MIGRATION: Climate-induced human migration is already taking place in Pakistan due to the rising sea level, floods, heat stress and glacial melt. In Pakistan, the rising number of people have fled the country's coastal region in recent years to escape rising sea levels and saltwater contamination. The coastal belt of Pakistan, especially in Thatta and Badin, seen more than 40,000 people migrating to Karachi due to extreme events like the cyclones of 1999 and 2005, seawater intrusion which has rendered up to 1.2 million acres of land infertile, and water shortages since the 1970s.[133] Entire communities from Badin, Sajiwal and Thatta districts migrated to Karachi permanently after the cyclones and floods of 2010 and 2011.[134]

A similar trend is evident in the case of floods. For instance, in the 2010 floods, 14 million people were temporarily relocated while 200,000 took shelter in aid camps. Moreover, heatwave and hot weather are expected to have much larger impacts than the cold weather in Pakistan. According to a study, between 1991 and 2012, flooding had modest to insignificant impacts, while heat stress increased the long-term migration of men to look for work elsewhere, mainly because it reduced income from farming and other sources. High temperatures affect people's livelihoods by harming farm yield thus; when heat stress caused wheat to mature early in Pakistan in 2010, yields dropped by 13 per cent.[135]

In Pakistan, a study has found a strong correlation between extreme high temperatures in the summer and human migration.[136] Climate shocks impact ecological conditions in rural areas that trigger shifts in farm productivity, thus eroding the incomes of poor and marginalized cultivators. Rural households may take migratory decisions to escape the losses in rural incomes that may be aggravated by climatic stress. It has been projected that such changes are likely to be magnified by 2030 in the arid and semi-arid areas of Pakistan that are important in terms of wheat production and are home to a majority of the country's rural population. Given the sensitivity of the wheat crop to heat-stress, it is anticipated that a decline in wheat production will affect the rural poor and marginalized households across Pakistan.[137]

CLIMATE CHANGE POLICIES: The Government of Pakistan has ratified all the major global conventions on climate change with the aim of climate change mitigation and adaptation. The country ratified the '1992 United Nations Framework Convention on Climate Change (UNFCCC)' in 1994, the '1997 Kyoto Protocol to the UNFCCC' in 2005, the '2015 Paris Climate Agreement to the UNFCCC' in 2016, the '1985 Vienna Convention for the Protection of the Ozone Layer' in 1992, and the '1987 Montreal Protocol on Substances that deplete the Ozone Layer' in 1992. In alignment with its commitment to global conventions on climate change and SDGs, Pakistan has developed several related

national policies and laws. Pakistan is one of the few countries in the world with a full-fledged Ministry of Climate Change.

The country developed both the National Policy on Climate Change and the National Disaster Risk Reduction Policy in 2012 to ensure that climate change is mainstreamed in the economically and socially vulnerable sectors of the country. This was followed by a Framework for Implementation of the Climate Change Policy (2014-2030) in 2013 which listed by priority, short-term, medium-term and long-term adaptation and mitigation actions required to be taken in various sectors. However, the climate change policy and its implementation framework need to be reviewed based on the Paris Agreement (finalized in 2015) and the SDGs framework.

In 2017, Pakistan approved the Climate Change Act, which brought it among the small group of countries with climate change legislation building on the commitment made in Paris in 2015. The Act suggested the formation of three institutions: the establishment of the high-level Pakistan Climate Change Council, the full-fledged Pakistan Climate Change Authority, and the Pakistan Climate Change Fund. The establishment of these institutions is instrumental to the implementation of the Climate Change Policy, in fulfilling the country's international climate change (mitigation) commitments, and in building the country's resilience capacity to adapt to climate change. Effective implementation of all these initiatives requires strong linkages between the federal Ministry of Climate Change and the related ministries of food security, energy, finance, planning, industry, housing, maritime affairs and water which have not been fully institutionalized yet. Moreover, after the initiation of all the policy initiatives, the delivery of outcomes in the policy documents depends on the efficiency of provinces and their commitment to the subjects of environment and forestry, which have been devolved after the 18th Amendment to the Constitution. However, the capacity of the provinces remains limited to address these new responsibilities.

Governance for sustainable development in Pakistan

Until recently, Pakistan's Vision 2025 was the main development plan, which talked about inclusive and sustainable growth process, focusing on energy, water and climate change and empowering people. However, the plan failed to explicitly cover air pollution along with its massive impact on health. Besides mainstreaming SDGs in policy planning, the country has also drafted its 12th Five Year Plane (2019-2023), which explicitly covers the topics of climate change and environment, and people's empowerment. The country also has an environment policy (Pakistan Environment Policy 2005), a Ministry of Climate Change, Environmental Protection Agencies (EPAs) (at federal and provincial levels) under the Environmental Protection Act 1997 and several environmental laws. Some *suo moto* actions and interventions in the form of Margala Development Schemes and the Ravi Commission have also taken place. However, numerous projects are bulldozed over Environmental Impact Assessments (EIAs) by the EPAs.

Pakistan is one of the few countries in the world with a full-fledged Ministry of Climate Change

Legal (and regulatory) framework for environmental sustainability and sustainable development in Pakistan

As a follow up to the 1972 United Nations Conference on Human Environment, the Ministry of Environment (now renamed Ministry of Climate Change) was established in 1975 which formulated the Pakistan Environmental Protection Ordinance (PEPO) 1983. Under the Constitution of Pakistan 1973, both the federal and provincial governments had a constitutional mandate for the preser-

vation of the environment. 'Environment Pollution and Ecology' were included in the concurrent legislative list, which was abolished after the 18th Amendment to the Constitution in 2010.

The PEPO 1983 established the PEPC as the supreme environmental policymaking body in the country. With the objective of the implementation of environmental policies, the PEPO formed the federal Environmental Protection Agency (EPA) as well as the provincial EPAs. The PEPA 1997 replaced the PEPO 1983 to bridge existing gaps. The PEPA 1997 strengthened the earlier provisions of the PEPO 1983 to provide for Initial Environmental Examination (IEE) and to set up Environmental Tribunals. The PEPA 1997 provided the country with an integrated system of environmental institutions: PEPA with legislative powers, EPAs with administrative powers and Environmental Tribunals with judicial powers. A major milestone by the PEPO was the adoption of the NEQS in 1993 (revised in 1997), which provided standards for industrial and municipal effluent and air emissions. It also adopted rules and regulations in various fields such as the Hospital Waste Management Rules 2005, Pakistan Bio-safety Rules 2005 and the Review of IEE/ Environmental Impact Assessment (EIA) 2001.

The PEPA 1997 provided the country with an integrated system of environmental institutions: PEPA with legislative powers, EPAs with administrative powers and Environmental Tribunals with judicial powers

Since the 18th Amendment to the Constitution, all four provinces have amended versions of the PEPA. The new laws are the Punjab Environmental Protection (Amendment) Act 2012, the Balochistan Environmental Protection Act 2012, the Sindh Environmental Protection Act 2014, and the Khyber Pakhtunkhwa Environmental Protection Act 2014. The preambles of these federal, as well as provincial acts, provide for the *"protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution, and promotion of sustainable development."* The new provincial Acts provide for the creation of provincial environmental protection councils headed by the respective chief ministers and are tasked with approving environmental policies and environmental quality standards.

In addition to environmental tribunals, the Supreme Court and the High Courts of Pakistan have also played an important role in the protection, preservation and sustainability of the environment. In Shehla Zia versus Wapda (1994) case, the Supreme Court of Pakistan declared that a clean and healthy environment was the fundamental right of every citizen of Pakistan by reading the right to a clean and healthy environment into the Fundamental Right to Life protected by Article 9 of the Constitution. Since the Shehla Zia case, the country's higher courts have upheld the right to a clean and healthy environment as a fundamental right.

Shortcomings and gaps

PEPA 1997 is a very comprehensive law, however, it has some gaps. For instance, PEPA's requirement of the PEPC to be headed by the Prime Minister of Pakistan has proved to be its weakness, as neither has the Prime Minister been available for the minimum of two statutory meetings to be held each year and nor has a sufficient number of the meetings been organized, indicating a lack of commitment. Another major gap in the PEPA 1997 is that it primarily addresses 'brown issues'—environmental issues relating to industrial emission development—and ignores 'green issues'—conservation of biodiversity, forests and marine resources (pollution of the sea).

The Environmental Tribunals, formed under the PEPA, are also facing problems due to shortage of staff, inadequate resources and an insufficient number of persons with expertise in environmental law. For instance, between 2002 and 2012, the Punjab Environmental

Tribunal disposed off only 15 per cent of the cases (435 out of 2,800) it was sent by the Punjab Environmental Protection Department. Additionally, only 20 per cent of the total fines imposed by the tribunal to polluters have been collected. The main factors responsible for the inefficiency of the tribunals are its slow working and an ineffective fine collection mechanism.[138]

Similarly, the NEQS follow the single-track approach to discharge-based enforcement. For instance, the River Ravi has a high concentration of pollutants whereas the Indus River has a lower intensity of municipal and industrial discharges, which indicates the need for more stringent ambient standards for the former.

Under federal as well as provincial environmental acts, IEE or EIA are mandatory and are required to assess the impact of a development project on the environment. However, low-quality IEE/EIA reports are often wrongly approved due mainly to political pressure. According to a 2010 EIA Mapping Study, EIA application was much lower compared to the level of ongoing development projects. In each of Punjab and Sindh, only 20 per cent of total development projects (that should be covered by EIAs) underwent an EIA. This ratio was 10 per cent or less in Balochistan, KP, Azad Jammu and Kashmir and Gilgit-Baltistan.[139]

Sustainable development policies and plans in Pakistan

The most important and relevant national policies influencing the efforts to conserve and sustainably manage natural resources include the Pakistan National Conservation Strategy 1992, the National Environment Policy 2005, the National Sustainable Development Strategy 2012, the Pakistan Vision 2025, and the formation of SDG Units at federal and provincial levels.

National Conservation Strategy 1992: After the Earth Summit 1992, Pakistan formulated the National Conservation Strategy 1992 to address the environmental problems of the country. It was aimed at achieving environmentally sustainable economic and social development in Pakistan. The three objectives of the strategy included: sustainable development, conservation of natural resources, and greater efficiency in the use and management of natural resources. This was followed by a Plan of Action for the implementation of the strategy over a five years period (1993-1998). The Plan was later included in the Eighth Five Year Plan (1993-1998). The achievements of the Strategy included the formulation of provincial conservation strategies, passing of the PEPA 1997, establishment of federal and provincial EPAs, the formation of Environment Sections in the federal Planning Commission and the provincial Planning and Development Departments. The strategy was successful in terms of creating awareness and in formulating a regulatory and institutional framework for environmental conservation. However, it lagged in terms of implementation and remained ineffective in terms of improvement in management and quality of the environment and natural resources. The country adopted the National Environmental Action Plan (NEAP) in 2001 by focusing on clean air, clean water, solid waste management and ecosystem management.[140] The Plan intended to mutually enforce poverty reduction and environmental sustainability. The Plan contributed to some capacity building. However, the NEAP approval process could not be integrated into the government's budgeting process, and as a result, failed to mobilize additional financial resources as well as the strategic impetus for environmental management.

National Environmental Policy 2005: The country formulated the National En-

In each of Punjab and Sindh, only 20 per cent of total development projects underwent an EIA

vironmental Policy in 2005, to protect, conserve and restore Pakistan's environment to improve the quality of life of its citizens through sustainable development. It provided broader guidelines for federal, provincial and local governments to address sectoral issues such as water management, energy, air pollution, waste management, deforestation, loss of biodiversity, desertification, natural disasters and climate change. It also provided a direction to address cross-sectoral issues such as population, poverty, trade, health and gender. Besides providing an implementation plan of action to achieve targets and objectives, it also aided in the formulation of the Task Force on Climate Change 2008. However, the policy failed to achieve its objectives due to the shortage of financial resources, capacity and lack of political will.

The Parliament has taken greater ownership of the SDGs, and various national and provincial policy visions incorporate the SDGs framework and the 2030 Agenda

National Sustainable Development Strategy 2012: The government developed the National Sustainable Development Strategy 2012 for the Rio+20 summit in 2012, to reinforce the references to sustainable industrial development, climate-resilient infrastructure, mass transit system, and conservation of land and marine biodiversity. The strategy envisions *"to evolve a just and harmonious society in the country through the promotion of a vibrant and equitable economic growth without overexploitation of natural resources with a fair distribution of development dividends to all; in particular to the marginalized, poor and vulnerable in the society and future generations."*[141] The government is recently revising the Strategy to integrate relevant federal and provincial sector policies/strategies with the SDGs to bridge the gaps created due to the shift from Millennium Development Goals (MDGs) to the SDGs.

Vision 2025: Pakistan's recently formulated national economic plan, the Vision 2025, includes several of the SDGs, including major sections on energy, water and food security, however, air quality remains missing. After having adopted the SDGs at the UN, the government needs to revise all its development plans in light of all 17 SDGs.

The 2030 Agenda for Sustainable Development and the SDGs: Unlike the MDGs where the political will of successive Pakistani governments was questionable and consequently their performances left much to be desired, Pakistan seems more committed to delivering on the SDGs and the 2030 Agenda. The Parliament has taken greater ownership of the SDGs, and various national and provincial policy visions incorporate the SDGs framework and the 2030 Agenda. The government has also established SDG Units at the Planning Commission and the provincial Planning and Development Departments. The SDGs Units have established an institutional architecture comprising of Technical Committees, Advisory Councils, District SDGs Committees and Parliamentary and Provincial Task Forces to ensure political commitment to the implementation of SDGs and to provide strategic guidance on how to popularize and localize SDGs. Commendably, a locally driven approach is being promoted—at least in the letter—that focuses on planning processes, data availability at the district level and utilization of local budgets and locally-generated resources. The corporate sector has also been mobilized to pursue relevant SDG benchmarks through their social responsibility programmes—albeit with mixed results.

These measures indicate some political will on the part of the state. And yet, as critical as it is, the political will must be translated into the sound implementation of policies and action. Pakistan's challenge remains uphill in this regard. Policy coordination has been a major weakness in the country. The multiple SDG units and task forces relevant

to the implementation and monitoring of SDGs have had a little internal interface to coordinate and synergize activities. Broader governance challenges like the weak administrative and financial powers of district governments reduce ownership at the local levels, which further compromises the effectiveness of efforts to improve Pakistan's performance against SDG benchmarks. There is also a need to balance the outcomes of the various SDG goals by focusing on specific sectors. Despite significant improvement in terms of reducing national poverty (down to 24.3 per cent in FY2016), the estimates of stunted children (40.2 per cent in 2018) and food insecure population (about 36.9 per cent in 2018), among other challenges remain abysmal.[142] Political considerations have also led to lopsided resource allocations across geographical regions. For instance, Lahore alone accounted for 58 per cent of the total development budget of Punjab in FY2016, while no other district received a share of over 3 per cent.[143]

In essence then, even as the Pakistani state can reasonably claim positive intent and serious efforts, various political, governance and capacity-related, and sector-specific inhibitors may be holding back optimal progress on SDGs. The inhibitors of the success of SDGs in Pakistan include ineffective accountability mechanism at local, provincial and national levels, insufficient vertical and horizontal coordination among relevant departments, shortage of financial resources especially for social sectors, and non-availability of up to date data (particularly in respect to sub-national level). Some of the fixes needed to resolve the above-mentioned issues may be structural and require systemic overhaul that is politically contested and fraught with challenges that are difficult to overcome in the short-to-medium term. But many other factors could be acting as inhibitors to accelerated progress that require general or sector-specific technical/legal, capacity or coordination related improvements or innovative, incentive-based choices. There are almost always variables in such policy contexts that can act as catalysts to unlock existing bottlenecks and produce better outputs and outcomes. These include an institutional structure for SDGs, local level governance systems, a vibrant media, local and international civil society and the private sector.

Conclusions and recommendations

The chapter provides an evaluation of trends in economic growth along with its impact on environmental sustainability and people's well-being. Despite many challenges in the form of natural disasters, terrorism and political uncertainty, the economy of Pakistan has progressed at an annual rate of about five per cent. However, the use of natural resources in the country has neither been sustainable nor efficient. Moreover, the focus has been on the quantity of economic growth and not on its equitable distribution and sustainability. As a result, human deprivation and inequity have deteriorated in the country. In terms of the use of natural resources, Pakistan is among the lowest natural resource-efficient countries of the world.

The inefficient and unsustainable use of natural resources such as air, land, water, forests and the sea has resulted in the poor quality of urban and household air, water pollution, decrease in land productivity and deforestation among others disastrous consequences. This in result has not only affected the health of already disadvantaged people disproportionately but has also become a drag on economic growth.

The country's focus on environmental sustainability on an equitable basis provides an opportunity to not only address the issues of deprivation and poverty effectively, but it also promises to boost economic growth. Economic

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policies considering environmental sustainability and inclusiveness can not only contribute to a higher level of economic growth but can also help to reduce the damage done by environmental deterioration. Globally, US$ 900 to US$ 1,700 billion of green investments in land, water and energy could yield economic returns of around US$ 3,000 to US$ 3,700 billion.[144]

The role of effective, accountable and inclusive institutions is crucial to achieving economic growth in an inclusive and environmentally sustainable manner

SDGs implementation: The 2030 Agenda and the SDGs framework provide an opportunity for the country to not only improve its economic growth, but to also benefit all of its residents irrespective of caste, religion, and ethnicity and sustain its environment. In this context, Pakistan can learn from many successful initiatives around the world such as renewable energy initiatives and energy efficiency in India and China, sustainable and inclusive urbanization in Brazil, and community forest management in Nepal, among others. The country already has the relevant institutional, legal and policy framework for this. What it needs is political commitment, availability of financial resources, coordination among relevant stakeholders and institutions, and an effective local-level governance system with administrative and financial powers.

Green jobs: Pakistan needs a seven per cent annual GDP growth rate to create sufficient jobs for over two million new entrants in the job market every year.[145] The focus has to be more on green jobs in manufacturing, construction and tourism, which generate more employment. For this, the role of natural resources especially in the energy sector will be crucial. Pakistan has to improve access to energy to improve economic growth and to make it inclusive regardless of environmental considerations. However, if the country follows the energy mix and energy efficiency approaches, it will succeed in cutting carbon emissions and decreasing deforestation.[146] In this regard, the role of regional cooperation is of vital importance.

Sustainable urbanization: The role of inclusive and sustainable urban-led industrial growth is crucial to not only boost economic growth but to also provide jobs to the low productivity surplus labour in the farm sector as well as the over two million working-age people that enter the labour force every year. The country's urbanization level is projected to increase from one-third to about one-half by 2030. In 2014, about 46 per cent of the country's urban population was living in slum areas without access to basic services with negative implications for environmental sustainability. In line with the country's commitment to fulfilling SDG 11 'making cities and human settlements inclusive, safe, resilient and sustainable', the country can address all three inter-linked aspects of economic, social and environmental sustainability (see box 4.3).

Governance: The role of effective, accountable and inclusive institutions is crucial to achieving economic growth in an inclusive and environmentally sustainable manner. In this context, the role of SDG 16 'promoting peaceful and inclusive societies for sustainable development, providing access to justice for all, and building effective accountable and inclusive institutions for all' is crucial for Pakistan. The country not only has to improve its governance system but also has to ensure the participation of all at all levels.

Box 4.3 Sustainable and equitable urban planning in Curitiba, Brazil: Lessons for Pakistan

Pakistan can learn from Brazil's experience, how urbanization can be managed in a way to ensure social, economic and environmental sustainability. The city of Curitiba, the capital of Parana state in Brazil, is a successful example of economic, social and environmental sustainability, which has been replicated in other cities in Brazil and beyond. Despite a six-fold population increase in half a century, air pollution in Curitiba is close to the WHO's guideline levels for particulate matter. Part of Curitiba's success can be attributed to initiatives that were directly aimed at poor households, to promote health, environment and equity simultaneously.

The city operates a progressive solid waste system. Besides encouraging domestic garbage recycling, the poor in squatter settlements are encouraged to exchange their waste for bus tokens, food and notebooks, with benefits for nutrition and sanitation; two-thirds of household waste is recycled, saving 1,200 trees per day. A comprehensive urban transport system (anchored by a bus rapid transit system) operates that is regularly used by 80 per cent of (2 million) the population, saving seven million gallons of fuel every year. Land-use legislation provides the city's inhabitants with about 60 square metres of green space per person, which is integrated with flood control. Additionally, the public housing programme provided 50,000 houses for the urban poor. Moreover, urban growth is restricted to corridors of growth, along key transport routes. Tall buildings are allowed only along bus routes.

Curitiba owes part of its success to strong governance and institutions. A cogent long-term vision, sustained political commitment, and a politically insulated regional planning organization to implement its vision have all been crucial steps in paving the city's long-term sustainable urban pathway.

Sources: WHO 2017a and BBC 2017.

Financing: The role of financial resources is crucial in achieving environmental sustainability, sustainable development and SDGs. Pakistan cannot meet all its financial needs in this regard by itself, it needs international cooperation and global level partnerships as per SDG 17 'strengthening the means of implementation and revitalize the global partnership for sustainable development'. This goal aims to revitalize global partnerships for development by building domestic mechanisms to implement SDGs. Global partnerships may take various forms including, increased development assistance, debt relief, trade agreements to find markets, and better conditions for foreign and domestic investment. Such partnerships are crucial for economic growth, poverty alleviation, reduction in inequality, environmental sustainability and peaceful society.

CHAPTER 5

Environmental Sustainability with Equity in Bangladesh

Introduction

Bangladesh has traditionally been an agriculture-dependent country with an 80 per cent share in the GDP at the time of its independence in 1971. Over the years, the structure of the economy has shifted towards higher-industry and services sectors. At present [fiscal year (FY) 2019], agriculture contributes 13.6 per cent to the GDP, while industry and services sectors contribute 35.1 and 51.3 per cent respectively.[1] The country has been able to achieve economic growth of about 6.6 per cent on average during the last decade (FY2009 and FY2019). Per capita income has also been increasing along with higher GDP growth rate. For example, in 1990 per capita GNI was US$ 320 at current prices, which rose to US$ 1,750 in 2018.[2] High per capita GNI improved Bangladesh's status from a low-income country to lower-middle-income country in 2013 when its per capita GNI reached US$ 1,040.[3] The country has also been able to reduce its poverty levels from 56.7 per cent in 1991 to 24.3 per cent in 2016, based on the national upper poverty line.[4] Economic growth has been accompanied by several better performing social indicators. Life expectancy at birth has increased from 58 years in 1990 to 72 years in 2017, while the infant mortality rate has declined from 100 per 1,000 in 1990 to 25 per 1,000 in 2018.[5]

Despite its remarkable growth, Bangladesh continues to face numerous challenges which hamper its journey towards sustainable development. High economic growth and reduction of poverty could not reduce inequality. The Gini coefficient, a measure to show inequality, rose to 0.483 in 2015 compared to 0.458 in 2010, indicating high-income inequality than before.[6] The top five per cent of the population owned 27.89 per cent of national income while the bottom five per cent had only 0.23 per cent of the national income in 2015 compared to 24.61 per cent and 0.78 per cent respectively in 2010.[7]

The country has been able to achieve economic growth of about 6.6 per cent on average during the last decade

Bangladesh is also beset with several environmental problems. With a population of 160 million in an area of 56,980 square miles, there is tremendous pressure on its natural resources which causes degradation of the environment.[8] Water and air pollution, soil degradation, deforestation, depletion of fish resources, loss of biodiversity and ecosystem, urbanisation and congestion are some of its major environmental challenges. Such environmental degradation is the result of many factors such as industrial pollution, excessive use of chemical fertilizers, excessive exploitation of natural resources for commercial purpose, flood and other natural hazards. High population levels and poverty are also important factors of environmental degradation.

A related challenge for Bangladesh is the impact of climate change. The impact of climate change can be gauged by noting the higher frequency of natural disasters such as drought, flood, cyclones, tidal surges and sea-level rise, which will severely impact the lives and livelihoods of a large number of people.[9] The effects of sea-level rise will be observed through increased rates of coastal erosion, loss of coastal vegetation and habitats, intrusion of salt into groundwater systems and coastal ecosystems, temporary and permanent flooding, and storm surges. These effects will, in

turn, adversely impact agriculture, water resources, commercial and residential property, energy and transportation system and human health.

Environmental challenges have grave implications for the lives and livelihoods of the people. The poor have little to no control over resources and they lack clean air, drinking water, adequate food and nutrition and access to clean energy. Hence, it is the poor who face the brunt of environmental degradation, as the rich can afford to protect themselves.

In 2018, Bangladesh ranked 179th among 180 countries in the world on the Environmental Performance Index

In the above context, to reduce poverty, the Bangladesh economy has to continue to grow at a higher rate and create employment and income opportunities for all. On the other hand, it has to achieve sustainable development by controlling environmental degradation. While higher economic growth translates to higher production and consumption, production of goods requires the extensive use of natural resources. However, the current practice of exploitation of natural resources is unsustainable for the economy and requires effective policies and their implementation.

In the above context, this chapter discusses the current state and trends of major environmental indicators in Bangladesh and sheds light on how it influences the well-being of various sections of the population, particularly the marginalized ones. More specifically, this chapter focuses on the following issues:

- State of the environment in the country;
- Consequences of environmental risks for human well-being;
- Review of key policies and laws on environmental issues; and
- Recommendations to ensure environmental sustainability.

The chapter is organized in the following way. The introductory section provides a brief context by discussing the economic growth, structural transformation and the resultant environmental problems of Bangladesh. The objectives, methodology and sources of data are also included in this section. Section 2 presents an overview of the state of the environment in Bangladesh. In section 3, discussions on the impact of environmental degradation have been presented. More specifically, this section discusses how environmental problems have affected the economy and human well-being. Section 4 outlines existing national policies and laws that focus on issues of environmental sustainability with equity. Here, five-year plans of the Government of Bangladesh, various environmental policies and acts are reviewed. Finally, section 5 presents key findings of the study and makes a set of recommendations which can contribute towards environmental sustainability and equity in Bangladesh.

An overview of the state of the environment in Bangladesh

The natural environment of Bangladesh has been increasingly under pressure due to a high population and its concentration in major cities. Urban areas have become crowded as people have migrated from rural areas in search of better opportunities. This has led to land clearing for housing, construction of infrastructure and demand for higher transportation and other facilities. The coastal morphology makes the country disaster-prone thus causing natural catastrophes each year. In 2018, Bangladesh ranked 179th among 180 countries in the world on the Environmental Performance Index (EPI).[10] The EPI score is calculated based on 24 performance indicators including environment and ecosystem vitality. Such low EPI score indicates poor air quality, loss of biodiversity and higher greenhouse gas (GHG) emissions in Bangladesh. This section provides a brief overview of a few major environmental concerns in Bangladesh.

Air quality degradation

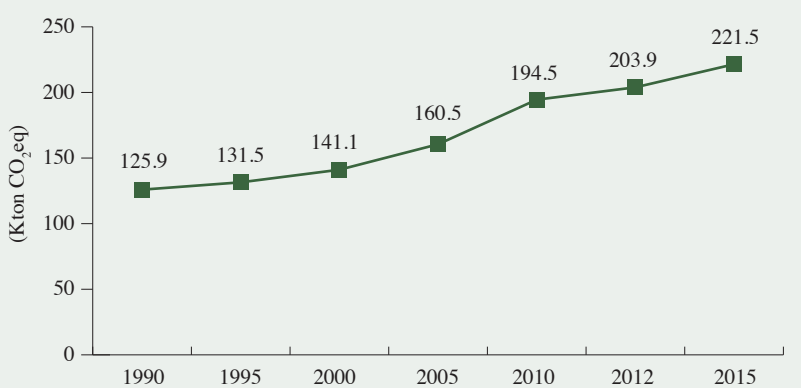
Bangladesh is consistently rated in the top 10 countries with high air pollution levels.[11] The main sources of air pollution in the country are burning of solid fuels in households, dust from construction, coal and diesel power plants, brick kilns and transportation. According to the World Health Organization (WHO), the standard level of particulate matter 10 (PM_{10}) is 50 µg/m^3 and $PM_{2.5}$ is 25 µg/m^3 in the ambient air for 24 hours.[12] However, in Bangladesh, the level of $PM_{2.5}$ was 76 µg/m^3 and PM_{10} was 153.5 µg/m^3, which were alarmingly high.[13] Populations in China, India, Pakistan and Bangladesh experienced 86 per cent of the most extreme concentrations above 75 µg/m^3.[14] Among the 10 most populous countries and the European Union, Bangladesh and India have the highest exposures to $PM_{2.5.}$ These countries have also experienced steepest increases in air pollution since 2010.[15]

In 2014, Bangladesh was rated as having the worst urban air quality out of 91 countries.[16] Dhaka, Gazipur and Narayanganj, the three major cities in Bangladesh, are included in the top 25 cities with the worst air quality. Bangladesh is the sixth worst country in the world for PM_{10} concentration in ambient air and the third worst among South Asian countries.[17] Apart from the three major cities, Chittagong and Barisal districts have also been identified as districts with the worst ambient air quality in Bangladesh. The maximum concentration (325 µg/m^3) was recorded in Narayanganj stations during January of 2014.[18] Generally, the concentration of PM reaches higher levels during the dry months of the year, whereas it reduces during the wet periods. The Government of Bangladesh adopted Air Quality Index with five different pollutants, $PM_{2.5,}$ PM_{10}, nitrogen oxide (NO_2), carbon dioxide (CO_2), sulfur dioxide (SO_2) and ozone (O_3), that reported daily how polluted the air was.[19] However, no appropriate measures have been taken to reduce the amount of PM in the air in the dry season for sustaining the air quality of Bangladesh. Rising levels of PM adversely impact human well-being particularly that of poor and marginalized people who frequently stay in the out-door environment.

Bangladeshi people are also affected by air pollution due to climate change and extreme weather events. GHGs emissions have increased globally. Bangladesh is no exception in this case. The total GHGs emissions, that include CO_2, methane (CH_4), NO_2 and fluorinated gases (F-gases), have drastically increased after 2000 in Bangladesh due to growing industrialization (figure 5.1). CO_2 is the major component of these lethal GHGs. The power sector is causing the most emissions in comparison to other industries, followed by the construction sector, transportations and others (figure 5.2). These GHGs are the key reasons for global warming. As a result, sea level is also rising which drives the coastline people to move to the urban areas.

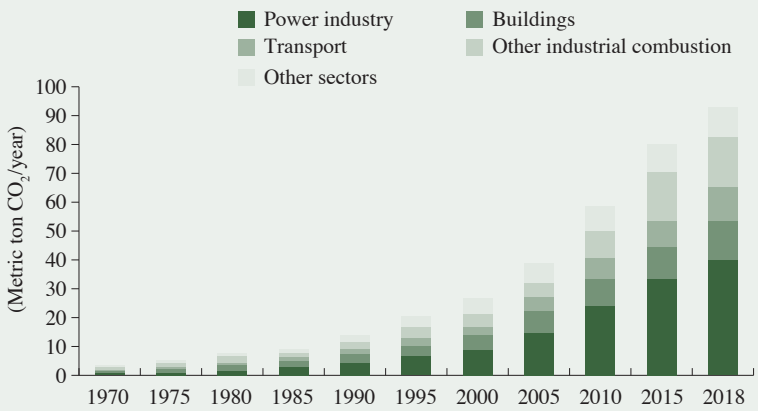
A low-lying country like Bangladesh has been experiencing recurrent floods, cyclones, riverbank erosion, drought and salinity. This is the result of increased global emissions of GHGs

Figure 5.1 Total GHG (CO_2, CH_4, NO_2, F-gases) emissions in Bangladesh, 1990-2012



Source: Crippa *et al.* 2019.

Figure 5.2 Fossil CO_2 emissions by sector, 1970-2018



Source: Crippa et al. 2019.

which is driving climate change. Bangladesh has been identified as the sixth most affected countries in the period 1996-2015 based on the damages caused by extreme weather events. The reported economic loss was about US$ 2,283 million due to floods, landslides, storms and cyclone.[20]

Water pollution

Bangladesh is a riverine country. Rivers are a source of living for many people but could also cause disruption and devastation in life, especially during a certain season or in particular regions. Farming, fishing and shipping are integral economic activities, which make significant use of the water sources. Although these activities have vastly contributed to the economy, they have also caused water pollution, which in return has harmed public health and the ecosystem. It has led to a dearth of clean water across the country. Due to a lack of proper sewerage systems and poorly managed dumping sites, surface water sources cannot be utilized and, hence groundwater has become the main source of drinking water.[21] There are various reasons for water pollution which include urbanization, industrialization, agricultural run-off and improper agricultural practices, and excessive withdrawal of water.[22]

A survey on major rivers situated beside the main cities of Bangladesh (such as Dhaka, Narayanganj, Rajshahi, Chittagong, Barisal, Khulna, Satkhira and Sylhet) indicated that Buriganga, Shitalakkhya and Turag rivers around the cities of Dhaka and Narayanganj were the most polluted rivers in the country (table 5.1). The levels of dissolved oxygen (DO) and biochemical oxygen demand (BOD) were not within acceptable limits in these rivers. Whilst the pH level of Buriganga, Shitalakkhya and Turag was within limits, other rivers were exceeding the standard level. The DO level of the Rupsha River was below the standard level as well as the BOD level of Jamuna River.

Recently, the water quality of both surface and groundwater in the Ganges-Brahmaputra-Meghna (GBM) Basin is degrading and is becoming a serious concern because the water quality of the basin that Bangladesh possesses is mostly affected by upstream activities in the transboundary watershed areas. As Bangladesh uses only GBM Basin water for irrigation purpose, it may indirectly suffer adverse impacts on several communities due to the excessive pollutant materials through the farming process. Pollutant materials can spread to the human body vis-a-vis consumption of fish, vegetables or fruits that grow with the use of basin water.[23]

Table 5.1 Level of water quality parameters in some selected rivers

River	Parameters value (standard level)*		
	Dissolved oxygen (DO) (7.3-10.9)	Power of hydrogen ($_pH$) (6.5-9.0)	Biochemical oxygen demand (BOD) (<10)
Buriganga	<1*	6.4-7.9	1-48*
Shitalakkhya	0-6.2*	6.3-8.8	2-16*
Turag	0-<1*	7.1-8.0	5-38*
Meghna	> 6	6.2-7.6	≤6
Jamuna*	5.9-8.5	7.2-8.5	2.8-11*
Padma	5.4-8.3	6.0-7.8	1.2-2.8
Rupsha*	4.5-6.8*	7.1-7.9	0.4-8
Surma	≥5	6.5-7.9	…

Note: *: Standard level retrieved from 'United Nations Environment Programme (UNEP's) Standard of Inland Water Quality Parameters'.
Source: GOB 2015b.

Groundwater depletion

Geographically, Bangladesh is located in an area with ample groundwater resources. It is reported that currently around 79 per cent of the cultivable land of Bangladesh is irrigated by groundwater; 35,322 deep tube wells, 1,523,322 shallow tube wells and 170,570 low lift pumps are in use in the country to extract groundwater for irrigation purpose.[24] However, over-exploitation, contamination and pollution of groundwater have become matters of serious concern for the country. Excessive extraction of groundwater amplifies the risk of arsenic-contaminated water, while also increases the cost of irrigation. It is also becoming a threat to land subsidence, decreasing the flow of surface water.

Declining rates of groundwater have also been observed in the dry-period across and surrounding areas of Dhaka city, as a result of which a lack of water accessibility is a common phenomenon for the dwellers of the city. However, the rate of decline is not as pronounced in the North and West of the country. Stable or slightly rising trends are generally observed from the Meghna estuary to the Southern coastal areas in the country. In rainy periods, the groundwater level slightly rises or remains stable in coastal regions. Groundwater depletion in coastal areas may, however, increase the salinity level in these areas. Associated threats of the rapid depletion of groundwater on environment and livelihood are high.

Effluents and wastes generated from different industries such as pharmaceutical, textile, dyeing and tannery, are constantly being accumulated in water either through direct disposal on soil surfaces or through an out-flow to surrounding water bodies. Due to seepage, or movements of the pollutants through the soil layers, these wastes are causing groundwater contamination.[25]

Noise pollution

Along with rising air and water quality degradation, sound pollution is also becoming a serious problem across all urban centres in Bangladesh. The situation is getting worse day by day with an increased level of traffic on the roads and construction works in all the major cities.[26]

Noise levels in selected commercial areas of Bangladesh paint a frightening picture as the noise level in residential areas exceeds the standard level. Where the standard noise level in residential areas is 55 decibels (dB), the actual level was 64.9 dB in 2002. While the standard acceptable level is 50 dB to 60 dB, the noise level exceeds more than double (100 dB+) in the busy areas of Dhaka city such as Sayedabad Bus Terminal, Bangla Motor, Mohakhali Crossing, Farmgate, Magbazar, Jatrabari, Gabtoli, etc. The situation of Chittagong and Gazipur cities is also concerning, as in these cities the noise level in the silent zone of major city areas exceeds the standard level by quite a margin.

Noise pollution causes both mental and physical illness among people. It may cause high blood pressure, headache and indigestion, and also affects one's ability to have a sound sleep, particularly in children and the elderly. It also seriously affects expecting mothers. Furthermore, prolonged exposure to loud noise can cause complete deafness to any person.

Excessive extraction of groundwater amplifies the risk of arsenic-contaminated water

Loss of biodiversity and wetlands

Over the last 100 years, Bangladesh has lost 18 species of mammals, with 77 species in Bangladesh joining the International Union for Conservation of Nature (IUCN's) 2015 Red List (including 21 mammals, 23 birds, 21 reptiles and 12 plants).[27] Unfortunately, no specific

measures have been adopted to secure the diversified species.

In Bangladesh, wetlands cover almost 50 per cent of the total land surface and are important sources of income and livelihood for several thousands of people. In Bangladesh alone, more than five million people are dependent on fishing for their livelihoods. Wetlands in Bangladesh also support special biodiversity and several commercial fishes. The pressures have, over the years, led to drastic changes in prime biodiversity habitats (table 5.2), resulting in a severe loss and degradation of its habitat. Among South Asian countries, the number of vulnerable animals is the highest in India (385), followed by Sri Lanka (139), Pakistan (88) and then Bangladesh (75). To mitigate this vulnerability, the Government of Bangladesh adopted several measures in its environmental policy but due to poor monitoring system, this issue remains unsolved.

Table 5.2 Animals' vulnerability in South Asian countries

	EX*	EW*	CR*	EN*	VU*	NT*	Total
India	0	0	75	205	385	341	1,006
Sri Lanka	20	0	62	96	139	175	492
Pakistan	0	0	9	31	88	101	229
Bangladesh	0	1	15	40	75	79	210
Maldives	0	0	2	12	61	92	167
Nepal	0	0	13	23	51	70	157
Bhutan	0	0	7	13	33	41	94
Afghanistan	0	0	4	9	24	26	63

Note: *: EX means extinct, EW means extinct in the wild, CR means critically endangered, EN means endangered, VU means vulnerable and NT means near threatened.
Source: IUCN 2017b.

Table 5.3 Land use in Bangladesh, by purpose

(percentage of total land area)

	1961	1971	1981	1991	2001	2011	2016
Cropland*	68.2	69.9	72.1	74.7	67.6	65.5	66.0
Land under permanent meadows and pastures	4.6	4.6	4.6	4.6	4.6	4.6	4.6
Agricultural land	72.8	74.5	76.7	79.3	72.2	70.1	70.6
Forest land	…	…	…	11.5	11.3	11.1	11.0

Note: *: Cropland is a subset of agricultural land.
Source: FAO 2019b.

Low forest coverage

The demand for forest products and services is increasing due to a rise in population and enhanced economic activities. Between 1990 and 2015, except for India and Bhutan, the South Asian region experienced forest degradation. Although the rate of deforestation is lower in Bangladesh compared to other South Asian countries, the percentage of forest area coverage according to the total land area is only 11.0 per cent, whereas the required standard is 25 per cent (table 5.3).

Environmental threats to human well-being

Growing environmental threats have been disproportionally affecting the poor and marginalized population, both in rural and urban areas. More polluted sites are associated with areas where low-income communities are concentrated. Hence, they are more vulnerable to the risks that arise from being around contaminated air, water and land. Besides, those underprivileged communities residing in slums or near the industrial areas are more vulnerable to the pollution from contaminated water and lack of sanitation.

Environmental threats to human health

Environmental degradation, most severely manifested in deteriorating human health, can be observed through a surge in eco-related diseases. Waterborne diseases (like diarrhoea, dysentery and jaundice), mosquito-borne diseases (like dengue and malaria) and diseases due to harmful gas emissions (like tuberculosis and flu) are common in Bangladesh.[28] Arsenic contamination in groundwater has been rampant in the recent past.

Causes of health hazards

The critical capacity of households to face health-related stresses is contingent on their economic status. Poverty is the greatest contributor to health problems, which are particularly enhanced by environmental degradation, climate change and recurring disasters. In the coastal areas, these enhancing factors create a combined effect, which is further exacerbated by the vulnerability of groups such as women and children.

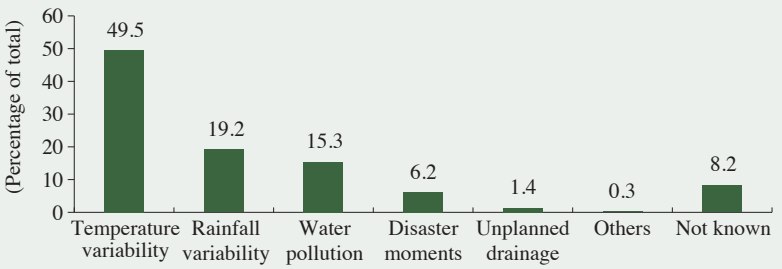
According to a survey conducted by the Bangladesh Bureau of Statistics, among 4.4 million households, nearly 50 per cent experienced illness due to temperature vulnerability in 2014. The highest number of occurrences happened in Dhaka city (11.0 per cent) followed by Barisal (8.4 per cent) and Rajshahi (7.6 per cent). Rainfall vulnerability was another cause of sickness, with the highest number of cases again in Dhaka city (4.4 per cent). Barisal was found to have the most cases of poor health due to the effects of the unplanned drainage system as well as natural disasters.[29]

Figure 5.3 indicates that a major portion of the population experiences several types of health hazards like flu and seasonal fever due to temperature variability, followed by rainfall variability. People also experience various water-borne diseases like diarrhoea and dysentery due to water pollution. The unplanned drainage system and lack of waste management are indirectly responsible for various types of mosquito-borne diseases.

Increased use of chemical fertilizers in agriculture

The use of chemical fertilizers and pesticides in agriculture has grown significantly as food production has increased (table 5.4). All types of fertilizers such as nutrient nitrogen, nutrient phosphate and nutrient potash are currently being used at an exponentially higher rate than ever before.[30] Consequently, the environment is suffering from several looming threats, making particular groups more vulnerable in terms of health and causing harm to eco-diversity. The toxic fertilizers and pesticides threaten the health of those who are exposed to these, particularly the farmers. The use of agrochemicals also creates health problems through pollution of drinking water by chemical residues.

Figure 5.3 Significant causes of health hazards in 2014



Source: GOB 2016a.

Inadequate safe drinking water and water-borne diseases

Inadequate safe drinking water is a serious concern in rural areas, as there are not enough tube wells to meet water demand, causing many people to use ponds

Table 5.4 Use of chemicals and pesticides

	Total use of chemical fertilizers (thousand metric tonnes)	Pesticides use (total) per area of cropland (kilogramme per hectare)
2004	3,755	0.8
2005	3,683	0.9
2006	3,551	1.1
2007	3,885	1.3
2008	2,865	1.4
2009	3,313	1.6
2010	4,085	1.5
2011	4,049	1.7
2012	4,023	1.6
2013	4,502	1.8
2014	4,815	1.9
2015	4,738	1.6
2016	4,907	1.7

Sources: GOB 2017a and FAO 2019b.

or rivers. Additionally, inadequate sanitation facilities create health hazards for individuals and cause difficulty for health care providers attempting to treat them.

The Bangladesh Bureau of Statistics shows that a primary health issue amongst affected households has usually been diarrhoea.[31] From 2009 to 2014, nearly 225,000 households reported cases of diarrhoea, with Dhaka, Khulna and Barisal experiencing the highest proportion of cases (37 per cent). Many reported experiencing dysentery (21 per cent) and flu (15 per cent) following disasters as well.

Lack of waste management and mosquito-borne diseases

Due to lack of waste management in the cities, mosquito-borne diseases such as dengue, malaria and chikungunya have increased in several city areas around Bangladesh. Symptoms of dengue fever are frequently experienced in Dhaka city due to lack of proper waste management and lack of good drainage system. This disease occurs mainly during monsoon.

Table 5.5 Scenario of mosquito-borne disease in Bangladesh

	Dengue	Malaria	
	+ve case (only Dhaka)	+ve cases (Bangladesh)	Death (Bangladesh)
2000	5,551	54,223	478
2001	2,430	54,216	490
2002	6,132	62,269	588
2003	486	54,654	577
2004	3,934	58,894	535
2005	1,048	48,121	501
2006	2,200	32,857	307
2007	466	59,857	228
2008	1,153	84,690	154
2009	474	63,873	47
2010	409	55,873	37
2011	1,362	51,773	36
2012	671	29,518	11
2013	1,749	26,891	15
2014	375	57,480	45
2015	3,162	39,719	9

Source: GOB 2016d.

Table 5.5 provides an account of dengue- and malaria-affected people during 2000-2015.

Environmental threats to the economy

Environmental degradation and extreme weather events such as heavy precipitation, heat waves and coastal flooding severely impact the economy of a country. Around 70-163 weather-related disasters occurred in Bangladesh from 1995 to 2015.[32] The absolute number of affected people by weather-related disasters in Bangladesh over this period was 131 million, leading the world in this statistic, just after China (2,274 million) and India (805 million).

From 2009 to 2014, floods caused 23.2 per cent of the economic losses from environmental disasters (table 5.6). River/coastal erosion and cyclones in coastal areas (Khulna and Chittagong divisions) caused a huge amount of economic loss and damage to livestock (2.1 per cent), poultry (0.4 per cent), houses (7.0 per cent) and homestead property (4.3 per cent). Storm/tidal surge causes the highest loss in the fisheries sector and land, although it caused 6.9 per cent of the total economic loss as a result of environmental disasters.

People living on an income that barely covers daily needs or those running small and medium scale business are particularly vulnerable to the after-effects of natural disasters. Additionally, due to the loss of agricultural outputs and incomes local economies face stress. This causes scarcity of products and increases prices of rice and cereals. Rising costs of staple food hit the poor hardest as they lose incomes during disasters.

An estimate of the average number of working days lost per household due to natural disasters during 2009-2014 showed that floods, river or coastal erosion and waterlogging caused the highest numbers of lost working days.[33] As flood and river or coastal erosion occur in the

Table 5.6 Economic loss of household by sector and by disaster categories, 2009-2014

Disaster type	Total Economic loss		Economic loss by sectors (%)						
	BDT in millions	% of the total	Crop	Livestock	Poultry	Fishery	Land	House	Homestead property
Drought	10,569	5.7	5.0	0.1	0.0	0.1	0.4	0.0	0.1
Flood	42,807	23.2	12.0	1.3	0.3	1.1	4.9	2.7	0.9
Waterlogging	16,062	8.7	4.7	0.4	0.1	1.3	0.8	1.0	0.4
Cyclone	28,385	15.4	2.3	1.7	0.4	1.1	…	5.9	4.0
Tornado	4,299	2.3	0.5	0.1	0.0	0.0	0.0	1.4	0.4
Storm/tidal surge	12,676	6.9	1.3	0.4	0.2	1.8	1.8	1.0	1.4
Thunderstorm	10,940	5.9	1.4	0.2	0.1	0.0	0.0	3.4	0.9
River/coastal erosion	36,409	19.8	0.6	0.4	0.0	0.2	17.2	1.1	0.3
Landslides	249	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Salinity	6,073	3.3	1.2	0.1	0.0	0.0	1.5	0.0	0.5
Hail storm	11,472	6.2	5.3	0.0	0.0	0.0	0.0	0.8	0.2
Others (fog, insecticides, rats, etc.)	4,306	2.3	2.1	0.1	0.0	0.2	0.0	0.0	0.0

Source: GOB 2016a.

countryside or rural areas of Bangladesh, most marginalized people such as poor, women and young are highly affected due to these types of environmental hazards. Poor people, particularly marginalized farmers who do not own land and produce crops through borrowing, are affected more due to disasters. During a flood or other natural disasters, access to safe drinking water becomes a serious problem. The elderly and children suffer more due to the lack of safe water.

Due to the gradual depletion of groundwater, irrigation costs are now increasing, making it a challenge for the agriculture sector to meet the demand for agricultural produce. As the groundwater depletion rate is high in the Khulna region (4.1 to 5.3 per cent), cost of irrigation is higher compared to other regions in Bangladesh.[34] Besides the Khulna region, Rangpur and Rajshahi regions also incurred the high cost of irrigation due to depletion of groundwater. Farmers in the North region (Rajshahi and Rangpur) are trying to convert their Boro rice farming to maize farming because maize cultivation requires less irrigation.

Urbanization has come with a huge cost to Bangladeshi economy through high mortality and morbidity. Recent estimates show that in 2015 the total number of deaths due to air pollution, inadequate water, sanitation and hygiene (WASH), arsenic in drinking water and occupational pollutants in urban areas of Bangladesh is 80,000 annually, and the disability-adjusted life years due to urban pollution amount to 2.6 million. In economic terms, the cost of mortality estimated in terms of forgone labour output in all urban areas was US$ 1.4 billion.[35]

Environmental threats to socially and economically marginalized people

As Bangladesh frequently faces natural disasters such as cyclones, floods and landslides, the living standard of the marginalized people such as poor, women and children is particularly affected. Due to environmental threats, the poor community becomes poorer as they lack opportunities.

Threats to the poor

An assessment of vulnerability among the disaster affected people shows that

the bottom income group is affected most by environmental disasters. The first quintile income group (the bottom) faced around 15.7 per cent loss, whereas the fifth quintile income group faced only 3.1 per cent loss and damage (table 5.7).

Households with an annual average income less than Bangladeshi Taka (BDT) 100,000 belong to the lower or bottom income group; households with income between BDT 100,000 to BDT 2,000,000 belong to the middle-income group; and households with income more than BDT 2,000,000 belong to high-income group. Table 5.7 shows that the proportion of loss due to a natural disaster in the first quintile is more than double the second quintile. This indicates that vulnerability to natural disasters is higher in the lower-income groups than the medium- and higher-income groups.

Threats to children

Children become victims of environmental degradation in many ways. In Bangladesh, floods, waterlogging and cyclones cause the highest number of health problems amongst children, and 48.6 per cent of those cases are due to diarrhoea and other waterborne diseases.[36] The highest proportion of cases are found in Dhaka city (21.7 per cent), followed by Rajshahi and Sylhet. Children under 12 years are the most vulnerable to diseases following a natural disaster.[37] This results in other challenges such as discontinuation of their education in the aftermath of natural disasters. It was reported that 73 per cent of children were unable to attend school regularly after a natural disaster due to lack of communication and information.[38] Around 10 per cent of children could not attend school due to sickness in the time of environmental hazards. In coastal areas, school buildings are frequently used as a cyclone shelter. Hence, there is no space to conduct classes at that time. During heavy rainfall both in urban and rural areas, students face difficulty in travelling to schools and colleges. Worse, floods can destroy school and college buildings which leads to suspension of children's education for a while.

Table 5.7 Vulnerability assessment among disaster-affected people

	Household group	Average annual income (BDT)	The proportion of loss to total income
Bottom income group	First quintile	34,957	15.7
…	Second quintile	74,590	7.2
Median income group	Third quintile	105,986	6.0
…	Fourth quintile	152,092	4.9
Top income group	Fifth quintile	357,897	3.1

Source: GOB 2016a.

Threats to women

Across the world, young women of low socioeconomic status are comparatively more vulnerable to environmental hazards than other demographic groups; they face injury or death as they are unable to leave during a disaster and suffer from water-borne infections and malnutrition.[39]

The Southern-most part of Bangladesh is bordered by about 710 kilometres (km) of coastal belts, where cyclones, storm surges, salinity intrusion and coastal erosion are common. Cyclone surges in the coastal region are very high (above one metre high) and women of these districts are the most vulnerable to cyclonic hazards. Following floods, extreme rainfall affects women through waterlogging effects, which was seen in *Aila* (a cyclone) affected areas in Bangladesh. Women are also affected due to the shortage of safe drinking water. During the monsoon, common flood-related deaths occur due to snake bites and drowning. Adult women are prone to deaths owing to the above-mentioned reasons as opposed to men.

Women from lower socioeconomic status face more vulnerability due to their lack of financial independence and social attitudes. They remain unemployed after the flood. For pregnant women, it is difficult to migrate to dry places during floods due to their need

for privacy. Young girls may face sexual harassment when they move to roadside high lands or embankments along with their families. When men migrate to other districts for employment, women and girls become vulnerable to harassment and sexual abuse.[40] Because of natural disasters and displacement women also feel social and mental health stress.[41]

Women have to walk long distances to collect drinking water for their families both during floods and droughts. In the drought-prone areas, in addition to household responsibilities, women also often participate in farm activities as pre-harvesting and post-harvesting day labourers. Women also sell their assets such as jewellery, livestock and poultry to ensure food for the household members.

Environmental threats to internal migration

Environmental risk-induced migration has emerged as a major issue in Bangladesh. Given the recent extreme events of floods in the Northeastern part of the country and repeated cyclones in the coastal areas, the links between migration, environmental stress, disaster and climate change are becoming more evident. This is one of the major contributing factors to the formation of slums in the major cities.

Those who live in rural and coastal areas as well as close to major rivers, are vulnerable to cyclones and flooding. As a result, migration happens from the Southern region particularly Satkhira, Kuakata, Shoronkhola and Potuakhali districts and from basin areas of Rangpur, Dinajpur and Gainbanda regions of the country. Those in the Northern region tend to experience more dry spells and heatwaves.[42]

It is estimated that 26 million people will be affected and displaced by storm surges and sea-level rise by the year 2050 in Bangladesh.[43] Sea-level rise by one metre will endanger mangrove forests in the Southwest of the country, flooding nearly 30,000 square km of land, and leading to nearly 15 million people losing their homes and becoming environmental migrants in their own country.[44]

In Bangladesh, the monsoon floods occurring in the Northwest part of the country during August and September 2014 were considered to have the worst environmental impact since 2007. Water levels did not return to normal until October 2014. Official estimates indicate that the 2014 flood affected 3.5 million people, killing 56 and displacing 325,000.[45]

A census among urban low-income settlements revealed that migrants from the coastal belt and the Northern Monga-affected districts account for a large proportion of slum dwellers within Dhaka (coastal areas 31.9 per cent and Monga-affected 4.6 per cent).[46] There are multiple environmentally challenged areas in Bangladesh like coastal zones, haors areas and monga-affected areas. The possibility of migrant outflow from the Haor and Monga areas is high (table 5.8).

Climate-induced migration has impacts on the security of human life and resources. Climate migrants tend to live in unhealthy and overcrowded slum areas. Due to the lack of effective garbage disposal and drainage system, the envi-

Table 5.8 Migration pattern of three disaster-prone areas in Bangladesh, 1991-2010

	Coastal (± on national rate)	Haor (± on national rate)	Monga (± on national rate)	All districts national rate
Urban	+17 per cent (-28)	+94 per cent (+49)	+45 per cent (-4)	+49 per cent
Rural	+21 per cent (-3)	+34 per cent (+8)	+21 per cent (-3)	+24 per cent
Total	+20 per cent (-9)	+39 per cent (+10)	+24 per cent (-5)	+29 per cent

Source: Marshal and Rahman 2014.

ronmental situation in slums is extremely unhealthy. Climate migrants face competition in sourcing utility services like electricity and clean water upon their arrival at new places. At times, migrants in urban slums can lead to conflicts among the slum dwellers. Quite often, increased demand leads to using illegal connections of utility services. Additional people due to migration put pressure on the existing facilities and services.

Climate migrants face competition in sourcing utility services like electricity and clean water upon their arrival at new places

National policies for environmental sustainability

In Bangladesh, the nineties marked the beginning of the history of environmental policy. In this decade, rapid development demonstrated a new direction for policy issues in the field of environment.[47] Gradually, various issues related to the environment have been incorporated in the government policies including the National Environment Policy (NEP), the Fourth to Seventh Five Year Plans, National Environment Action Plan, and Environment Conservation Rules 1995 and Act 1997. Recently, the Bangladesh Water Act and National Land Use Policy (draft) incorporated within the NEP includes various issues related to environmental sustainability with equity. These include ensuring the right to access land and water resources for every citizen, particularly for ethnically and gender-sensitive groups, as well as implementing land zoning, declaring ecologically critical areas for protecting environmental resources for future generations, ensuring community participation to reduce environmental degradation and expanding the benefit of conservation to the marginalized people of coastal, hilly, forest, haors and various critical areas. Table 5.9 presents some of the important objectives related to environmental sustainability with equity in the five-year plans of Bangladesh since 1990.

To protect the environment from various types of degradation, the NEP was first adopted in 1992. Though the issues of environmental sustainability with equity were not mentioned in NEP 1992, the policy included several rules and acts to protect the environment and natural resources for future generation and sustainable development. The revised version of the NEP 1992 was formulated in 2013. Table 5.10 presents various objectives of NEP 1992 and NEP 2013 that aim to ensure environmental sustainability in the country.

To abate pollution and conserve natural resources, the Government of Bangladesh has formulated relevant policies, acts and rules related to protecting the environment and reducing deterioration of the environment (table 5.11). Through declaring areas like the Sundarbans (mangrove forests), Tanguarhaors (a wetland ecosystem located in the Dharmapasha and Tahirpur Upazilas of Sunamganj District in Bangladesh), beach, islands and rivers as ecologically critical, by requiring environmental clearance certificates before establishing any industry, and running environmental impacts assessments (EIAs) on several factories like leather and garments, the government has made efforts to ensure environmental sustainability.

Bangladesh Environmental Management Project (BEMP) is ongoing and being implemented by the Department of Environment after the implementation of Environmental Institutional Strengthening Project from 2006 to 2010. Two major objectives of BEMP are ensuring meaningful stakeholder participation in the management of the environment and conservation of natural resources through the identification of ecologically critical areas. Under BEMP, the Department of Environment drafted EIA guidelines for several industrial and development sectors including coal and gas mining,

Table 5.9 Issue of environmental sustainability with equity in national plans of Bangladesh		
	Relevant objectives with environmental sustainability and equity	Mechanisms for achieving objectives
Fourth Five Year Plan (1990-1995)	• Incorporated a chapter on 'Environment and Sustainable Development' for the first time and identified several factors hampering the environmental quality and deteriorating natural resources.	• In this plan environmental degradation was identified as the eleventh constraint to national economic growth but the strategy for reducing this constraint was not discussed in detail.
Fifth Five Year Plan (1997-2002)	• Ensuring active participation of women and low socioeconomic groups in the protection of the environment, promoting environmentally friendly activities in development phases, and preserving and protecting natural resources like air, water and soil and also pollution of resources.	• This plan also incorporated the 'polluter pays principle' in the form of the tax holiday, tax rebate, etc. • The 'polluter pays principle' is the commonly accepted practice that those who produce pollution should bear the costs of managing it to prevent damage to human health or the environment.
Sixth Five Year Plan (2011-2015)	• Achieving 20 per cent productive forest coverage. • Controlling air pollution in all large cities including Dhaka. • Establishing and protecting a 500-metre wide green belt in coastal areas. • Low socioeconomic groups allowed to lease wetland resources. • Treating urban wastewater to clean river water. • Completing land zoning for sustainable land and water use. • Climate change, disaster risk and environmental issues are considered through an integrated process in project design and budget allocation. • Promoting zero discharge of industrial pollutants to the water. • Enacting clean air act both at urban and rural level.	• Forest coverage achieved only 13.1 per cent and the rest will take place in the Sixth Five Year Plan. • To control air pollution, traditional brick kilns are being passed out and air quality monitoring stations have been set up in the different station. • For the conservation of the forest and biodiversity, the total protected area reached at 2.3 per cent but the target was 5.0 per cent. • Setting up effluent treatment plants (ETPs) for wastewater treatment has been mandatory. • 'Polluters pay principle' is adopted to ensure environmental compliances. • Before establishing, proposed industries are required Environmental Clearance Certificates (ECCs). • To reduce GHGs and to get health benefit, market initiatives were taken to expand improved cookstoves.
Seventh Five Year Plan (2016-2020)	• Achieving 20 per cent forest coverage with (tree density >70 per cent). • Protecting wildlife as well as controlling illegal wildlife trading. • Controlling saline intrusion in the Southwest region and the Sundarbans. • Reducing water conservation by 25 per cent and wastewater generation by 25 per cent. • Relocating Hazaribag tanneries and strict enforcement of Brick Kiln Act 2013. • Utilizing surface water to avoid arsenic contamination in groundwater. • Protecting 15 per cent of wetland in pick dry seasons to protect aquatic resources. • Introduction of community-based pollution control mechanism. • Installing ETP within washing, dyeing and finishing (WDF) firms.	• Forest coverage will be achieved around 15 per cent. • Establishing and maintaining fish and wetland resources in eco-sensitive areas like Sundarbans, Kaptai Lake, several parts of Halda River, etc. • Preventing water-logging and shrinkage of water resources by roads, embankments, etc. • Creation of 500 metres wide green coastal belt will be continued and vacant space will be brought under the coverage. • In Sylhet, 5,000-hectare reed land will be planted. • Introducing low-sulphur diesel and energy-efficient technology. • Controlling river water pollution.

Source: GOB, *Five Year Plan* (various issues).

Table 5.10 Major frameworks on environmental sustainability with equity		
	Relevant objectives	Mechanisms for achieving objectives
National Environment Policy (NEP) 1992	• Maintaining ecological balance and ensuring sustainable use of natural resources. • Regulating activities that cause environmental degradation. • Protect the country against natural disasters.	• Formulating National Environment Management Action Plan in 1995. • Including 15 broad sectors like agriculture, fisheries, etc., regardless of controlling pollution and maintaining the quality of the environment. • Forming new laws and amending those to cope with degradation. • Ratifying all international conventions and modifying national laws in the form of those conventions.
NEP 2013	• It provides high importance on controlling and regulating air and water pollution. • Reducing the impacts of climate change and economic loss of natural disasters. • Ensuring environment-friendly sustainable development in all sectors and the use of natural resources. • Establishing public-private partnerships for the improved environment and mass awareness for conservation. • Enhancing global and regional cooperation for the improved global environment and against transboundary pollution. • Assessing environmental impacts on all necessary sectors.	• Emphasis on sustainable land management. • Emphasis on protecting water resources from illegal grabbing and pollution. • Maintaining air quality and keeping pollutant particles within the standard limits. • Restricting importation of old vehicles. • Obtaining emission testing and fitness certificate is mandatory. • Defining the standard quality of fuel used in vehicles. • Fixing emission tax and enacting this tax in case of violation. • Restricting to dump industrial waste in the ground near the aquatic resources. • Preventing all types of activities that cause natural imbalance or hamper public well-being. • Researching on genetic engineering to protect biodiversity and ecosystem. • Encouraging to implement Clean Development Mechanism (CDM).

Source: GOB 2013a.

cement factories, pharmaceuticals, water and transport sectors. Most of these guidelines are still in draft form.[48]

Besides these, there are also the environment-related policies such as National Conservation Strategy, National Adaptation Programme of Action, and climate change-related policies and strategies including Bangladesh Climate Change Strategy and Action Plan 2009, and Intended Nationally Determined Contributions.

In the recent period, the Government of Bangladesh has put a strong emphasis on the implementation of the Sustainable Development Goals (SDGs). The Planning Commission and the Prime Minister's office are engaged in SDG implementation. Since several SDGs are linked to environmental and climate-related issues, it is expected that initiatives of the government in case of SDGs will ensure environmental sustainability with equity.

In terms of institutional arrangements, the Department of Environment is responsible for the enforcement of the legislation related to the discharge of industrial and other sources of pollutants and for monitoring environmental quality. Responsibilities for management of forests, fisheries and agricultural land lie within the individual department and ministries.

There have been many initiatives in terms of formulating policies and setting up of institutions. However, the implementation of these policies is constrained by several factors. There are limitations in accessing environmental justice due to the existence and prevalence of complex procedural hurdles. The key challenge is linked to governance and institutional capacity. Most of the pollution including air, water and human health impacts are due to poor governance and elite-capture of common property resources including land, water bodies and common property natural resources such as rivers, canals, forests, railways lands and roadsides. Hence, despite good policies and programmes, a low level of

Table 5.11 Major laws on environmental sustainability with equity		
	Relevant objectives	Strategies for achieving objectives
Environmental Conservation Act 1995; Environmental Conservation Rules 1997; Environmental Court Act (ECA) 2000 and 2010	• Conservation and improvement of the environment. • Control and mitigation of pollution.	• Restriction on the operational activities in declared ecologically critical areas. • Declaration of standards for quality of air, water, noise and soil for different areas for different purposes and a standard limit for discharging waste. • Formulation and promulgation of environmental guidelines. • ECA 2000 includes protocols for court establishments and defines the court's jurisdiction, penalties and procedures for investigation, trial and appeal.
National Environment Management Action Plan (1995-2005)	• The focused issues of this plan were protection from natural disasters, maintaining ecological balance and sustainable use of natural resources.	• Provides an action plan for environmental development with a set of the sectoral guideline. • Undertaking a sound environment development programme.
Bangladesh Water Act 2013	• According to this Act, license or permit is required in case of large scale water withdrawal, although the maximum amount of permit is not mentioned. • Water pollution fees and zonal regulation will be introduced.	• Industrial polluters will be required to pay for the cleaning of water-body polluted by them according to this Act and effluent disposal will be monitored. • Zoning regulations will be established for new industries considering fresh and safe water availability and possibilities of effluent. • Discharge that ensures sustainable use of water resources.
Brick Kilns (Control) Amendment 2013	• Prohibits burning of fuelwood or any other wood in brick making and bans the establishment of brick kilns in residential, agricultural land, business and reserved areas, forests, wetland, orchard and in ecologically critical areas.	• Restricting collection of soil for brick making from mountains, agricultural land and hillocks to ensure sustainable use of soil resources and to protect the marginalized communities from landslides and river erosion.
National Sustainable Development Policy (2010-2021)	• One of the major objectives is to reduce air pollution caused by transport and water pollution caused by industrial units and manage solid waste in urban areas.	• Reducing water pollution through industrial zoning, monitoring water quality and ensuring waste dumping facilities in port areas. • Reducing air pollution by improved transport system, replaced traditional brick kilns and dust control measures in construction work.
National Land Policy (draft) 2016	• Providing access to land facilities and promoting land tenure securities to every citizen. • Providing equitable and efficient allocation of land. • Providing general guidance for managing and administering land in an equitable, efficient, transparent, accountable and sustainable manner.	• Any person's right to access land must not be affected by any legal hurdle on account of personal matters such as gender or ethnicity. • Transparency, accountability and community participation should be ensured for effective land administration. • Implement zoning regulations for all eco-fragile areas such as forests, water bodies and coastal areas to protect them from unlawful encroachment by any person or organization and further degradation.

Sources: GOB 1995, 2013a, b, c and d, and 2016c.

implementation could not bring in expected improvement in the environmental situation of the country. Therefore, in the end, it is institutional reforms which can improve the environmental situation through more accountability and transparency.[49]

Conclusions and recommendations

The discussion in the chapter indicates that the economy of Bangladesh is very much dependent on environmental resources, such as land, water, forests and fisheries. Environmental problems are being created due to the unsustainable exploitation of natural resources for economic growth and meet the needs of a large population. Economic growth has led to industrialization and urbanization in Bangladesh. The phenomena have led to an increased requirement for energy, food and construction material. There is an increase in transportation, thermal-based power

plants, brick kilns and agricultural production through chemical fertilizers. Due to increased economic activities, there is a strain on these limited resources. Environmental problems are manifested through contamination and pollution of land, water and air which have serious implications for the economy and human health. This can have serious implications on the sustainability of the economy and human well-being.

To mitigate the adverse effects of environmental degradation on human well-being, some policies need to be tailored or introduced in Bangladesh. Some of the recommendations in this regard are as follows:

The government should enhance community-based efforts to protect, regenerate and manage the natural resources. For example, support should be given for social forestry, and afforestation programme needs to be undertaken in the drought-prone agricultural land, coastal and homestead areas. In the case of the fishery, community management and empowerment of fishermen is a useful tool for enforcing regulations that could limit overexploitation of fishery resources.

Actions are needed to control the extent of effluent dumping and to keep air, water and solid waste pollution within the acceptable prescribed limits. The cost of the degradation of natural resources should be taken into account. The implementation of regulations requires regular monitoring. To monitor these programmes, a strong institutional set up is essential and close cooperation between the public and private agencies is necessary. Stronger legislative mandate and greater power of enforcement are required to control pollution.

Increased awareness both at the individual and national level is essential to develop a sense of responsibility towards preventing environmental degradation

The solution to many environmental problems lies in the reduction of poverty. People overexploit natural resources to survive. Therefore, the government has to provide adequate income and employment opportunities to reduce overexploitation of common property resources.

Awareness among people from all walks of life is essential to control resource exploitation and environmental degradation. Environmental education is needed for both policymakers and those who harvest resources. Increased awareness both at the individual and national level is essential to develop a sense of responsibility towards preventing environmental degradation.

CHAPTER 6

A Policy Framework for Environmental Sustainability and Sustainable Development in South Asia

Introduction

Environmental degradation is inextricably linked to the problems of poverty, hunger, health and natural disasters. Managing the natural resource base has, therefore, become a fundamental requirement for achieving sustainable human development. The preceding chapters have analysed various aspects of human development and environmental sustainability nexus including questions such as:

- Why is environmental sustainability critical to human development in South Asia?
- How has a failure to tackle environmental problems in the past created other sustainable development problems in South Asia? and
- How does the natural environment enhance and damage human development?

Based on discussions in previous chapters of this report, the objective of this chapter is to (i) summarize key linkages between environmental sustainability, human development and sustainable development, (ii) highlight key sustainable development trends and patterns in South Asia, and (iii) present a policy framework for environmental sustainability in the context of achieving broader Sustainable Development Goals (SDGs) in a balanced and integrated manner in South Asia.

Sustaining natural ecosystems such as forests, biodiversity, freshwater, coastal and marine is essential to making 'the 2030 Agenda for Sustainable Development' a reality. Natural ecosystems are the natural assets and resources that provide ecosystem services, such as food, water, energy, timber, fertilization of crops and absorption of waste and pollution like carbon dioxide (CO_2). Promoting environmental sustainability is an opportunity to build people's capabilities, provide opportunities for communities to thrive, and promote stewardship of natural resources to benefit people now and in the future. It is also an opportunity to empower and engage the marginalized people and local communities, including indigenous peoples, to leverage their valuable traditional knowledge about nature and sustainable practices to achieve sustainable development. The opportunities people have and the choices they make determine the course of human development—nowhere more so than in South Asia, home to one-fourth of the world's population. South Asia's future, to a large extent, will shape the world's future in the 21st century.

South Asia's future, to a large extent, will shape the world's future in the 21st century

Over the past few decades, South Asia has seen major advancements in human development—people are more educated and live longer and healthier lives. However, serious challenges to sustainable human development remain, ranging from persisting poverty and growing inequalities to rapid urbanization, air pollution, freshwater scarcity, land degradation and climate change. These challenges are inter-related and must be tackled together. Doing so requires a coherent and integrated strategy that ensures environmental sustainability as well as promotes inclusive and sustainable socio-economic development.

This chapter highlights the importance of a sustainable human development approach that integrates development with environmental protection and sustainable resource management. Such

an integrated approach is key to fostering economic growth while ensuring that natural resources continue to provide the required environmental resources and services to all. The chapter argues for an integrated approach over the one that seeks to solve each issue in isolation because such an approach can:

1. Enable countries to leverage emerging opportunities and positive spill-overs while managing challenges and reducing risks;
2. Shift the focus from the symptoms to the root causes of environmental degradation;
3. Involve a wide set of stakeholders (e.g., ministries, institutions, businesses and local communities) at the national, local, regional and international levels in the search for solutions; and
4. Improve policy and institutional coherence to ensure that progress in environmental sustainability will contribute to progress in social and economic aspects.

Without proper policies, environmental changes can aggravate poverty, inequality and other human deprivations

The key message of the chapter is that promoting environmental sustainability is critical for fostering human development, and this can and should be done by eradicating poverty and hunger, reducing inequalities, improving energy access for the poor, and minimizing environmental risks or natural resource scarcities. The chapter asserts that the environmental changes and human development are inter-related: without proper policies, environmental changes can aggravate poverty, inequality and other human deprivations.

Key sustainable development trends, patterns and challenges in South Asia

The South Asia region, covering eight countries, is extremely diverse in terms of geography, climate, size and levels of development. Roughly half of the eight South Asian countries are emerging as middle-income, while the other half can be classified as the least developed countries (LDCs). Some of these countries are small in terms of land size and population, others are large: a few are landlocked, mountainous nations while some are island nations. Sustainable development challenges vary from one country to the next, but the region shares many common features. Based on the analysis of the previous chapters and related reports, key sustainable development trends, patterns and challenges in South Asia are summarized below.

***Rapid economic growth and poverty reduction*:** For the last 27 years, the growth rates of South Asian countries have been among the highest in the world, annually averaging about 6.2 per cent.[1] A promising corollary of this high rate of economic growth in the last quarter-century was the impressive reduction in poverty. The proportion of the population living in extreme poverty—defined as people living on less than US$ 1.90 a day in 2011 purchasing power parity—fell from 47.3 per cent in 1990 to 12.4 per cent in 2015.[2] The region's population living in extreme poverty fell from 536 million to 216 million, indicating that the region lifted about 320 million people from extreme poverty conditions *despite* population growth.[3]

***Human development is at the medium level*:** South Asia's Human Development Index (HDI) value for 2017 is 0.638—which puts the region in the medium human development category. The region also covers the spectrum of diversity in human development—two countries (Sri Lanka and the Maldives) in the high human development group, five are in the medium human development group and one is in the low human development group (Afghanistan). South Asia was the fastest-growing region in the HDI value over the period from 1990 to 2017 with

an increase of 45.3 per cent.[4] Over the same period, the region's average life expectancy at birth increased by 10.8 years (from 58.5 to 69.3), mean years of schooling increased by 3.4 years (from 3.0 to 6.4), expected years of schooling increased by 4.7 years (from 7.2 to 11.9) and GNI per capita increased by about 206.2 per cent (from US$ 2,311 to US$ 6,473).[5] These figures show that South Asia has not only achieved sustained high economic growth but has also been able to reduce poverty and improved human development substantially in recent decades.

***Jobless growth is a key concern*:** South Asia, like other world regions, faces jobless growth due to globalization and rapid technological change. Though this is one of the main concerns of politicians and policymakers around the world, it is more pronounced in South Asia where a large number of young people is reaching working age every year. Economic growth alone will not be enough to overcome job challenges in South Asia, as the number of new jobs needed every year would be enormous.[6] For example, Bangladesh would have to create over 1.6 million jobs every year, Pakistan more than 2.0 million and India close to 13.0 million. Assuming the past relationship between the economic growth and employment creation, to generate so many new jobs, growth rates over 10 per cent per year would be needed in South Asia, and growth rates should reach 15 per cent per year in Bangladesh and 18 per cent in India. Given that such high growth rates are not feasible, rapid growth alone will not be enough to tackle the unemployment issue. As jobless growth is a systemic and multi-dimensional issue, a more effective solution is to develop a synergistic policy-matrix. Implementing flexible labour market reforms, promoting the growth of small and medium industries, skilling for an industry-ready workforce, producing periodic data on employment, and promoting and tracking entrepreneurial sector are some ways that can lead to sustainable employment generation. Besides, a boost to the infrastructure too helps in generating more jobs. For example, if roads are constructed in any area, it will promote economic activities like restaurants and vehicle repair shops along with it.

***South Asia is still home to many poor people*:** Despite South Asia's remarkable socio-economic progress in the recent decades, persisting high unemployment and under-employment problems mean South Asia is still home to 42 per cent (absolute number of 546 million) of the world's multidimensional poor.[7] The 2018 estimates on Multidimensional Poverty Index show the proportion of the population living in multidimensional poverty is high throughout South Asia, with the highest rates in Afghanistan (56 per cent), followed by Pakistan (44 per cent), Bangladesh (41 per cent), Bhutan (37 per cent), Nepal (35 per cent) and India (28 per cent).[8] This means that the region's performance in reducing multidimensional poverty is less impressive than its performance in reducing income poverty. It also shows that multidimensional poverty has become one of the most important factors hindering the sustainable development of South Asia.

South Asia is still home to 42 per cent (absolute number of 546 million) of the world's multidimensional poor

As highlighted in the previous chapters, though poverty, hunger and malnourishment have decreased substantially, they remain serious problems in almost all South Asian countries. Similarly, though access to safe drinking water supply and modern sanitation improved significantly in the last two decades, needs for improved sanitation and modern energy are likely to remain unmet for hundreds of millions of households. South Asia also has high and persisting gender disparities, second only to Sub-Saharan Africa. This is due to low female representation in parliaments, gender imbalances in educational achievement and low labour force participation.

Across South Asia, widening gaps between the rich and the poor combined with low wages threaten to reduce the sustainability of economic growth and are also associated with negative social and environmental outcomes

***Rapid economic growth has been accompanied by widening inequalities in some parts of the region*:** At the aggregate regional level, income inequality in South Asia appears to be moderate when looking at standard indicators such as the Gini index. Gini coefficients in South Asian countries range between 0.32 and 0.40, much lower than in countries in Latin America, Africa and South-East Asia.[9] However, it must be noted that Gini index numbers in South Asia are based on inequality in consumption. If we look at the inequality in income and wealth, one finds a higher level of inequality. For example, India's consumption Gini coefficient was 0.36 in 2011-12, while its income and wealth Gini coefficients were 0.55 and 0.74 in 2011-12.[10] This shows that the in India income inequality was about 20 points higher than consumption inequality while wealth inequality was nearly almost 40 points higher than consumption inequality.

***Long-term inequality trends show a mixed picture*:** In terms of trends in consumption/income inequality, one finds a mixed picture in the last three decades: the Gini index mildly fluctuated in the 1980s but increased substantially in the 1990s and early 2000s. Since the mid-2000s, there are encouraging signs of inequality plateauing or declining in many South Asian countries (see figure 2.4 in chapter 2). India and Pakistan appear to be two of the countries where inequality has increased. While the Gini index increased from 32.7 in 2005 to 33.5 in 2015 in Pakistan,[11] it increased from 34.7 in 2005 to 35.9 in 2011 in India.[12] Urban inequality has been the major driver of rising inequality in India. While the Gini index increased in rural areas from 28.6 in 1993 to 31.1 in 2011, in urban India, it has risen more significantly from 34.4 to 39.0 for the same period.[13] According to the latest data from Oxfam, India's richest one per cent garnered as much as 73 per cent of the total wealth generated in the country in 2017. It also shows that India's top 10 per cent of the population holds 73 per cent of the wealth—i.e., the stock of wealth and not just the flow of wealth generated in a year. At the other end, the poorer half account for a mere 4.1 per cent of national wealth. Ten per cent of Indians garnered 56 per cent of the national income in 2014.[14] Even more strikingly, during the period of South Asia's rapid economic growth, the rich have been the greatest beneficiaries. Between 2000 and 2016, the share of India's richest 1 per cent increased from 36.8 per cent to over 50 per cent of national income. Across South Asia, widening gaps between the rich and the poor combined with low wages threaten to reduce the sustainability of economic growth and are also associated with negative social and environmental outcomes. Income inequalities are mirrored in access and quality in areas such as health, education and basic services such as electricity and drinking water. Public policy needs to go beyond the targeting of poverty and inequity of outcomes and tackle the foundation of structural inequalities.

***A historical demographic transition is underway in South Asia*:** Beyond the sheer size of its population, South Asia is in the midst of a historic demographic transition. All countries in the region are at some stage along a continuum where the shares of younger, older and working-age people have been shifting rapidly. The region is on the cusp of a period where working-age people comprise a significant share of the population. This puts the region at a favourable juncture to reap the demographic dividend and advance human development—although not for long. Demographic considerations need to be integrated across core national development plans and strategies. Despite the creation of millions of new jobs every year, employment still falls short in terms of the needs of the burgeoning working-age populations, both in terms of the numbers of jobs and their quality. Creating more work

opportunities require sectoral strategies, but increased investments in human capabilities are fundamental. The region's generally poor record on gender equality undermines its ability to realize the demographic dividend. Policies designed to bring more women into the workforce will be critical for fully realizing the demographic dividends.

***Rapid urbanization is also transforming South Asia*:** Lured by the promise of better jobs and higher incomes, as well as quality education and health care, people across the region are on the move from the countryside to new lives in cities. However, South Asian cities lack the necessary institutions, policies and resources to keep up with growing populations. If urbanization is not well managed and soon, the region will not likely sustain the momentum of economic growth and will lose some of its demographic dividends.

***Rapid economic growth has come at the cost of the environment and ecosystems*:** As South Asia focuses on economic growth and job creation to meet the needs of a booming working-age population, any development plans must consider environmental concerns. Many of South Asia's key natural resources and ecosystems services are already scarce or under pressure. Achieving sustained economic growth will require absolute decoupling of the production of goods and services from their environmental impacts. But unfortunately, South Asia's current development model relies on unsustainable patterns of production and consumption leading to severe challenges of environmental sustainability.

***Air pollution in South Asia has reached historic levels*:** South Asian cities hold 18 of the top 20 spots in the world's worst air quality, making it a toxic region.[15] Rapid urban growth and industrialization in South Asia have caused air pollution to become a serious human development issue. Toxic air kills five million people every year in the world, 32 per cent of those deaths occur in South Asia (see table 2.12 in chapter 2). Thus, it is clear that air pollution in South Asia is a major health risk. Besides, various reports highlight that air pollution also has damaging impacts on the environment, agricultural crop yields and other economic consequences, affecting economic growth as well as welfare.

***Land degradation is also a major problem in South Asia*:** In the last three decades, the intensity of land use has also heightened. Modern methods of agriculture with practices such as the overuse of fertilizers and pesticides have resulted in the degradation of land quality. The excessive irrigation of saline water and shifting agriculture has also resulted in land degradation in South Asia. Policies that are driving land-use change trends can undermine goals to support poverty eradication. Strengthened policy coherence concerning inclusive growth and the protection of terrestrial ecosystems are needed to secure livelihoods, strengthen food security and ensure the continued flow of ecosystem services. Measures to tackle land-degradation are as follows: (i) development and implementation of national land-use policies; (ii) integrated watershed management, rural development and coastal area and river basin management; and (iii) improving rural and urban infrastructure.

***Freshwater scarcity is also becoming a serious human development issue*:** Freshwater ecosystems are among the world's most valuable natural resources and vital ecosystems services. In South Asia, 24 per cent of the world's population depends on about 4.5 per cent of the world's available freshwater resources.[16] Therefore, in many areas around the region, there is intense competition for available water supplies and in many places within the region as well as within-country like India sharing water has

The region's generally poor record on gender equality undermines its ability to realize the demographic dividend

long been a sensitive issue. The Hindu Kush-Himalayan region is one of the largest storehouses of freshwater in the world, and its mountains are the source of major river systems such as the Ganges, Indus and Brahmaputra. But recently Himalayan glaciers have been shrinking because of decreased snowfall, higher average air temperatures that melt existing ice, and anthropogenic factors such as local practices of damaging forests coverage. As meltwater lakes swell, the risk of catastrophe heightens. This is because many glacial lakes form behind unstable debris dams that are poised to collapse and send disastrous floods.[17] Many of rivers flowing from the Himalayas have come under considerable pressure from industrial development, urbanization, population growth and environmental pollution. This situation has been compounded by the excessive tapping of groundwater. As a result, groundwater depletion and contamination are growing concerns. Water is also being used more indiscriminately and intensely. Due to poor management of water resources, most wastewater is also discharged without treatment in the region. This may result in acute water shortage not only in South Asia during the dry season but may also cause flooding in the wet season. In fact, per capita water availability already has declined rapidly.

South Asian countries need to formulate a regional level water management strategy by focusing on issues such as supply, reduction of use, as well as the reusing and recycling of water

At the same time, water demand is expected to exceed sustainable supply resulting in a huge water deficit by 2030. This is especially acute in Afghanistan, India and Pakistan. Failure to safeguard water supply and demand will be an increasing challenge to achieve the SDGs. In this context, South Asia needs a research study on the so-called the 'Karakoram anomaly' in which glaciers in the Karakoram mountains within the Himalayas have remained stable and even increased in mass, while many other glaciers in the Himalayas have been receding during the past 150 years, particularly in recent decades and formulate a regional strategy to manage glaciers in the Himalayas. Besides, South Asian countries also need to formulate a *regional* level water management strategy by focusing on issues such as supply, reduction of use, as well as the reusing and recycling of water.

***Coastal and river pollutions are also a serious issue in South Asia*:** Coastal, marine and river ecosystems are also key, as they provide food and livelihoods for communities throughout South Asia, as well as many other valuable ecosystem services upon which life depends. South Asian rivers such as the Ganges, Indus and Brahmaputra are not only the cultural and economic backbone to the region but have also contributed to the rise and prosperity of some of the earliest civilizations in history and today are the source of livelihood for millions. Unfortunately, rapid urbanization, economic development and population growth are increasing pressure on the region's river, coastal and marine ecosystems. Consequently, they have become a dumping ground for garbage and waste deposits, making them some of the most polluted rivers, coastal and marine ecosystems in the world. Moreover, rivers in South Asia, like elsewhere in the world, carry plastic waste from deep inland to the sea, making them major contributors to ocean pollution. Plastic waste—whether in a river, an ocean, or on land—can persist in the environment for centuries. If current trends continue, the world's oceans could contain more plastic than fish by 2050.[18] It may be noted that Americans and Europeans use more plastic per capita than people in South Asia but recycling and waste disposal practices are generally more effective in the Western world. Fortunately, South Asian countries are waking up to the problem and governments are starting to act. For example, the Indian government initiated the Clean Ganga Project in 2014. Likewise, Sri Lanka has implemented a ban on single-use plastic products from 1st January 2018, stepping up separation and recycling of waste, and

has set a goal to make its ocean and coastline 'pollution-free' by 2030.[19] Similarly in 2018, India announced that by 2022, it will eliminate all single-use plastics from the country. The announcement builds on state-specific bans on the manufacture, supply, storage and use of plastics that are already in place in at least 25 of the country's 29 states.[20] Likewise, in Pakistan, in 2018, the provincial government of Sindh imposed a ban on the manufacture, sale and purchase of non-biodegradable polythene bags in the province.[21] A related issue is how to harness rivers to meet the basic needs of more than one billion inhabitants of these river basin communities, sustain a rich and diverse ecosystem, and play a central role in the economies of the region. What is needed is an integrated strategy not only for hydropower and irrigation but also for water supply and sanitation, flood management, the environment, tourism and wetlands. As the region has long and densely populated coastlines with many low-lying islands, sea-level rise poses an existential threat, potentially submerging much of the Maldives and inundating at least one-tenth of Bangladesh's population.

***Energy supply and security are major challenges on the road to sustainable development in South Asia*:** South Asia has more people without adequate access to energy than anywhere else in the world. South Asian nations are faced with a rapidly rising energy demand coupled with increasingly insufficient energy supplies. South Asia's energy security emanates from the growing imbalance between the demand for energy as well as from its single-source dominated supply and increased import dependence. For example, many South Asian countries depend on a single source to generate more than half of their electricity needs (see table 2.7 in chapter 2). In this context, South Asian countries need to diversify their energy sources and develop their energy infrastructure to improve energy efficiency and expand intra- and cross-regional energy trade and investment. South Asian countries recognize that their current patterns of energy production and consumption are entirely unsustainable. Moreover, their energy demand is projected to nearly double by 2030 and it is unlikely that renewables will be able to fill this gap. Many of these countries see improving energy efficiency as a low hanging fruit. Rising energy demand in the region has also been accompanied by rising GHG emissions, thus making the region a significant contributor to GHG emissions. It may be noted that in many countries less than five per cent of energy consumed came from renewable sources.[22] Both energy security and energy transition from traditional coal-based to modern renewables would be the major drivers of sustainable development in the region. Fortunately, there are considerable and untapped possibilities for renewable energy supply (hydropower, wind and solar) as well as for improving energy-efficiency opportunities in the region, but there remain difficulties in establishing transboundary energy trade agreements. Regional policies and cooperation can play an important role in supporting renewable energy development and implementation in the region. For example, a regional electricity and gas grid in the region could help South Asian countries obtain gas from Myanmar, Central Asia and West Asia.

Regional policies and cooperation can play an important role in supporting renewable energy development and implementation in the region

***Vulnerabilities to natural disasters are high in South Asia*:** South Asia is also faced with the problems of climate change and threats to human development through more frequent extreme climate phenomena, such as cyclones, flooding and droughts as well as the ever-growing survival threat for the Maldives from rising sea levels. Climate change has the potential to compound existing development problems and increase pressures on key resources needed to sustain future growth, urbanization and industrialization. Among many other impacts, climate

Action on climate change must be integrated within economic and poverty-reduction strategies

change is accelerating the melting of glaciers in the Himalayan region, threatening regional water and energy security and raising concerns regarding disaster impacts. Some of the world's most vulnerable countries to climate change are in the region. Four South Asian countries have been ranked as the most vulnerable to climate change: India, Pakistan, Bangladesh and Sri Lanka appear in the list of top six countries likely to be worst affected by a global temperature rise.[23] These countries are not only highly vulnerable to extreme weather events, such as storms and flooding but also are least equipped to handle the impact of climate change and extreme weather events. Uncontrolled climate impacts will cause damage to infrastructure, disrupt business activity, and destroy jobs and livelihoods on an unprecedented scale. On the other hand, transitions to low-carbon, environmentally and socially sustainable economies can become a strong driver of job creation, job upgrading, social justice and poverty eradication, allowing climate-resilient economic growth and sustainable development. There is a need to address the drivers of climate change as well as mitigation and adaptation to climate change. The biggest driver of climate change is CO_2 emissions. Measured per person, South Asia's emissions are still very low—at only about 1.5 tonnes of CO_2 per capita—which is much lower than the world average of 5.0 tonnes.[24] But those emissions have been growing rapidly. Action on climate change must be integrated within economic and poverty-reduction strategies. There is a huge opportunity for catalysing low-carbon growth which can simultaneously contribute to poverty and inequality reduction as well. Fortunately, countries in the region recognized the importance of such an integrated climate change strategy. For example, despite recent economic growth and development causing its national emissions to rise, Bhutan has managed to achieve a carbon negative development process, sequestering more CO_2 than it emits. Similarly, the Government of Bangladesh, which developed the Bangladesh Climate Change Strategy and Action Plan in 2009, is currently updating its strategy in light of changed circumstances as well as learning from the experience of activities carried out over the last decade.[25]

***South Asian governments have recognized climatic risks and attempting to tackle them*:** Recognizing the significance of the green growth development path, South Asia has embraced green growth as a means of alternative economic development. It has committed to invest in tackling climate change while addressing poverty, food security and access to health care and education. South Asian countries have already initiated several climate-friendly measures. For example, in the Paris climate conference, India announced its new climate plan, also known as its INDC. The plan targets to install 175 gigawatts (GW) of renewable energy capacity by 2022, out of which 100 GW have been allocated to solar and 60 GW to wind. It has set a new target to increase its share of non-fossil fuel-based energy from 30 per cent now to about 40 per cent by 2030 and committed to reducing its emissions intensity per unit of GDP by 33-35 per cent below the 2005 levels by 2030 and create an additional carbon sink of 2.5 to 3.0 billion tonnes of CO_2 through additional tree cover.[26] Energy efficiency still ranks the foremost choice among emission reduction activities. Countries like India have also been reforming its National Forest Policy, which addresses the new realities—climate change, human-animal conflict and declining green cover.

***Forests ecosystems in South Asia are under extreme pressure to meet society's multiple and conflicting demands*:** Forests have a significant role in archiving sustainable development, they mitigate climate change through carbon sequestration, contribute to the balance

of oxygen, CO_2 and humidity in the air and protect watersheds, which supply most of the freshwater. They also reduce the risk of natural disasters, including floods, droughts, landslides and other extreme events; home to most of the animals, plants and insects; and provide shelter, jobs and security for forest-dependent communities. Forests are also a major source of fuel, as they provide firewood for millions of mostly poor people. But South Asia is now one of the least-forested sub-regions in the world with a per capita forest area of about 0.05 hectares.[27] With almost one-fourth of the world's population, South Asia has only 2.1 per cent of global forests.[28] Although at the regional level forest area has stabilized, this is mainly due to afforestation/reforestation efforts in India and Bhutan. In all the other countries, forest area continues to decline.[29] Given limited forests resources and high level of poverty, forest policies in the region continue to focus on poverty alleviation and improving the natural resource base by transferring resource management responsibilities to local institutions and communities. At the same time, they need to address the new realities—climate change, human-animal conflict and declining green cover. Fortunately, the region recognized the importance of incorporating new realities. In 2018, India's Ministry of Environment, Forest and Climate Change framed a new draft National Forest Policy 2018 which proposes to address not only climate change mitigation but also aims to bring a minimum of one-third of India's total geographical area under forest cover through scientific intervention. Likewise, in 2018, Pakistan's newly elected government announced that it plans to 'aggressively' undertake a massive countrywide campaign to plant 10 billion trees in the next five years to tackle climate change, by building on the success of the provincial government of Khyber Pakhtunkhwa (KP's) Billion Tree Tsunami Project, which restored 350,000 hectares of forests and degraded land during 2014-2017.[30]

***The ecological footprints of South Asian countries have exceeded their biocapacity extensively*:** Ecological overshoot is the highest in India (- 469.0 million global hectares) and the lowest in Sri Lanka (-15.2 million global hectares).[31] The ecological footprint of many South Asian countries is growing as they industrialize and reach middle-income status. Consequently, biodiversity has been declining considerably in the last two or three decades. This trend is likely to continue, as countries in the region are not investing adequately in protecting biodiversity. Countries in the region need to protect, restore and enhance the management of ecosystems. One of the key policy options is to ensure that biodiversity conservation is integrated into key development sectors such as agriculture, fisheries, energy, tourism and finance. Fortunately, countries in the region started to formulate such a strategy. For example, in 2017, Pakistan revised its earlier Biodiversity Action Plan of 1999 to prepare a comprehensive National Biodiversity Strategy and Action Plan 2017-2030 by integrating conservation of biodiversity, the sustainable use of its components, and fair and equitable sharing of the benefits arising out of the utilisation of genetic resources.[32]

With almost one-fourth of the world's population, South Asia has only 2.1 per cent of global forests

***The environment is a transboundary issue*:** South Asia shares common geological formations and river basins, so natural hazards frequently transcend national boundaries. Many transboundary issues will require a regional response and there are many opportunities for joint action. Issues highlighted in this report with important transboundary dimensions include migration, trade and environmental protection, particularly concerning water resources and cross-border investment. Furthermore, regional economic integration, cooperation and dialogue will provide numerous opportunities for strengthening the response to these

shared concerns. Policy coherence also sends a distinctive signal, fostering initiatives and new partnerships to take on the complex issues, such as financial inclusion, food security, education access and quality services.

The above analysis clearly illustrates that the South Asia region is challenged by the current and potential impacts of climate change, increasing resource scarcity, and pressure on land, water and forests from economic development. These interconnected challenges have put pressure on communities and people and present a threat to global prosperity if not managed properly. They require an integrated approach that links locally-driven efforts, with engagement by the private sector and efforts to implement better policies, strategies, regulations, incentive mechanisms and capacities at national and regional levels. This will be discussed in the next section.

The 2030 Agenda for Sustainable Development offers the chance to adjust South Asia's course

Policy framework for environmental sustainability in South Asia

Environmental sustainability is more than being responsive to ecological concerns. It includes social, economic, political, institutional and ethical concerns as well. The 2030 Agenda for Sustainable Development offers the chance to adjust South Asia's course. That will mean doing far more to connect the dots among the main challenges the region faces today: poverty, inequality, water, food and energy security, climate change, etc. The objective of any sustainable development policy framework is to optimize achievement across the social, economic and environmental systems through an adaptive process of integration (where possible), but more usually through trade-offs. It is adaptive because of uncertainty, and because of individual preferences, social norms, ecological conditions, and the state of development change over time. A related question is who should make the decisions on trade-offs? Here, the 2030 Agenda calls for inclusive decisionmaking process involving all relevant stakeholders. Such participation is necessary because of the relative paucity of 'scientific' tools and indicators available to give us 'the answers'. What is needed is a coordinated, participatory and iterative process to achieve economic, environmental and social objectives in an integrated manner. The main elements of a policy framework are as follows:

No one approach fits all: Need for country-specific measures

Experience shows that every country or region will need to determine how best to approach the preparation and implementation of a national or regional strategy based on their economic, environmental and social conditions as well as prevailing political, bureaucratic and cultural circumstances. Given the fact that South Asia has different socio-economic and environmental conditions, a 'blueprint' approach is neither possible nor desirable. In other words, there can be no one-size-fits-all approach to building environmental sustainability across South Asia.

Each country will need to identify its solutions and to find its growth path. Engagement with local communities, urban governments and business partners will deliver stronger outcomes. Environmental sustainability policies in South Asia will need to be tailored to risks and country circumstances. It is therefore up to each country to design the appropriate mix of tools tailored to its specific circumstances, combining economic instruments, legislation and regulations, research and technological innovations and awareness-raising. Furthermore, each country needs to stimulate and support the involvement of the local authorities, the private sector and civil society organizations (CSOs) in addressing the various facets of these challenges.

Focus on an alternative integrated and multidimensional approach to development

The current development model has not worked as intended in South Asia. A new and alternative development strategy is needed for the region to overcome environmental sustainability challenges. Such an alternative development strategy should integrate environmental sustainability with socio-economic considerations. In many cases, there will be trade-offs. Measures to improve the environment can have adverse effects on equity—for example, constraining economic growth in developing countries. Evidence from around the world shows that while economic growth and human activities undermine environmental sustainability, environmental degradation, in turn, weakens economic growth and human well-being. At the same time, an environmental sustainability framework can improve human well-being not only by increasing access to clean air, water, energy and transport services, but also tackling poor health associated with air and water pollution. What is at stake is the decoupling of economies' growth from resource use.

There are also important synergies between the goals of poverty reduction and environmental protection. Rural populations, for instance, often depend directly on their surrounding ecosystems—pastures, forests, wetlands and coastal fisheries—to meet their needs for food, fuel, shelter, fodder and medicinal plants. In this context, poverty reduction is integral to the pursuit of environmental sustainability.

Also, an environmental sustainability strategy can contribute to improvements in productivity by promoting resource-efficient technologies and practices while easing environmental pressures. Analysing and understanding interlinkages among environmental protection, economic growth and human well-being will be key to understanding the synergies and trade-offs as well as developing a new model for sustainable development. New models for economic development consistent with equity and environmental protection need to be identified and promoted.

Enhance policy coherence and take a whole-of-government approach

Interconnections among socio-economic and environmental components, as well as interactions among sub-components of the natural resource system such as land, water, air, energy, food and minerals, might transmit and compound the pressure of the resource demand. Such pressure could exacerbate existing resource scarcities and worsening environmental conditions. As these components and sub-components are intrinsically interlinked, pathways and policies designed to accomplish one development goal may either enhance or impede progress towards other goals.

The achievement of environmental sustainability will require not only an integrated strategy but also improved policy coherence, strengthened institutional coordination and taking whole-of-government approaches at all levels of policymaking. Such an approach is key to (i) addressing the multidimensional challenges of environmental sustainability; (ii) ensuring more integrated policy frameworks for sustainable development; (iii) identifying trade-offs and promoting synergies between economic, social and environmental policies; (iv) achieving a better balance between its diverse dimensions; (v) improving coherence between short-term interests and long-term needs; (vi) considering transboundary impacts; and (vii) strengthening governments' capacities to address more complex challenges.

Policy coherence requires a better understanding of policy interactions and how they can accelerate or retard progress towards sustainable development. Improved coherence and collab-

Analysing and understanding interlinkages among environmental protection, economic growth and human well-being will be key to understanding the synergies and trade-offs as well as developing a new model for sustainable development

oration across government departments can make it easier to recognize opportunities and address potential trade-offs. Policy coherence builds on the fact that coordinated actions tend to have significantly greater benefits than the sum of uncoordinated individual measures. Since some of the national environmental sustainability strategies might yield negative spill-overs on other countries, policy coherence with neighbours could tackle some of the international spill-over effects of domestic policy decisions.

Some recent studies identify five levels at which policy coherence is useful for SDG implementation, covering both vertical and horizontal dimensions of coherence: (i) coherence between global goals and national contexts; (ii) coherence between international agendas; (iii) coherence between economic, social and environmental policy; (iv) coherence between different sources of finance; and (v) coherence between diverse actions implemented by different actors.

National ownership and political leadership are key for ensuring environmental sustainability and achievement of SDGs

Ensure that the right policies and institutions are put in place through national ownership and political leardership

National ownership and political leadership are key for ensuring environmental sustainability and achievement of SDGs because such ownership is the key to putting the right policies and institutions in place.[33] In recent years, a new global consensus has emerged that recognizes the primacy of national ownership over the sustainable development process. There is also an acknowledgement that national ownership needs to go beyond government, with a critical role to be played by business and civil society. The need for broad ownership is explicitly mentioned in the 2030 Agenda's political declaration: *"We acknowledge the role of the diverse private sector, ranging from micro-enterprises to cooperatives to multinationals, and that of CSOs and philanthropic organizations in the implementation of the Agenda."*[34]

At the country level, governments need to play a leadership role. In this regard, high-level political support (at parliamentary, cabinet or head of state level) is crucial, as is a commitment to follow up and implement the strategy that evolves. However, no government can achieve a transformative environment sustainability agenda alone. Local governments, business, academics, CSOs and citizens all have a role to play, whether by adopting locally sustainable development solutions, shifting to sustainable business models, inventing smart technologies or adopting sustainable consumption habits. Sustainable development will entail quite radical changes in governance and institutional roles—and for this reason, it may be quite legitimate for governments to start with a strategy which concentrates on government roles and especially their integration, before going on to a wider, participatory process. Provincial and local governments and other stakeholders like parliaments must also be mobilized. For example, parliaments need to play a critical role in ensuring that the implementation of environmental sustainability is high on the government agenda, debating the issues and setting priorities for action, and ensuring democratic accountability in the process.

Ensuring environmental sustainability also requires strong political leadership and good governance such as the effective rule of law, anti-corruption measures and well-enforced property rights. Moreover, it requires a stable and transparent institutional framework that will boost socio-economic progress, while at the same time facilitating the design and implementation of green growth strategies. Clear, consistent, predictable and credible strategies and regulations will help mobilize required national and international financing for sustainable development. Formulation of environmentally-sensitive fiscal policies is also key, as they will ensure that the price of goods and services reflect their social

and environmental costs. For example, tax reforms that shift taxation away from labour, income and capital onto pollution and resource-use or expenditure reforms focusing on the phasing out of fossil fuel and agriculture subsidies would help tackle inefficient natural resource use and rising pollution levels.

Adopt a green growth strategy for sustainability purposes

Economic growth is a pre-requisite for meeting these challenges to improve human well-being. However, rapid economic growth, along with rapid urbanization, in South Asia put an increasing strain on environmental conditions and natural resources. Making consumption patterns sustainable is one of the greatest current challenges in the region. It requires the timely and concerted action of government, businesses and consumers. Sustainable consumption policies also need to take into account not only on the ecological impacts of consumption but also their social and ethical dimensions. Governments across the region need to initiate actions aimed at reducing energy and water use as well as provide subsidies and incentives to encourage consumers and households to make more sustainable product and service selections. They also need to undertake advocacy campaigns aimed at encouraging eco-friendly consumption habits including promoting more sustainable packaging and recycling.

To ensure that growth is sustainable over the long-term, countries need to move to greener growth paths, characterized by economic growth and human development that better conserves natural resources. This requires sustainable development strategies. Large-scale adoption of green growth has the potential to unlock new growth engines and spur economic growth. Green growth policies and practices can contribute to growth by stimulating innovation, promoting the efficiency of resources and increasing resilience to environmental and other shocks.

Much of green growth is about good policies—addressing market failure and 'getting the price right' by introducing environmental taxation, pricing the use of scarce natural resources and pollution (such as carbon pricing), defining and enforcing property rights and reforming inefficient subsidies. There is a need for a comprehensive green growth strategy that puts a price on carbon and other environmental externalities while phasing out subsidies to carbon and resource-intensive sectors. Such a strategy will send the right market signals and help accelerate investment in low-carbon and resource-efficient technologies.

Governments across the region need to initiate actions aimed at reducing energy and water use

Green growth policies and practices not only boost the development of technological solutions which countries can export but can also help countries and organizations save on energy, water and raw material costs by promoting greater resource efficiency.

The green growth paradigm includes not only favouring new economic growth opportunities but also mitigating environmental risks. In the South Asian context, green growth policies and practices should focus on at least three areas: (i) greening the production process based on implementation of a clean industrialization strategy, development of green industry, agriculture, technologies and equipment, and prevention and treatment of pollution; (ii) reducing GHG emissions and promoting the use of clean and renewable energy; and (iii) greening lifestyles where traditional lifestyles are combined with technologies to create quality and traditionally rooted living standards.

New challenges might occur when countries implement green growth strategies. These include the possibility of worsening income distribution and poverty, due to an increase in the cost of fuel or energy for example or crowding out of jobs in the non-green sectors. Care must be taken to ensure that green

growth policies further goals of inclusiveness and poverty reduction, so they can contribute to achieving sustainable development.

Improve governance and strengthen institutions for effective agenda-setting and implementation work

Agenda setting and implementation are critical to the achievement of environmental sustainability. However, agenda setting and implementation work is heavily dependent upon the governance and institutions at the global, regional, national and local level. Unfortunately, there is an increasing gap between the environmental commitments made and the actual implementation to improve environmental outcomes due to limited power for dispute resolution, limited ability to monitor compliance and limited authority to impose sanctions.[35] In this context, effective governance comprising the rules, practices, policies and institutions at all levels become critical to achieving environmental sustainability. Countries need strong legislative, political and judicial systems and practices such as rule of law, citizen's rights of access to information, public participation and equal access to justice to achieve their environmental commitments and goals. Governments have neither the means nor the capacity to implement the Agenda 2030 on their own; they are dependent on other actors. Effective and inclusive environmental governance should focus both on the role of governments at the international, national and sub-national levels as well as actors such as the private sector and civil society.

Moreover, countries have not fully integrated internationally negotiated agreements into their domestic law and policies in an effective fashion. In this regard, there is also a need for national development planning, which integrates global and regional environmental sustainability issues with national development policies. A context-specific analysis is a key to identify the steps that are needed to take to improve governance in the short, medium and long term.

In recent years, the devolution of decisionmaking powers over natural resources and environment to local authorities and communities is also frequently advocated as a means of achieving environmental sustainability. This is because decentralization reshapes the institutional infrastructure and promises to transfer power and authority, improve efficiency, equity, accountability and inclusion of local people who are previously excluded from the decisionmaking process. Moreover, decentralization and increased participation of local communities, including indigenous groups, are particularly effective in an implementation context, because they can provide local operational insights.

Greater accountability and transparency in decision making are also critical in achieving environmental sustainability. Active participation of parliaments, CSOs, local authorities and the private sector not only in the decisionmaking process but also in the implementation and monitoring process will improve accountability. These actors need greater access to detailed environmental information and analysis. In this regard, improving access to information and impact analysis of government policies and resource allocations on the environment and climate change is critical for ensuring accountability and transparency. Such governance systems will be helpful to instil trust among all development actors and promote change in behaviour leading to improved natural resource management and environmental conditions. Establishing a framework for stronger accountability of state and non-state actors is key for achieving environmental sustainability.

Establishing a framework for stronger accountability of state and non-state actors is key for achieving environmental sustainability

Harness science and technology to decouple economic growth from environmental degradation

Scientific progress and technological development offer some promise for decoupling economic growth from long-term environmental degradation. However, there is no guarantee that innovations will appear when and where they are most needed, or at a price that accurately reflects all environmental and social externalities associated with their deployment. Countries need to create a policy environment that provides the right incentives for innovation, including supporting private initiatives and funding basic research.

Achieving environmental sustainability will require changes in patterns of production and consumption, in the type and amount of resources produced and consumed, and in the goods and services produced and consumed. For example, there are a variety of possibilities for achieving energy security. In recent years, there have been rapid advances in renewable energy technologies such as efficient solar cell-based power generation, biomass and wind. Increased energy efficiency is also important.

Likewise, information and communication technologies have the potential to not only alter how and where people work and live but is also changing the way that businesses are managed. It is improving the efficiency of the economy as well as helping to expand countries' ability to survey and protect the environment through real-time monitoring of environmental conditions.

Technology can also help reduce, reuse and recycle materials and products. For example, the mineral extraction industry has not only begun adopting environmentally sound practices but also started developing approaches and technologies for remediating past environmental damage. South Asia has a golden opportunity to leapfrog over polluting and resource-inefficient technologies and practices.

Technology can also contribute to water treatment and water re-use. Technologies now exist for controlling many types of pollutants. The future challenge will be the control of organic micropollutants and heavy metals. Technology can also play a role in minimizing water consumption in the water-intensive industries.

While all these technologies present opportunities to achieve environmental sustainability in the medium-term, they also create new risks and exacerbate existing risks. These new technologies will not only shape our production, mobility, communication, energy and other methods but will also disrupt everything from employment patterns to social relationships and geopolitical stability. Policymakers and other stakeholders must collaborate to create more agile and adaptive forms of technology, governance and risk management. Such national collaborative frameworks need to be accompanied, supported and, sometimes, even guided by international and regional cooperation.

Countries need to create a policy environment that provides the right incentives for innovation, including supporting private initiatives and funding basic research

Mobilize the private sector for environmental sustainability

The private sector has long been criticized for sacrificing the environment for the pursuit of profits. However, defenders of private enterprise point out that the bulk of environmental damages comes from a comparatively small set of industries, and there is no evidence that these industries are polluting less when they are publicly owned. Both perspectives have some truth to them. The key question is not whether but how the private sector can contribute more to environmental sustainability.

The private sector can play an important role in securing livelihoods, ensuring sustainable use of natural resources and minimizing environmental

impacts of its operations. The private sector is now almost universally recognized as the primary engine of the economic growth and development needed to alleviate poverty. Business ingenuity and innovation are also needed in meeting sustainable development challenges in the future.

Private sector-led industrial development can play a significant role in bringing about the much-needed structural changes that can set the economies of developing countries on a path of sustained economic growth. The private sector can provide an ecosystem for entrepreneurship, promote business investment, foster technological upgrading and dynamism, and improve human skills and create skilled jobs. The private sector, by providing decent jobs and expanding the fiscal revenues needed for social investments, can boost capacity for inclusive development, creating decent work for all, improve health and education systems and living standards, thus alleviating poverty and socio-political tensions. With their supportive environment and opportunity, the businesses can also leverage youth's energy, vibrancy and optimism in the context of a demographic dividend from the largest youth population South Asia has ever known.

The private sector, by developing new innovative technologies and business practices, can also promote the environment and deal with climate change. Companies emit GHGs, consume energy and natural resources, require water and transport, use toxic materials and produce waste. Businesses influence virtually all major global environmental changes. Their activities, for example, may directly affect areas such as agro-industry, forestry, commercial fishing, or indirectly affect areas such as air/water pollution or unsustainable demand for natural resources. Businesses can also commit to environmental sustainability through the supply chain by ensuring all or a majority of products used by businesses are friendly to the environment.

By using sustainable materials and innovative products as well as by using cutting edge energy efficiency measures and harnessing renewable energy, the private sector has started to construct buildings that have zero—or even negative—carbon emissions.

Leveraging the private sector, including through public-private partnerships, is also crucial to the financing of low-carbon green growth initiatives. The pricing of carbon through taxes or implementation of emissions trading schemes can provide strong incentives to improve efficiency as market participants seek the lowest cost abatement options wherever they occur.

Regional environmental cooperation, resulting from successful cooperation efforts, can build trust in the long-term

Improve regional environmental cooperation

South Asian countries share common ecosystems, geological formations and river basins so that environmental conditions and natural hazards frequently transcend national boundaries. With climate change, the frequency and intensity of such natural disasters are projected to increase. While South Asia will need support from the global community, regional cooperation and integration can play a critical role in achieving environmental sustainability. Moreover, the areas of environmental sustainability and tackling climate change provide mutual benefits and hold incentives for improved regional cooperation because neither the environment nor climate change is confined to physical borders or boundaries. Regional environmental cooperation, resulting from successful cooperation efforts, can build trust in the long-term. The resulting interdependence increases the costs of potential conflicts, therefore serving as an escalation prevention mechanism. For example, joint water management of river basins allows for the improvement of the water supply.

In South Asia, an active discussion is underway on cross-border energy projects such as interconnecting natural

gas and electricity systems. Cooperative approaches to harness regional complementarities in energy have already begun. Bhutan-India cooperation in exploiting hydroelectric resources of the Himalayan region is a good example that can be emulated in other contexts. The region needs to move towards exploiting its considerable renewable energy resources—hydro, wind and solar—and optimize their use across the region through integrated power grids, such as the Asian Energy Highway Initiative. Although there are large win-win opportunities, challenges such as the huge capital requirement for energy infrastructure development and the risks involved need to be resolved for improved regional energy cooperation.

Similarly, with better transport linkages and efficient management of border-crossings, South Asia can facilitate intraregional trade and promote sustained economic growth. Ongoing regional cooperation initiatives such as South Asian Association for Regional Cooperation (SAARC), Association of Southeast Asian Nations (ASEAN-) India, One Belt and One Road Initiative (OBOR), and Central Asia Regional Economic Cooperation (CAREC) can support sustainable development of shared or transboundary natural resources or the exploitation of these resources. Faster decisionmaking processes with strong reference to a legally binding treaty for regional cooperation could lead to more effective cooperation in dealing with environmental issues in South Asia.

Stronger regional cooperation is also needed to formulate regional strategies, promote policy convergence, effectively share knowledge and promote South-South policy dialogue, and coordinate action leading to the creation of regional public goods such as regional carbon markets, joint research and development efforts and technology cooperation for addressing national and transboundary environment sustainability issues.

The imperative of environmental conservation and management has been recognized and underscored by the leaders of the SAARC at successive summits. Indeed, the directives issued by successive SAARC summits provide the continued impetus for strengthening and intensifying regional cooperation in the environmental sustainability area.

Strengthen multi-stakeholder global partnership to achieve sustainability

Achieving environmental sustainability with equity will require partnerships at multiple levels—international (e.g., global and regional) and national levels (e.g., national, sub-national and community levels). It is important to recognize that world leaders have realized the importance of global partnership and cooperation in the achievement of the SDGs. That is why they have established a separate standalone goal on global partnership—SDG 17—which aims to strengthen the means of implementation and the global partnership for sustainable development. The first major area of global partnership is finance. The achievement of the SDGs requires large financial resources. Estimates from the United Nations Conference on Trade and Development (UNCTAD) show achieving the SDGs would cost US$ 3.3 trillion to US$ 4.5 trillion a year of both public and private financing over 15 years. That is roughly 4 to 5 per cent of world GDP or 20 per cent of annual global savings. This is a big gap. That is why the 2030 Agenda stresses that raising domestic revenues to expand public services and investments remain vital for sustainable growth and create ownership and accountability for public spending. However, domestic revenues alone—especially in South Asia, where some LDCs, landlocked developed countries (LLDCs) and small island developing states (SIDS) are located—will not be enough, given the scale of the resources needed to achieve the SDGs.

Achieving the SDGs would cost US$ 3.3 trillion to US$ 4.5 trillion a year of both public and private financing over 15 years

External finance, which includes official development assistance (ODA), private capital flows (foreign direct investment, portfolio and loan flows) as well as remittances and other flows will help complement domestic sources. Financing from developed countries will be key as it is also in the global community's interest in South Asia to cut emissions. From the perspective of equity and historical responsibility, developed countries should show leadership and share responsibility in filling the significant financing gap. Improving domestic resource mobilization in developing countries require capacity development at the national and local level.

The second major area of global partnership is international trade, which has been a driver of structural economic transformation, growth, job creation and poverty reduction in many countries. That is why the SDGs include several targets related to international trade. A successful Doha Round will not only help the achievement of the SDGs in South Asia but is also expected to bring significant economic benefits. Another area that should be emphasized during the implementation of the SDG framework is trade facilitation and non-tariff measures (NTMs). Benefiting from a more open global market is becoming increasingly dependent on reforming the use of NTMs to minimize or remove their impact on reducing trade costs. In this context, trade reforms aimed at reducing trade costs, such as trade facilitation and streamlining NTMs, can also have a significant contribution to the achievement of several SDG targets.

The third major area of global partnership is technology. Like international trade, science, technology and innovation (STI) have also been key drivers of economic growth, poverty reduction and rising living standards. Innovative and affordable technology solutions will have to be developed, transferred and disseminated to achieve the SDGs by 2030. Given such challenges, special efforts will be needed to build STI capacity and enabling policy environments and to facilitate technology development, transfer and dissemination for inclusive and sustainable development. The landscape of science and technology has been changing rapidly. Emerging economies have become leaders not only in manufacturing, information and communications technology (ICT), pharmaceuticals and green technologies but also increasingly in research and innovation. For example, China is now a world leader in wind and solar energy, compact fluorescent lamps, heat pumps, etc. India is a world leader in generic drugs, ICT, biodiesel from jatropha, wind energy, etc. South-South technology transfer has become increasingly important. Yet, several policies continue to hinder South-South technology transfer. The recently launched the United Nations Technology Bank for LDCs could tackle some of the bottlenecks related to South-South technology transfer and help South Asian LDCs namely Afghanistan, Bangladesh, Bhutan and Nepal to use technology and innovation effectively in the context of aching environmental sustainability.

To monitor environmental sustainability, improve natural resource management and establish transparency in climate change strategy, a broad set of reliable, high quality and cross-nationally comparable data are required

Improve the production, distribution and use of sustainability data

Going forward, improved monitoring should make use of the interconnections between various environmental sub-components themselves and between socio-economic and environmental components to accelerate SDGs progress. This will require finding targets and indicators that capture these interlinkages in an integrated manner whose quantitative nature also permits better monitoring of progress.

To monitor environmental sustainability, improve natural resource management and establish transparency in climate change strategy, a broad set of reliable, high quality and cross-nationally comparable data are required. Yet such data are currently incomplete, which

makes monitoring difficult or impossible. South Asian countries should work on a data revolution by mapping the data ecosystem in their countries regarding the production, distribution and use of data. This may boost evidence-based decisionmaking, enhance transparency and promote citizen participation.

Activities aimed at addressing this challenge can be organized under three broad areas: the enabling environment, data production and data dissemination. As part of the enabling environment, there is a need for strong national institutions that are well funded and staffed by qualified individuals. Data production mechanisms must be strengthened, starting with adherence to existing international norms and standards. Data dissemination platform and mechanisms must also be improved. Similarly, new technologies offer new opportunities to improve data on environmental sustainability. The widespread use of a plethora of digital services is transforming the data landscape. Faster connectivity and near-ubiquitous smartphone adoption enable users to create and share vast volumes of data seamlessly. Finally, a multi-stakeholder partnership among government institutions, development agencies, the private sector, CSOs and multilateral and international organizations helps countries to achieve the required data revolution.

The time for action is now to shift towards a sustainable development model

South Asia is experiencing rapid but unsustainable growth with dirty air and shortage of clean water. Furthermore, it is undergoing profound demographic change (urbanization) and industrialization. The region is highly vulnerable to climate change, which will particularly hurt poor farmers and people in both mountain and coastal areas. Throughout the region, infrastructure needs are acute. Such challenges have begun to undermine the foundation of sustainable development in South Asia in recent years. Failing to address these challenges immediately while not leveraging opportunities in the area of demography and technology not only threatens to reverse the important gains made so far in this region but will also be a great missed opportunity in the 21st century. All these combined with the region's rapid economic growth and relative political stability in recent years present a golden opportunity for South Asia to act now in shifting towards a sustainable development model. The costs and consequences of inaction are enormous, both in economic and human terms. Today's decisions by policymakers and business and community leaders will determine the sustainability of the region's development path for decades and potentially centuries, to come.

Today's decisions by policymakers and business and community leaders will determine the sustainability of the region's development path for decades and potentially centuries, to come

Conclusions and recommendations

Concepts such as 'environmental sustainability', 'human development' and 'sustainable development' are not only dynamic, complex, multidimensional and holistic but also mutually reinforcing each other. Therefore, any solutions to advance the sustainable development agenda must include sustainability of various dimensions of human development, namely social, economic, environmental and political aspects. Such solutions must also address both intragenerational and intergenerational equity and sustainability. Integrating environmental sustainability with the human development agenda also involves the same idea: meeting the needs and rights of the poorest people, sustaining prosperity for a growing global middle class, and protecting the core planetary resources for this and future generations.

Intensive resource use, combined with limited resource endowments, aggravates the environmental sustainability challenges, vulnerabilities and uncertainties in South Asia. Land degradation, loss of farmland due to urbanization and industrialization, groundwater depletion,

and shortage of freshwater undermine sustainable food supply prospects. With increasing transport and energy demand and solid waste generation, air and water pollution also threaten sustainable human well-being in South Asia. Recently, the region has emerged as a significant contributor to global GHG emissions as well as among the most vulnerable to climate change-related natural disasters such as droughts, tsunamis, floods and hurricanes. For instance, melting glaciers in the Himalayas are swelling local lakes and triggering flash-flooding in the narrow valleys below. This trend is likely to accelerate in the coming years, creating social and economic problems not only for the communities in the Himalayan foothills but also for the communities on the plateau.

If South Asia is to achieve the SDGs, it needs to change its current development strategy

Since South Asia has a variety of climate zones, including arid deserts, parched rangelands, freezing alpine mountains and humid tropical islands, there can be no one-size-fits-all approach to building climate resilience across South Asia. Responses will need to be customized to specific risks and circumstances.

Given the current and future projections of climate change, South Asian countries will require substantial levels of new and additional technology and finance to enable mitigation and adaptation to the impacts of climate change.

In the last two decades, South Asian countries have made great progress in key human development areas. They have mainstreamed environmental sustainability into their national and sub-national development plans and strategies. However, due to implementation issues, progress has been limited and uneven in various aspects of sustainability. For example, in recent years, many South Asian countries have strengthened their laws and policies to reduce air pollution, but further action is needed to bring air quality to safe levels. Similarly, governments across the region have been making efforts in the development of cost-effective no- or low-carbon energy technologies, eliminating subsidies and distortions in the energy prices. At the international level, the Montreal Protocol has successfully curbed emissions of ozone-depleting substances, many countries have improved air and water quality, and large shares of forests and land ecosystems have been placed under protection.

In recent decades, challenges to sustainability have been driven by global 'megatrends', such as changing economic and social dynamics, changing demographic profiles, changes in natural resources and ecosystems and advancements in technology. An improved understanding of the relationships among these trends and the associated changes in social, economic and environmental conditions are needed for the implementation of the 2030 Agenda in South Asia. The previous chapters of the report analysed these megatrends and the related changes in sustainable development conditions from South Asia's perspective. This analysis shows clearly that if South Asia is to achieve the SDGs, it needs to change its current development strategy. The 'business as usual' scenario is likely to aggravate the current sustainable development challenges and risks.

Some recent experiences in environmental policymaking in the industrialized European and Asian countries offer some effective and democratically legitimate policy lessons for a sustainable transition process. One of the lessons is the acknowledgement that government regulations in pursuit of public interest goals are often, by itself, not enough to compel durable changes in behaviour. Rather, direct state intervention is more likely to be effective when used strategically and selectively.

At the same time, responsible business can play an important role in upholding and advancing environmental practices in their role as an employer, investor, source of innovation, provider of infrastructure and development solutions and engine of competitiveness. A fun-

damental rethink is required for the role of business in society. Instead of taking a narrow, short-term and profit-focused approach, the business should align their core business strategies with sustainable development approach and work with others towards a system-level change. To maximize the rewards and minimize the risks, governments must choose the most appropriate modalities for private-public partnerships, given local needs and conditions.

Likewise, CSOs can also complement government's initiatives with community-based, tailored assistance using evidence-based, innovative and sustained solutions to advance environmental sustainability. By generating and sharing knowledge, capacities, resources, skills and technology, CSOs can support national needs and priorities in areas such as poverty eradication, health, education, food security, social protection, sustainable energy, climate change and related infrastructures. CSOs could also act as catalysts for change and assist in bringing voices of citizens, particularly local and indigenous people to national and regional debates on sustainable development.

Challenges related to environmental sustainability must be tackled 'with a sense of urgency'. People are already protesting against rising air-pollution, single-use plastics, water scarcity, etc. Similarly, the impact of climate change is not something that can wait for 2030 but is already underway with increasing floods, heatwaves, etc. Hence, there is a need for urgent collective action involving governments, the private sector, civil society and general citizens alike.

Success will depend in large part on the use of all available avenues to sustain and accelerate human development. Governments which overlook emerging opportunities in the area of technology (e.g., the fourth industrial revolution technologies) or demography (e.g., relatively large share of the population that is of working age) or international cooperation (e.g., South-South partnership) do so at their peril, missing out on potentially large gains in sustainable human development. The time is now to make smart policy choices and act on them through an investment that will steer social, economic and environmental patterns in inclusive ways benefiting all people, now and for generations to come.

The time is now to make smart policy choices and act on them through an investment that will steer social, economic and environmental patterns in inclusive ways benefiting all people, now and for generations to come

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61. UN 2019.
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66. Annual floods in Indian cities are also blamed, at least in part, on plastic bags clogging the drains. In response to annual flooding in Mumbai, the state of Maharashtra in India banned the manufacture, sale and use of plastic bags in 2005; unfortunately, the ban has so far been ineffective due to poor enforcement.
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68. The concept of integrated solid waste management (ISWM) can be explained in two parts: the physical elements and the governance features. The physical elements include three components: public health, environment and resource management. While the governance aspect consists of three characteristics: inclusiveness, financial sustainability and sound institutions and pro-active policies.
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30. Lele and Sahu 2017.
31. Ibid.
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35. GOI 2009.
36. GOI 2001.
37. Mani *et al.* 2012.
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52. Reddy and Mishra 2009, Singh 2017 and Dandekar and Bhattacharya 2017.
53. Dorin 2017.
54. Dorin 2017 and Raina 2015.
55. Hazell 2002.
56. Bhalla and Singh 2010.
57. Raina 2015.
58. Grebmer *et al.* 2019.
59. Ibid.
60. GOI 2017a.
61. Bhalla and Singh 2010.
62. GOI 2017a.
63. Raina 2015.
64. Raina 2014.
65. Steffen *et al.* 2015.
66. Vaidyanathan 2010.
67. Raina 2014.
68. Sharma 2012.
69. Varshney 2015.
70. Deshpande 2010.
71. Brammer and Ravenscroft 2009.
72. Orr *et al.* 2017.
73. ICAR 1998.
74. Shah *et al.* 1998 and Raina *et al.* 2015.
75. Vyas 2001.
76. GOI 2018b.
77. Narain 2017.
78. Ramaswamy 2004.
79. Iyer 2007.
80. Himanshu *et al.* 2014.
81. Mishra and Chand 1995 and Raina *et al.* 2015.
82. GOI 2018b.
83. D'Souza 2006.
84. Dandekar and Thakkar 2014, SANDRP 2008 and 2013 and Iyer 2015.
85. Lok Sabha 2016.
86. Senapati and Gupta 2014.
87. Nayak 2017.
88. Ibid.
89. Lok Sabha 2016.
90. Colopy 2012.
91. GOI 2018b.
92. Ibid.
93. Dandekar and Thakkar 2014.
94. Ibid.
95. Ibid.
96. GOI and GIZ 2014.
97. Mohamad 2015.
98. Even if the Environmental Impact Assessment (EIA) is not granted, special economic zones will be established, as was the case with Mundra, where the *Adani* group signed MOUs with 22 companies even before the EIA was conducted. Sanjai *et al.* 2014.
99. GOI and GIZ 2014.
100. Kulkarni *et al.* 2014.
101. Ibid.
102. Perhaps the best example for an oxymoron, in the definition of 'stage of groundwater development' is E/N, where E is the 'existing gross draft' for all uses and N is the 'net annual availability'.
103. GOI 2018b.
104. NIUA 2005.
105. Koonan 2016.
106. FICCI 2011.
107. GOI 2018b.
108. Raina and Kumar 2017.
109. Raina and Kumar 2017 and Ravindra and Raina 2012.
110. Aggarwal and Kumar 2011.
111. Ibid.
112. FICCI 2011.
113. Rajaram and Das 2008.
114. Ibid.
115. Changing Markets Foundation and Ecostorm 2016 and 2018.
116. GOI 2018b.
117. Khanna 2017.
118. Bhattacharya and Rathore 2018.
119. FICCI 2011.
120. Changing Markets Foundation and Ecostorm 2016.
121. FICCI 2011.
122. Ibid.
123. EJ Atlas 2018.
124. Iyer 2007.
125. India Gate in Delhi is the most frequently featured.
126. The safe limits for these are 60 and 100 respectively.
127. GOI 2018b.
128. Greenpeace 2017a.
129. GOI 2018b.
130. Ibid.
131. ISLDBI-CRD 2018.
132. ISLDBI-Air Pollution Collaborators 2019.
133. Ibid.

134. Upadhyay *et al.* 2017.
135. Ibid.
136. Raina 2015.
137. Dubash 2007 and Raina 2014.
138. Jayan 2018.
139. Bandyopadhyay and Perveen 2004, Iyer 2015 and Water Conflicts Forum 2013.
140. Esteva 2010.
141. IISc, Bangalore *et al.* 2013.
142. Ibid.
143. Shah 2008.
144. Jitendra 2015.
145. Tiwari *et al.* 2011.
146. Like farm ponds, gabion structures for watersheds, planting agroforestry systems, reviving commons, etc.
147. Sen and Pattanaik 2017.
148. Mishra and Chand 1995.
149. Vaidyanathan 2007, Raj 1973 and Raina 2015.
150. Raina 2014.
151. Sanan 2014.
152. Ibid.
153. Mansatta 2010, Mansatta *et al.* 2017 and Raina 2016.
154. Goodera 2017.
155. See Kalpavriksh 2016 and 2017, for a detailed evaluation of the civil society organizations (CSOs) and community alternatives to mainstream environment-development trade-offs.
156. Shah *et al.* 1998.
157. Kothari and Joy 2017.
158. Gerber and Raina 2018.
159. Soderbaum 2004 and 2007.
160. Mukherjee and Chakraborty 2015.
161. Kalecki 1964.
162. See Martinez-Alier 2002 for environmentalism of the poor.
163. Faber 2008.
164. Cederlof and Rangarajan 2015 and Kashwan 2017.
165. Chopra 2017 and Kashwan 2017.
166. Meadows *et al.* 1972.
167. Raj 1973.
168. McCartney and Harriss-White 2000.
169. Martinez-Alier 2002 and Guha 2002.
170. The ecological time scales are immaterial when measured annually, whether an annual account of fertilizer subsidy or the multi-decadal account of contamination and degradation of soil and water systems.
171. Shah 2005.
172. Kashwan 2017.
173. Chowdhury 2016.
174. Aggarwal and Kumar 2011.
175. GOI 2011c.
176. GOI 2013.
177. GOI 2014b.
178. Joshi 1979.
179. Agarwal 1985.
180. WEF 2019b.
181. Raina 2017.

Chapter 4

1. Greenpeace and AirVisual 2019.
2. Landrigan *et al.* 2018.
3. World Bank 2006.
4. GOP 2015a and 2018.
5. World Bank 2019c.
6. GOP 2018b.
7. Amjad and Burki 2013.
8. GOP 2015a and 2018.
9. Afraz 2016.
10. MHHDC 2006.
11. GOP, *Economic Survey of Pakistan* (various issues).
12. GOP 2005 and 2013 and MHRC computations.
13. GOP 2018a.
14. GOP 2019a.
15. *The News* 2019.
16. Nasim 2014.
17. Rama *et al.* 2015.
18. UNDP 2018.
19. GOP 2016a and GOP 2018b
20. Haq 1973.
21. Bengali 2016.
22. Pakistan's 80 per cent of total tax revenues are comprised of indirect taxes. Bengali 2016.
23. Bengali 2016.
24. GOP 2018a.
25. GOP 2018b.
26. *Lancet* 2017.
27. Save the Children 2015.
28. WHO 2018.
29. Ali 2016.
30. GOP 2019c.
31. EIU 2017.
32. IFPRI 2017.
33. UN 2019.
34. Ibid.
35. GOP 2018b.
36. MHRC 2017/2018, *Statistical Profile of Sustainable Development in South Asia*.
37. GOP 2018a.
38. Chauhan 2012.
39. GOP 2012a.
40. Burki 2017.
41. Rehman 2019.
42. GOP 2019b.
43. EIR 2019.
44. An area experiences 'water stress' when annual water supplies drop below 1,700 cubic metres per person. When annual water supplies drop below 1,000 cubic metres per person, the population faces 'water scarcity', and below 500 cubic metres 'absolute

scarcity'. UN 2012b.
45. Roberts 2017.
46. Kugelman 2016.
47. JPL 2015.
48. IMF 2015.
49. In 1950, the population rank is for West Pakistan (now Pakistan) which became Pakistan in 1971, while East Pakistan became Bangladesh in 1971. UN DESA 2019a.
50. Khawar 2017 and UN DESA 2019a.
51. Qureshi 2011.
52. IMF 2015.
53. GOP 2017a.
54. GOP 2017a.
55. IMF 2015.
56. UNDP, Pakistan 2016.
57. GOP 2017a.
58. Shaikh 2016.
59. Kugleman 2015.
60. UN 2019.
61. PCRWR 2016.
62. Kamal and Hashmi 2015.
63. Sindhu 2017.
64. GOP 2016b.
65. UNESCO 2017b.
66. Podgorski 2017.
67. GOP 2009.
68. Haydar *et al.* 2009.
69. GOP 2012a.
70. IHME 2018.
71. Junaid 2015.
72. Sahi 2013.
73. World Bank 2019d.
74. WHO and UNICEF 2015.
75. Abubakar 2018.
76. IHME 2018.
77. PPP adjusted 2011 US dollars.
78. World Bank 2016b.
79. Greenpeace and AirVisual 2019.
80. Ibid.
81. Brandon 1995.
82. HEI 2017.
83. HEI 2019 and GOP 2018a.
84. UN 2019.
85. HEI 2019.
86. Iqbal 2019.
87. GOP 2014a.
88. Rouse 2006.
89. Zahidi 2014.
90. Ghani 2016.
91. MFF, Pakistan 2016.
92. Ibid.
93. Guriro 2017.
94. Ibid.
95. *Daily Times* 2017.
96. GOP 2014b.
97. FAO 2017a.
98. GOP 2015b.
99. UN 2019.
100. SDG 15 focuses on 'protecting, restoring and promoting sustainable use of terrestrial ecosystems, sustainably managed forests, combating desertification, and halting and reversing land degradation and biodiversity loss'.
101. APP 2017b.
102. WWF Pakistan 2017.
103. Bearak 2016.
104. Hutt 2018.
105. APP 2018.
106. Khan *et al.* 2012.
107. FAO 2019b.
108. Shah and Arshad 2006.
109. GOP 2007.
110. Khan *et al.* 2012.
111. GOP 2015b.
112. Ahmed 2016.
113. GOP 2014b.
114. GOP 2015b.
115. IUCN 2017a.
116. UN 2019.
117. GOP 2015b.
118. Shahid 2015.
119. Eckstein *et al.* 2018 and Ebrahim 2017.
120. WFP *et al.* 2018.
121. Saeed 2013.
122. Salam 2018.
123. Wasif 2017.
124. GOP 2015b.
125. World Bank 2018b.
126. GOP 2011.
127. GOP 2018b.
128. Grebmer *et al.* 2019.
129. GOP 2019c.
130. Ibid.
131. Spijkers 2012.
132. APP 2017a.
133. Sattar 2013.
134. Oxfam, Pakistan 2019.
135. Rowling 2014.
136. Mueller *et al.* 2014.
137. Saeed *et al.* 2015.
138. Malik 2012.
139. NCEA 2010.
140. Hussain and Sabri 2014.
141. GOP 2012a.
142. GOP 2018b and 2019c.
143. Abbasi 2016.
144. World Bank 2012.
145. Between 2017 and 2027, Pakistan's working age population (15 to 64 years old) is projected to increase by 27.5 million which is the third largest increase in the world after India (115.9 million) and Nigeria (34.2 million). Giudice and Lu 2017.
146. An increase in energy supply along with improvement in access to energy will reduce people's dependence on wood as a source of energy, and hence reduce deforestation.

Chapter 5

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2. World Bank 2019f.
3. Ibid.
4. GOB 2017b.
5. World Bank 2019f.
6. GOB 2017b.
7. Ibid.
8. GOB 2016b.
9. GOB 2016a.
10. Wendling *et al.* 2018.
11. WHO 2015.
12. Ibid.
13. GOB 2015b.
14. HEI 2017.
15. Ibid.
16. WHO 2015.
17. Ibid.
18. GOB 2015b.
19. Ibid.
20. Kreft *et al.* 2017
21. Arefin and Mallik 2017
22. GOB 2015a.
23. FAO 2011.
24. Mohiuddin *et al.* 2011.
25. GOB 2015b.
26. Ibid.
27. IUCN 2017b.
28. GOB 2016a.
29. Ibid.
30. FAO 2019b.
31. GOB 2016a.
32. CRED 2016.
33. GOB 2016a.
34. BARC 2015.
35. World Bank 2018a.
36. GOB 2016a.
37. Ibid.
38. Ibid.
39. WHO 2010.
40. Ahmed *et al.* 2012.
41. Bhatta *et al.* 2015.
42. Etzold and Mallick 2015.
43. Ibid.
44. Greenpeace 2017b.
45. Walter 2015.
46. CUS 2007.
47. Hossain 2014.
48. GOB 2015b.
49. Khatun and Hossain 2012.

Chapter 6

1. Based on the annual GDP growth for the period from 1990 to 2017. World Bank 2019f.
2. World Bank 2018c.
3. Ibid.
4. UNDP 2018.
5. Based on annual GDP growth for the period from 1990 to 2017. UNDP 2018.
6. World Bank 2017a.
7. UNDP 2018.
8. Ibid.
9. World Bank 2019f.
10. Dev 2018.
11. World Bank 2019f.
12. Dev 2018.
13. World Bank 2019f.
14. Chancel and Piketty 2017.
15. Greenpeace and AirVisual 2019.
16. ADB and WWF 2012.
17. More than a quarter of the planet's estimated 198,000 glaciers are found in the Himalayas. But recently many Himalayan glaciers are melting. Studies show that the famed snows of Kilimanjaro have melted more than 80 per cent since 1912. Glaciers in the Garhwal Himalaya are retreating so fast that researchers believe that most central and eastern Himalayan glaciers could virtually disappear by 2035. Glick 2004 and Kornei 2017.
18. UNEP 2019a.
19. UNEP 2019b.
20. Parvaiz 2018.
21. *Geo News* 2018.
22. Shukla *et al.* 2017.
23. Paun *et al.* 2018.
24. World Bank 2019f.
25. Huq 2018.
26. GOI 2015a.
27. FAO 2012.
28. ADB and WWF 2012.
29. Ibid.
30. Gul 2018.
31. Kakon and Reza 2018.
32. GOP 2017b.
33. UNDP 2015.
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Statistical Profile of Sustainable Development in South Asia

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    - female/male
    - rural/urban
    - lowest wealth quintile/highest wealth quintile
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    - rural/urban
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    - total

urban/rural
no education/primary/secondary/higher
lowest wealth quintile/highest wealth quintile

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total
male/female
urban/rural
no education/primary/secondary/higher
lowest wealth quintile/highest wealth quintile

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total
male/female
urban/rural
no education/primary/secondary/higher
lowest wealth quintile/highest wealth quintile

births attended by skilled health staff (SDG 3.1.2),
total
urban/rural
no education/primary/secondary/higher
lowest wealth quintile/highest wealth quintile

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total
male/female
urban/rural
no education/primary/secondary/higher
lowest wealth quintile/highest wealth quintile

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total
urban/rural
no education/primary/secondary/higher
lowest wealth quintile/highest wealth quintile

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Note on Statistical Sources for Sustainable Development Tables

The special sustainable development data for this report have been collected from numerous international sources. In general, international sources include United Nations (UN), United Nations Population Division (UNPD), United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP), United States Agency for International Development (USAID), United Nations Educational, Scientific and Cultural Organization (UNESCO), World Resource Institute (WRI), Food and Agriculture Organization of the United Nations (FAO), and the World Bank.

Countries in the indicator tables are arranged in descending order according to population size. Data for South Asia is the total (T) or weighted average value of eight countries, India, Pakistan, Bangladesh, Afghanistan, Nepal, Sri Lanka, Bhutan and the Maldives.

Since data obtained from national sources limit international level comparability, efforts have been made to use international data. Although data from international sources are not as current as the ones available in national sources, preference has been given to the former due to the nature of the data required. There is, however, scarcity of international and national data for both Bhutan and the Maldives.

Extra care has also been taken to ensure that the information provided in the tables is both reliable and consistent.

1. Summary of Key Sustainable Development Data

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Environmental limits										
Greenhouse gases (GHGs) emissions,										
• per capita (tons CO_2e)										
1990	1.4	1.7	1.1	1.2	3.1	1.6	-5.5	1.0	1.4	…
2016	2.4	2.0	1.3	2.7	2.2	1.8	-2.5	4.2	2.3	…
• average annual change (%)										
1990-2000	3.5	3.3	1.6	-0.1	1.1	-1.3	-0.9	9.6	3.2	…
2001-2016	4.9	3.2	2.7	14.0	0.0	2.5	-3.3	8.8	4.6	…
Forest area as a proportion of total land area (SDG 15.1.1)										
1990	21.5	3.3	11.5	2.1	33.7	36.4	53.7	3.3	19.0	33.7
2016	23.8	1.9	11.0	2.1	25.4	32.9	72.5	3.3	20.0	31.9
$PM_{2.5}$ air pollution, mean annual exposure (micrograms per cubic metre) (SDG 11.6.2)										
1990	81.3	60.3	61.6	65.5	87.6	29.8	40.2	11.4	76.6	50.7
2017	90.9	58.3	60.8	56.9	99.7	11.1	37.9	7.8	83.0	51.4
Water availability per person (renewable water resources) (cubic metres)										
1992	2,108	2,172	11,055	4,753	10,634	2,976	179,890	127.1	3,217	…
2014	1,458	1,306	7,621	2,008	7,372	2,549	100,671	82.5	2,175	…
Level of water stress: freshwater withdrawal as a proportion of available freshwater resources (SDG 6.4.2)										
2014	44.5	102.5	3.8	43.7	5.9	34.1	0.6	15.7	46.2	…
Resource use										
Domestic material consumption annual growth (%)										
1990-2017	3.6	3.0	3.9	2.2	3.1	4.1	2.7	10.6	3.5	…
Material footprint consumption annual growth (%)										
1990-2015	4.3	2.9	3.3	2.6	2.5	6.2	3.8	9.3	4.1	…
Renewable energy consumption (% of total final energy consumption) (SDG 7.2.1)										
1990	58.7	57.5	71.7	15.9	95.1	78.1	95.9	4.5	60.0	28.0
2015	36.0	46.5	34.7	18.4	85.3	52.9	86.9	1.0	38.3	23.0
Total primary energy supply (million tons of oil equivalent)										
1990	305,713	42,900	12,738	…	5,789	5,516	…	…	372,656T	…
2014	824,743	89,887	35,423	…	11,690	10,711	…	…	972,454T	…
Inequality										
Gini coefficients										
1993-1995[a]	30.8	28.6	27.5[b]	…	35.2	35.4	69.4[c]	62.6[d]	30.4	…
2010-2017[a]	35.7	33.5	32.4	…	32.8	39.8	37.4	38.4	35.1	…
Primary completion rate (% of relevant age group) (SDG 4.1.4),										
• year										
	2015	2012	2014	2015	2016	2006	2010	2009	…	…
• lowest wealth quintile										
	80	24	62	45	82	96	42	94	72	…
• highest wealth quintile										
	99	88	89	74	95	99	90	99	96	…

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Percentage of children stunted (height for age) (SDG 2.2.1)										
. year	2016	2018	2014	…	2016	1987	…	2017	…	…
. total	38	38	36	…	36	31	…	15	38	…
. male	39	38	37	…	36	32	…	16	39	…
. female	38	37	35	…	36	30	…	14	38	…
. urban	31	31	31	…	32	22	…	13	31	…
. rural	41	41	38	…	40	33	…	16	41	…
. lowest wealth quintile	51	57	49	…	49	…	…	18	51	…
. highest wealth quintile	22	22	19	…	17	…	…	16	22	…
GDP annual average growth (%)										
1990-2018	6.3	4.2	5.6	6.8	4.5	5.3	6.6	5.9	6.0	4.5

Notes: a: Data refer to the most recent year available. b: Data refer to 1991. c: Data refer to 2003. d: Data refer to 1998.

Sources: Row 1a: WRI 2017; Row 1b and e: UN 2019; Row 1c: World Bank 2019e; Row 1d: FAO 2019b; Row 2a: UN ESCAP 2019; Row 2b: UN 2019; Row 2c: World Bank 2019e; Row 2d: World Bank 2019f; Row 3a: UN ESCAP 2017 and World Bank 2019f; Row 3b: UNESCO 2017a; Row 3c: USAID 2017; Row 4: World Bank 2019f.

2. Environmental Limits

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Atmosphere: Climate change										
Greenhouse gases (GHGs) emissions,										
. GHGs emissions total [metric tons of carbon dioxide equivalent ($MtCO_2e$)]										
1990	1,183	180	116	15.1	57.9	28.2	-2.9	0.2	1,578T	…
2000	1,664	250	136	15.1	64.3	24.8	-2.7	0.6	2,152T	…
2016	3,236	404	210	96.6	61.3	37.3	-1.8	2.0	4,044T	…
. GHGs emissions annual growth (%)										
1990-2000	3.5	3.3	1.6	-0.1	1.1	-1.3	-0.9	9.6	3.2	…
2001-2016	4.9	3.2	2.7	14.0	0.0	2.5	-3.3	8.8	4.6	…
. GHGs emissions per capita (tons CO_2e)										
1990	1.4	1.7	1.1	1.2	3.1	1.6	-5.5	1.0	1.4	…
2000	1.6	1.8	1.1	0.7	2.7	1.3	-4.5	2.0	1.5	…
2016	2.4	2.0	1.3	2.7	2.2	1.8	-2.5	4.2	2.3	…
. GHGs emissions by type (% of total GHGs emission),										
.. carbon dioxide emissions (CO_2)										
1990	43.2	45.9	30.2	19.2	60.2	26.5	135.8	77.3	42.5	…
2000	53.2	48.1	33.4	5.0	57.0	58.5	139.7	81.8	51.1	…
2016	71.3	48.3	47.5	8.9	25.8	65.9	161.0	81.7	65.5	…
.. methane emissions (CH_4)										
1990	44.7	39.1	55.6	59.2	31.6	65.5	-29.7	18.2	45.0	…
2000	35.5	36.0	50.7	70.4	34.6	31.1	-33.0	10.9	36.7	…
2016	20.5	35.5	38.3	80.9	58.2	25.1	-48.9	5.9	25.0	…
.. nitrous oxide emissions (N_2O)										
1990	12.0	14.9	14.1	21.5	8.2	8.0	-6.1	0.0	12.4	…
2000	10.9	15.5	15.7	24.1	8.4	9.9	-6.4	1.8	11.8	…
2016	7.6	14.3	13.1	9.5	15.9	6.5	-10.4	1.5	8.8	…
.. fluorinated gases emissions (F-Gas)										
1990	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.1	…
2000	0.5	0.4	0.2	0.6	0.0	0.5	0.0	5.5	0.4	…
2016	0.5	1.9	1.1	0.7	0.1	2.5	-1.6	10.4	0.7	…
. GHGs emissions by source (% of total GHGs emissions),										
.. energy										
1990	51.4	36.7	11.8	38.1	5.6	20.0	-15.4	77.3	44.6	…
2000	58.6	42.4	17.5	13.2	14.4	49.5	-25.8	83.6	52.5	…
2016	67.8	42.1	36.8	79.9	33.2	63.7	-56.6	83.2	63.4	…
.. industrial processes										
1990	2.2	1.8	0.1	0.3	0.1	0.6	0.0	0.0	1.9	…
2000	3.5	2.0	1.3	0.7	0.2	2.2	-2.2	5.5	3.0	…
2016	4.0	5.1	4.4	0.8	1.3	4.9	-18.1	10.4	4.1	…
.. agriculture										
1990	47.9	47.6	56.3	53.4	31.0	24.8	-21.5	0.0	47.6	…
2000	37.1	44.3	53.2	73.0	31.6	22.6	-22.8	0.0	39.0	…
2016	21.8	43.5	39.9	15.9	40.4	14.8	-28.6	0.0	25.0	…

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
.. waste										
1990	2.1	7.2	2.9	8.1	0.9	41.6	-1.4	22.7	3.4	…
2000	3.7	6.0	4.8	13.0	1.1	11.1	-1.9	10.9	4.1	…
2016	2.5	5.0	4.3	3.5	1.6	9.0	-4.4	6.4	2.9	…
.. land-use change and forestry										
1990	-3.6	12.0	20.6	0.0	62.3	13.0	138.2	0.0	2.5	…
2000	-2.9	8.7	17.1	0.0	52.8	14.6	152.8	0.0	1.4	…
2016	3.9	7.1	9.3	0.0	23.5	7.6	207.7	0.0	4.7	…
.. bunker fuels										
1990	0.4	0.8	0.3	…	0.0	4.3	…	…	0.5	…
2000	0.4	0.8	0.4	…	0.3	3.2	…	…	0.5	…
2016	0.6	0.6	0.7	…	0.7	9.4	…	…	0.7	…
Air quality										
$PM_{2.5}$ air pollution, mean annual exposure (micrograms per cubic metre) (SDG 11.6.2)										
1990	81.3	60.3	61.6	65.5	87.6	29.8	40.2	11.4	76.6	50.7
2000	84.2	61.1	63.0	64.9	88.9	30.9	39.7	11.1	78.9	52.2
2017	90.9	58.3	60.8	56.9	99.7	11.1	37.9	7.8	83.0	51.4
Total welfare losses (% of GDP)										
1990	6.8	6.1	4.7	…	4.6	4.3	…	…	6.5	…
2013	7.7	5.6	6.1	…	4.7	7.6	…	…	7.3	…
Freshwater: Water stress										
Water availability per person (renewable water resources) (cubic metres)										
1992	2,108	2,172	11,055	4,753	10,634	2,976	179,890	127.1	3,217	…
2002	1,753	1,711	9,007	3,040	8,574	2,770	135,361	103.4	2,636	…
2014	1,458	1,306	7,621	2,008	7,372	2,549	100,671	82.5	2,175	…
Agricultural freshwater withdrawal (% of total freshwater withdrawal)										
1992	92.0	96.8	…	…	…	96.0	…	…	…	…
2002	91.5	94.3	…	98.6	97.5	92.2	…	…	92.1	…
2014	90.4	94.0	87.8	98.6	98.1	87.3	94.1	0.0	90.8	79.3
Water productivity, total (constant 2010 US$ GDP per cubic metre of total freshwater withdrawal) (SDG 6.4.1)										
1992	1.0	0.6	…	…	…	2.3	…	…	…	2.3
2002	1.4	0.7	…	0.4	1.2	2.7	…	…	1.3	4.0
2014	2.8	1.1	4.1	1.0	2.0	5.6	5.7	487.0	2.8	8.4
Level of water stress: freshwater withdrawal as a proportion of available freshwater resources (SDG 6.4.2)										
2014	44.5	102.5	3.8	43.7	5.9	34.1	0.6	15.7	46.2	…
Biodiversity and land use change										
Threatened species, 2016,										
. amphibians	75	0	1	1	3	56	1	0	137T	…
. birds	84	32	33	17	36	16	20	0	238T	…
. fishes	222	41	27	5	7	54	3	24	383T	…
. mammals	92	25	36	11	30	29	26	2	251T	…
. molluscs	7	0	0	0	1	0	0	0	8T	…
. plants	388	12	21	5	17	291	18	0	752T	…
. reptiles	54	12	23	1	9	12	3	3	117T	…
. other inverts	128	18	7	2	2	130	1	46	334T	…
. total	1,050	140	148	42	105	588	72	75	2,220T	…

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Red List Index (SDG 15.5.1)										
2000	0.75	0.93	0.83	0.84	0.82	0.66	0.80	0.91	0.78	…
2019	0.67	0.85	0.76	0.84	0.83	0.56	0.80	0.84	0.67	…
Proportion of important sites (Key biodiversity areas) for terrestrial biodiversity that are covered by protected areas (SDG 15.1.2a)										
2000	21.7	35.0	38.0	0.1	42.2	41.6	38.6	…	27.7	26.4
2018	26.0	36.6	48.0	6.1	54.6	49.8	42.9	…	32.8	34.6
Proportion of important sites (Key biodiversity areas) for freshwater biodiversity that are covered by protected areas (SDG 15.1.2b)										
2000	13.2	36.3	20.8	0.1	22.0	72.6	23.1	…	21.4	22.7
2018	15.2	37.0	20.8	0.1	36.5	80.0	34.3	…	25.0	31.2
Proportion of important sites (Key biodiversity areas) for mountain biodiversity that are covered by protected areas (SDG 15.4.1)										
2000	28.0	36.0	…	0.1	57.1	25.9	38.6	…	32.4	32.4
2018	35.4	36.0	…	12.3	67.1	40.2	43.0	…	39.5	40.5
Coverage of protected areas in relation to marine areas (Exclusive Economic Zones) (%) (SDG 14.5.1)										
2018	0.2	0.8	5.3	…	…	0.1	…	0.1	0.7	…
Forest area as a proportion of total land area (SDG 15.1.1)										
1990	21.5	3.3	11.5	2.1	33.7	36.4	53.7	3.3	19.0	33.7
2000	22.0	2.7	11.3	2.1	27.2	35.0	68.4	3.3	19.1	32.7
2016	23.8	1.9	11.0	2.1	25.4	32.9	72.5	3.3	20.0	31.9

Sources: Row 1: WRI 2017; Row 2a: World Bank 2019e; Row 2b: World Bank 2016b; Row 3a: FAO 2019b; Row 3b-c: World Bank 2019f; Row 4a: UN ESCAP 2016; Row 4b-g: UN 2019.

3. Sustainable Consumption and Production

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Material footprint consumption (SDG 12.2.1)										
Total (million tonnes) (SDG 12.2.1a)										
1990	1,998.1	282.0	137.3	32.9	38.6	16.1	3.6	0.8	2,509.4T	…
2000	2,575.2	325.9	196.9	17.2	29.8	27.3	3.2	2.1	3,177.6T	…
2015	5,783.2	577.2	306.3	63.0	71.2	71.9	9.2	6.6	6,888.6T	…
Material footprint per unit of GDP (kilogrammes per unit of constant 2005 US$) (SDG 12.2.1b)										
1990	5.9	4.5	4.9	5.7	9.0	1.2	11.0	1.8	5.7	…
2000	4.4	3.5	4.4	4.9	4.3	1.4	5.8	2.4	4.3	…
2015	3.4	3.4	2.9	4.6	5.6	1.4	5.6	3.1	3.4	…
Per capita (tonnes) (SDG 12.2.1c)										
1990	2.3	2.6	1.3	2.7	2.1	0.9	6.8	3.4	2.2	…
2000	2.4	2.4	1.5	0.9	1.3	1.5	5.6	7.4	2.3	…
2015	4.4	3.0	1.9	1.9	2.5	3.5	11.7	15.8	3.9	…
Domestic material consumption (SDG 12.2.2)										
Total (million tons) (SDG 12.2.2a)										
1990	2,859	391.6	154.1	38.2	48.6	36.0	4.1	0.2	3,531.8T	…
2017	7,403	875.8	435.7	67.9	111.6	107.4	8.4	3.0	9,012.8T	…
Domestic material consumption per unit of GDP (kilogrammes per unit of constant 2010 US$) (SDG 12.2.2b)										
1990	6.2	5.0	3.7	4.3	7.2	1.8	10.1	0.3	5.8	…
2017	2.8	3.7	2.4	3.1	5.1	1.3	3.5	0.9	2.9	…
Per capita (metric tons) (SDG 12.2.2c)										
1990	3.3	3.6	1.5	3.1	2.6	2.1	7.7	0.8	3.1	…
2017	5.5	4.4	2.6	1.9	3.8	5.1	10.4	6.8	5.0	…
Sustainable and modern energy										
Access to electricity (% of population) (SDG 7.1.1),										
. % of total population										
2000	59	70	32	…	27	…	31	84	57	74
2017	93	71	88	98	96	98	98	100	90	87
. % of rural population										
2000	48	59	17	…	18	…	9	78	45	61
2017	89	54	81	97	95	97	97	100	85	77
. % of urban population										
2000	89	94	81	…	84	…	97	100	89	93
2017	99	100	100	100	99	100	99	100	99	97
Access to clean fuels and technologies for cooking (% of population) (SDG 7.1.2)										
1990	15	14	4	12	12	9	18	34	13	…
2000	22	22	7	13	19	20	33	58	20	…
2017	40	48	21	29	35	55	70	93	39	…

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Renewable energy consumption (% of total final energy consumption) (SDG 7.2.1)										
1990	58.7	57.5	71.7	15.9	95.1	78.1	95.9	4.5	60.0	28.0
2000	51.6	51.0	59.0	54.2	88.3	64.2	91.4	2.1	52.9	30.3
2015	36.0	46.5	34.7	18.4	85.3	52.9	86.9	1.0	38.3	23.0
Energy intensity level of primary energy (megajoules per US$ constant 2011 PPP[a] GDP) (SDG 7.3.1)										
1990	8.3	5.5	3.9	1.9	10.8	3.7	30.0	2.6	7.5	9.2
2000	6.9	5.5	3.5	1.7	9.3	3.3	21.8	3.3	6.5	7.4
2015	4.7	4.4	3.1	2.5	7.4	2.1	10.4	3.8	4.6	5.6

Note: a: PPP means purchasing power parity.

Sources: Row 1: UN 2019; Row 2: UNE SCAP 2019; Rows 3a, 4, 5: World Bank 2019e; Row 3b: HEI 2019.

4. Inequality

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Economic inequality										
Gini coefficients										
1993-1995[a]	30.8	28.6	27.5[b]	…	35.2	35.4	69.4[c]	62.6[d]	30.4	…
2010-2017[a]	35.7	33.5	32.4	…	32.8	39.8	37.4	38.4	35.1	…
Ratio of richest to poorest deciles										
1995-1996[a]	…	5.8	7.4[b]	…	8.9	8.6	…	…	6.9	…
2010-2017[a]	8.6	7.4	7.2	…	7.5	11.3	11.4	12.0	8.4	…
Share of the poorest 40 per cent of population										
1995-1996[a]	…	23.4	21.2[b]	…	19.8	19.7	…	…	21.9	…
2010-2017[a]	19.8	21.1	21.0	…	20.4	17.7	17.5	17.4	20.0	18
Educational inequality										
Primary completion rate (% of relevant age group) (SDG 4.1.4),										
. year	2015	2012	2014	2015	2016	2006	2010	2009	…	…
. total	92	61	80	54	83	98	68	97	87	…
. female	92	58	84	40	82	99	70	98	87	…
. male	92	63	75	67	84	98	66	95	87	…
. rural	91	54	80	48	78	99	60	96	85	…
. urban	94	75	81	71	87	98	89	99	90	…
. lowest wealth quintile										
	80	24	62	45	82	96	42	94	72	…
. highest wealth quintile										
	99	88	89	74	95	99	90	99	96	…
Mean years of education (average number of years of schooling attained for the age group 20–24 years),										
. year	2011	2012	2014	2010	2014	…	2010	2009	…	…
. total	8.8	6.3	6.9	3.1	7.8	…	6.0	10.0	8.2	…
. female	8.4	5.5	7.1	1.3	7.2	…	5.4	10.0	7.8	…
. male	9.2	7.2	6.6	4.7	8.7	…	6.6	9.9	8.7	…
. rural	8.0	5.2	6.5	2.4	7.2	…	4.7	9.6	7.4	…
. urban	10.4	8.4	7.7	5.9	9.9	…	8.6	10.5	9.8	…
. lowest wealth quintile										
	7.4	1.9	3.8	1.0	5.7	…	2.8	9.1	6.3	…
. highest wealth quintile										
	11.6	10.5	9.3	6.1	10.9	…	10.0	10.8	11.1	…
Out-of-school children (% of primary school-age children) (SDG 4.1.5a),										
. year	2015	2012	2014	2015	2016	2006	2010	2009	…	…
. total	5	36	9	37	17	2	8	6	10	…
. female	5	40	7	47	15	2	8	6	10	…
. male	5	33	10	28	18	2	8	7	9	…
. rural	5	41	8	43	20	2	10	7	10	…
. urban	5	25	9	20	14	3	5	6	8	…
. lowest wealth quintile										
	11	61	12	42	11	3	17	7	17	…
. highest wealth quintile										
	1	13	7	16	10	1	3	7	3	…

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Out-of-school youth (% of upper secondary school-age children) (SDG 4.1.5b),										
. year	2015	2012	2014	2015	2016	2006	2010	2009	…	…
. total	30	49	48	57	23	37	45	33	34	…
. female	33	56	51	72	27	34	50	34	38	…
. male	27	42	44	41	18	40	39	32	31	…
. rural	33	56	48	61	28	37	57	30	37	…
. urban	23	35	49	44	19	35	25	37	27	…
. lowest wealth quintile	49	80	65	68	23	48	79	32	54	…
. highest wealth quintile	9	20	37	40	8	24	25	31	14	…
Youth literacy rate (% of young people aged 15-24 who can read a simple sentence) (SDG 4.6.2),										
. year	2005	2012	2014	2015	2014	…	2010	2009	…	…
. total	86	84	83	64	…	…	…	…	…	…
. female	78	68	83	29	87	…	63	…	…	…
. male	92	90	…	80	…	…	…	…	…	…
. rural	80	78	81	58	…	…	…	…	…	…
. urban	94	93	88	82	…	…	…	…	…	…
. lowest wealth quintile	52	49	50	49	…	…	…	…	…	…
. highest wealth quintile	99	98	96	87	…	…	…	…	…	…
Health inequality										
Total fertility rate (births per women aged 15-49) (three years preceding the surveys),										
. year	2016	2018	2014	2015	2016	1987	2010	2017	…	…
. total	2.2	3.6	2.3	5.3	2.3	2.7	…	2.1	2.4	…
. urban	1.8	2.9	2.0	4.8	2.0	2.1	…	1.8	2.0	…
. rural	2.4	3.9	2.4	5.4	2.9	2.8	…	2.5	2.6	…
. no education	3.1	4.2	2.4	5.5	3.3	…	…	1.6	3.2	…
. primary	2.5	3.6	2.4	4.7	2.7	…	…	2.4	2.7	…
. secondary	2.1	3.2	2.4	4.3	2.1	…	…	2.3	2.3	…
. higher	1.6	2.6	1.9	3.6	1.8	…	…	1.9	1.8	…
. lowest wealth quintile	3.2	4.9	2.8	5.3	3.2	…	3.1	2.5	3.4	…
. highest wealth quintile	1.5	2.8	2.0	4.6	1.6	…	2.0	1.7	1.8	…

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Child immunization all (8 basic) vaccinations (% of children ages 12-23 months),										
. year	2016	2018	2014	2015	2016	1987	…	2017	…	…
. total	62	66	84	46	78	65	…	77	64	…
. male	62	68	84	45	77	66	…	76	65	…
. female	62	63	84	46	78	63	…	77	64	…
. urban	64	71	88	53	79	…	…	83	67	…
. rural	61	63	83	43	77	…	…	74	63	…
. no education	52	50	74	42	68	46	…	…	54	…
. primary	60	76	76	55	76	55	…	81	63	…
. secondary	67	79	89	62	82	65	…	74	70	…
. higher	71	82	94	65	94	80	…	83	75	…
. lowest wealth quintile	53	38	69	38	77	…	…	71	53	…
. lowest wealth quintile	70	80	92	56	82	…	…	76	73	…
Percentage of children stunted (height for age) (SDG 2.2.1),										
. year	2016	2018	2014	…	2016	1987	…	2017	…	…
. total	38	38	36	…	36	31	…	15	38	…
. male	39	38	37	…	36	32	…	16	39	…
. female	38	37	35	…	36	30	…	14	38	…
. urban	31	31	31	…	32	22	…	13	31	…
. rural	41	41	38	…	40	33	…	16	41	…
. no education	51	48	47	…	46	58	…	19	50	…
. primary	44	39	44	…	37	38	…	16	43	…
. secondary	33	28	31	…	30	30	…	16	32	…
. higher	21	16	20	…	21	17	…	13	20	…
. lowest wealth quintile	51	57	49	…	49	…	…	18	51	…
. lowest wealth quintile	22	22	19	…	17	…	…	16	22	…
Births attended by skilled health staff (SDG 3.1.2), (three years preceding the surveys),										
. year	2016	2018	2014	2015	2016	1987	…	2017	…	…
. total	83	73	42	54	63	87	…	100	77	…
. urban	91	86	61	81	71	96	…	99	87	…
. rural	80	67	36	46	53	86	…	100	73	…
. no education	69	60	17	49	44	64	…	100	62	…
. primary	79	74	30	75	54	83	…	100	73	…
. secondary	90	86	49	80	73	91	…	99	85	…
. higher	96	96	79	97	89	95	…	100	94	…
. lowest wealth quintile	67	50	18	27	39	…	…	100	59	…
. highest wealth quintile	96	94	74	88	90	…	…	99	93	…

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Under-five mortality rate (per 1,000 live births) (SDG 3.2.1) (ten years preceding the surveys),										
. year	2016	2018	2014	2015	2016	1987	2010	2017	…	…
. total	52	78	54	62	46	42	…	22	55	…
. male	54	87	52	66	50	50	…	25	58	…
. female	50	68	56	58	42	35	…	18	52	…
. urban	36	63	46	43	39	40	…	24	40	…
. rural	59	85	56	67	55	43	…	20	62	…
. no education	69	91	63	65	60	72	…	…	71	…
. primary	60	83	60	46	43	43	…	24	62	…
. secondary	39	55	49	45	34	41	…	18	42	…
. higher	23	38	24	20	21	26	…	27	25	…
. lowest wealth quintile	75	100	62	81	62	…	106	15	77	…
. highest wealth quintile	25	56	37	40	24	…	…	...	30	…
Percentage of currently married or in union women currently using any modern method of contraception (SDG 3.7.1),										
. year	2016	2018	2014	2015	2016	1987	…	2017	…	…
. total	48	25	54	20	43	41	…	15	45	…
. urban	51	29	56	29	44	41	…	16	48	…
. rural	46	23	53	17	41	41	…	14	43	…
. no education	49	22	51	19	52	44	…	17	46	…
. primary	53	28	55	22	42	48	…	18	50	…
. secondary	47	27	55	26	35	41	…	12	45	…
. higher	41	30	54	30	33	30	…	17	41	…
. lowest wealth quintile	36	17	55	15	42	…	…	13	35	…
. highest wealth quintile	53	30	53	31	43	…	…	17	50	…
Percentage of ever married women (15-49 years) who have ever experienced physical or sexual violence committed by their husband or partner (SDG 5.2.1),										
. year	2016	2018	2007	2015	2016	…	…	2017	…	…
. total	29	25	53	51	25	…	…	16	31	…
. urban	24	21	48	41	23	…	…	12	26	…
. rural	31	26	55	54	26	…	…	13	33	…
. no education	38	27	62	54	32	…	…	13	39	…
. primary	34	30	58	42	26	…	…	13	36	…
. secondary	23	19	44	33	16	…	…	13	25	…
. higher	13	11	27	27	12	…	…	10	14	…
. lowest wealth quintile	42	28	62	54	23	…	…	15	42	…
. highest wealth quintile	16	16	39	39	17	…	…	12	19	…

Notes: a: Data refer to the most recent year available. b: Data refer to 1991. c: Data refer to 2003. d: Data refer to 1998.

Sources: Row 1: UN ESCAP 2017, World Bank 2019f and UNDP 2019; Rows 2-6: UNESCO 2019b; Rows 7-13: USAID 2019.

5. Economic Structure

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
GDP growth (annual %) (SDG 8.1.1a)										
1990-2000	5.6	4.0	4.8	…	5.0	5.3	5.5	6.8	5.3	3.0
2001-2018	6.8	4.4	6.1	6.8[a]	4.2	5.2	7.2	5.7	6.5	5.4
1990-2018	6.3	4.2	5.6	6.8	4.5	5.3	6.6	5.9	6.0	4.5
Structure of GDP,										
. agriculture (% of GDP)										
1990	30.1	26.0	32.8	…	51.6	26.7	35.3	11.5[b]	30.3	20.2
2000	21.6	24.1	22.7	38.6[c]	38.2	19.9	26.8	8.8	22.0	12.3
2017	15.6	22.9	13.4	20.5	26.2	7.8	17.4	5.6	16.1	8.4
. industry (% of GDP)										
1990	31.6	25.2	20.7	…	16.2	26.3	24.9	13.5[b]	29.6	38.1
2000	27.3	21.7	22.3	23.8[c]	20.7	27.3	35.2	15.0	26.4	35.8
2017	26.5	17.9	27.8	22.1	13.4	27.3	40.6	12.8	25.6	31.9
. services (% of GDP)										
1990	38.3	48.8	46.6	…	32.1	47.0	39.9	75.0[b]	40.2	41.6
2000	42.5	47.2	50.6	36.2[c]	34.7	52.8	35.8	73.1	43.6	49.5
2017	48.5	53.1	53.5	52.7	51.6	55.7	37.2	67.4	49.4	53.8
Labour productivity [GDP per person employed (constant 2011 PPP[d] US$)] (SDG 8.2.1)										
1991	4,877	10,917	4,047	5,272	2,549	10,659	6,275	25,650	5,473	9,980
2000	6,836	11,720	4,721	2,387	3,100	14,407	9,280	30,969	7,026	11,619
2018	18,565	15,430	9,216	4,897	4,393	32,673	19,524	33,072	1,669	23,969
. annual growth rate of labour productivity (1991-2018)										
	5.1	1.3	3.1	-0.3	2.0	4.2	4.3	0.9	4.2	3.3
Structure of employment,										
. agriculture (% of total employment)										
1991	62.7	47.5	60.7	62.0	84.0	41.8	62.2	28.1	61.1	50.7
2000	59.9	48.1	59.5	69.4	73.0	43.2	54.2	14.4	58.8	47.6
2017	44.3	42.1	40.6	61.6	72.6	27.4	56.6	7.7	44.3	34.0
. industry (% of total employment)										
1991	15.4	19.8	12.3	12.1	2.9	26.1	11.3	20.3	15.4	18.2
2000	16.0	18.0	9.9	11.0	11.2	20.4	16.2	20.0	15.5	17.7
2017	24.5	19.8	19.1	10.0	10.9	25.9	9.7	22.8	23.0	21.4
. services (% of total employment)										
1991	21.8	32.7	26.9	25.8	13.2	32.1	26.5	51.6	23.4	31.1
2000	24.1	33.9	30.7	19.6	15.8	36.4	29.6	65.6	25.7	34.6
2017	31.2	38.1	40.3	28.5	16.5	46.6	33.7	69.5	32.7	44.6
Urban population (% of total)										
1990	25.5	30.6	19.8	21.2	8.9	18.5	16.4	25.8	25.1	35.7
2000	27.7	33.0	23.6	22.1	13.4	18.4	25.4	27.7	27.4	40.3
2018	34.0	36.7	36.6	25.5	19.7	18.5	40.9	39.8	34.0	50.3

Notes: a: Data refer to 2002-2018. b: Data refer to 1995. c: Data refer to 2002. d: PPP means purchasing power parity.

Source: Rows 1-5: World Bank 2017f.

Human Development Indicators for South Asia

Contents

- Gross intake rate to the last grade of: (SDG 4.1.3), 2015,
    - primary education
    - lower secondary education
- Primary completion rate, total (% of relevant age group) (SDG 4.1.4)
- Children out of primary school (SDG 4.1.5),
    - total (millions)
    - % of primary school age
    - female % of total
- Proportion of children developmentally on track in health, learning and ... (SDG 4.2.1)
- Participation rate in organized learning (before the official primary entry age) (SDG 4.2.2)
- Gross enrolment ratio in pre-primary education and early childhood education (SDG 4.2.4)
- School enrollment, tertiary (SDG 4.3.2)
- Technical and vocational enrolment (SDG 4.3.3)
- Percentage of adults (25 and over) who have attained at least (SDG 4.4.3),
    - primary
    - lower secondary
    - upper secondary
    - short cycle tertiary
- Literacy rate (SDG 4.6.2),
    - adult literacy rate
    - male literacy rate
    - female literacy rate
    - youth literacy rate
- Inclusion in national curricular frameworks of issues relating to (SDG 4.7.1),
    - gender equality
    - human rights
    - sustainable development
    - global citizenship
- Percentage of schools providing life skills-based HIV/AIDS education (SDG 4.7.2)
- Percentage of primary schools with access to (SDG 4.A.1),
    - basic drinking water
    - basic handwashing facilities
    - single sex basic sanitation
    - electricity
- Total official development assistance (ODA) (gross disbursements) for scholarships (SDG 4.B.1)
- Trained teachers (% of total teachers) (SDG 4.C.1),
    - primary education
    - lower secondary education
- Public expenditure on education (SDG 1.A.2a),
    - % of GDP
    - % of total government expenditure
- Research and development (R&D) expenditure (% of GDP) (SDG 9.5.1)
- Researchers in R&D (per million people) (SDG 9.5.2)

Table 3: Health Profile

- Population using at least basic drinking water services (%) (SDG 6.1.1)
- Population using at least basic sanitation services (%) (SDG 6.2.1)
- Maternal mortality ratio (per 100,000 live births) (SDG 3.1.1)
- New HIV infections among adults 15-49 years old (per 1,000 uninfected population) (SDG 3.3.1)
- Tuberculosis incidence (per 100,000 population) (SDG 3.3.2)
- Malaria incidence (per 1,000 population at risk) (SDG 3.3.3)
- Infants receiving three doses of hepatitis B vaccine (%) (SDG 3.3.4)
- Number of people requiring interventions against neglected tropical diseases (SDG 3.3.5)
- Probability of dying from cardio disease, cancer, diabetes, chronic respiratory disease (SDG 3.4.1)
- Total alcohol consumption per capita (SDG 3.5.2)
- Road traffic mortality rate (per 100,000 people) (SDG 3.6.1)
- Women who have their need for family planning satisfied with modern methods (%) (SDG 3.7.1)
- Mortality rate attributed to household and ambient air pollution (SDG 3.9.1)
- Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (SDG 3.9.2)
- Mortality rate attributed to unintentional poisonings (SDG 3.9.3)

- Smoking prevalence (% of adults) (SDG 3.A.1),
    - female
    - male
- Diphtheria-tetanus-pertussis (DTP3) immunization coverage among 1-year-olds (%) (SDG 3.B.1)
- Health worker density (SDG 3.C.1),
    - physicians (per 1,000 people)
    - nurses and midwives (per 1,000 people)
- International Health Regulations (IHR) core capacity index (SDG 3.D.1)
- Total net ODA disbursements to medical research and basic health sectors (SDG 3.B.2)
- Domestic general government health expenditure (SDG 1.A.2b),
    - % of GDP
    - % of general government expenditure

Table 4: Human Deprivation Profile

- Population below international poverty lines (SDG 1.1.1a),
    - $1.90 a day
    - $3.20 a day
    - $5.50 a day
- Population below national poverty lines (SDG 1.2.1),
    - total
    - rural
    - urban
- Population in multidimensional poverty
- Proportion of employed population below the international poverty line (SDG 1.1.1b),
    - 15 to 24 years old
    - 15 years old and over
    - 25 years old and over
- Population without access to at least basic water services,
    - number (millions)
    - % of total population
- Population without access to at least basic sanitation services,
    - number (millions)
    - % of total population
- Illiterate adults,
    - number (millions)
    - % of total adult population
- Illiterate female adults,
    - number (millions)
    - % of total adult female population
- Malnourished children (proportion of children under 5 who are stunted) (SDG 2.2.1)
- Under-five mortality rate (per 1,000 live births) (SDG 3.2.1)
- New HIV infections among adults 15-49 years old (per 1,000 uninfected population) (SDG 3.3.1)

Table 5: Gender Disparities Profile

- Female population,
    - number (millions)
    - % of male
- Parity indices for all education indicators (SDG 4.5.1),
    - gender parity in literacy,
        - adult
        - youth
    - gender parity in gross school enrolment ratio in,
        - primary
        - secondary
        - tertiary
        - primary to tertiary
    - gender parity in school completion,
        - primary
        - lower secondary
    - gender parity in trained teachers,

primary
lower secondary
- Proportion of women subjected to physical and/or sexual violence (SDG 5.2.1)
- Proportion of women aged 20-24 years who were married (SDG 5.3.1a),
  by age 15
  by age 18
- Female economic activity rate (aged 15 years and over) (% of male)
- Proportion of time spent on unpaid domestic and care work (SDG 5.4.1),
  female
  male
- Proportion of seats held by women in national parliaments (%) (SDG 5.5.1a)
- Firms with female participation in ownership (% of firms) (SDG 5.5.2a)
- Firms with female top manager (% of firms) (SDG 5.5.2b)
- Female unemployment rate (%) (SDG 8.5.2a)

Table 6: Child Survival and Development Profile

- Population under-18,
  number (millions)
  % of total population
- Population under-five,
  number (millions)
  % of total population
- Births attended by skilled health staff (SDG 3.1.2)
- Mortality rate, under-five (per 1,000 live births) (SDG 3.2.1)
- Mortality rate, neonatal (per 1,000 live births) (SDG 3.2.2)
- Adolescent fertility rate (per 1,000 women aged 15-19 years) (SDG 3.7.2)
- Proportion of children under 5 who are stunted (height for age) (SDG 2.2.1)
- Proportion of children under 5 who are wasted (weight for height) (2.2.2a)
- Proportion of children under 5 who are overweight (2.2.2b)
- Children (1-14 years) who experienced any physical punishment and/or aggression (SDG 16.2.1)
- Proportion of children under age 5 whose births have been registered (SDG 16.9.1)
- Share of youth not in education, employment or training, total (SDG 8.6.1)
- Children in employment, (% of children ages 7-14) (SDG 8.7.1),
  female
  male
  total
- Unemployment, youth total (% of total labor force ages 15-24) (SDG 8.5.2b),
  female
  male
  total

Table 7: Profile of Military Spending

- Defence expenditure
- Defence expenditure annual increase
- Defence expenditure (% of GDP)
- Defence expenditure (% of central government expenditure)
- Defence expenditure per capita
- Armed forces personnel,
  number (thousands)
  % of total labour force
- Arms imports
- Global militarization index (GMI)

Table 8: Profile of Wealth and Poverty

- Total GDP (SDG 17.13.1)
- GDP growth (SDG 8.1.1a)
- GDP per capita growth (SDG 8.1.1b)
- Sectoral composition of GDP (% of GDP),
  agriculture value added

industry value added
services value added
- Manufacturing value added (SDG 9.2.1),
  - % of GDP
  - per capita
- Emissions of carbon dioxide per unit of manufacturing value added (SDG 9.4.1)
- Gross capital formation (% of GDP)
- Gross savings (% of GDP)
- Trade (% of GDP)
- Total ODA for trade commitments (SDG 8.A.1)
- Total external debt
- Strengthen the capacity of domestic financial institutions (SDG 8.10.1),
  - number of commercial bank branches
  - number of automated teller machines (ATMs)
- Material footprint per unit of GDP (SDG 8.4.1 and 12.2.1)
- Domestic material consumption per unit of GDP (SDG 8.4.2 and 12.2.2)
- Transmission rate for (SDG 12.4.1),
  - Basel Convention
  - Montreal Protocol
  - Rotterdam Convention
  - Stockholm Convention
- Growth rates of household income or expenditure per capita (SDG 10.1.1),
  - bottom 40 per cent
  - total population
- Total resource flows (net ODA disbursements) for development (SDG 10.B.1)
- Poverty headcount ratio at $1.90 a day (SDG 1.1.1a)
- Proportion of population covered by (SDG 1.3.1a),
  - mothers with newborns
  - older persons
  - persons with severe disability
  - vulnerable
- Proportion of population covered by (SDG 1.3.1b),
  - labour market programmes
  - social assistance programmes
  - social insurance programmes

Table 9: Demographic Profile

- Total population
- Annual population growth rate
- Rural population
- Urban population (SDG 11.1.2a)
- Annual growth rate of urban population (SDG 11.1.2b)
- Population living in slums (% of urban population) (SDG 11.1.1)
- Crude birth rate (per 1,000 live births)
- Crude death rate (per 1,000 live births)
- Total fertility rate (births per woman)
- Adolescent fertility rate (per 1,000 women aged 15-19 years) (SDG 3.7.2)
- Dependency ratio (dependents to working-age population)
- Total labour force
- Male labour force
- Female labour force
- Annual growth in labour force
- Manufacturing employment as a proportion of total employment (SDG 9.2.2)
- Informal employment (% of total non-agricultural employment) (SDG 8.3.1)
- Annual growth rate of GDP per person employed (constant 2011 PPP $) (SDG 8.2.1)
- Unemployment rate (SDG 8.5.2a),
  - total
  - female
  - male

- Proportion of adults with an account at a bank/ financial institution... (SDG 8.10.2)
- Proportion of population covered by a mobile network, by technology (SDG 9.C.1),
    - proportion covered by at least a 2G mobile network
    - proportion covered by at least a 3G mobile network
    - proportion covered by at least a 4G mobile network
- Fixed Internet broadband subscriptions per 100 inhabitants (SDG 17.6.2)
- Individuals using the Internet (% of population) (SDG 17.8.1)

Table 10: Profile of Food Security and Natural Resources

- Food production net per capita index
- Food exports
- Food imports
- Cereal production
- Cereal imports
- Cereal exports
- Crop production index
- Number of plant and animal genetic resources secured (SDG 2.5.1),
    - number of accessions of plant genetic resources secured in conservation facilities
    - number of animal genetic resources for food and agriculture secured
- Local breeds at risk, not-at-risk or at unknown level of risk of extinction (SDG 2.5.2),
    - proportion of local breeds
    - number of local breeds
- Fisheries production (SDG 14.4.1),
    - thousands of metric tons
    - annual growth
- Coverage of protected areas in relation to marine areas (SDG 14.5.1)
- The agriculture orientation index for government expenditures (SDG 2.A.1)
- Total official flows (ODA) (gross disbursements) to the agriculture sector (SDG 2.A.2)
- Forest area as a proportion of total land area (SDG 15.1.1)
- Forest production,
    - roundwood
    - wood fuel
- Progress towards sustainable forest management (SDG 15.2.1),
    - annual change in forest area
    - proportion of forest area within legally established protected areas
    - proportion of forest area with a long-term management plan
    - proportion of forest area certified under an independently verified certification scheme
- Mountain Green Cover Index (SDG 15.4.2)
- Water productivity, total (SDG 6.4.1)
- Level of water stress (SDG 6.4.2)
- Total ODA (gross disbursements) for water supply and sanitation (SDG 6.A.1)
- Land area
- Land use,
    - arable land
    - permanent cropped area
- Agricultural irrigated land (% of total agricultural land)
- Prevalence of undernourishment (% of population) (SDG 2.1.1)

Table 11: Energy and Environment

- Energy use per capita
- Total electricity production
- Access to electricity (% of population) (SDG 7.1.1),
    - total
    - rural
    - urban

- Access to clean fuels and technologies for cooking (% of population) (SDG 7.1.2)
- Renewable energy consumption (% of total final energy consumption) (SDG 7.2.1)
- Energy intensity level of primary energy (SDG 7.3.1)
- Passenger and freight volume, by mode of transport (SDG 9.1.2),
    - air transport,
        - freight volume
        - passenger volume
    - rail transport (excluding passenger urban rail transport),
        - freight volume
        - passenger volume
    - road transport,
        - freight volume
        - passenger volume
- Total official flows (ODA) (gross disbursements) for infrastructure (SDG 9.A.1)
- $PM_{2.5}$ air pollution, mean annual exposure (micrograms per cubic metre) (SDG 11.6.2)
- Proportion of urban solid waste regularly collected (SDG 11.6.1)
- Proportion of wastewater safely treated (SDG 6.3.1)
- Sites (KBAs) for terrestrial biodiversity covered by protected areas (SDG 15.1.2a)
- Sites (KBAs) for freshwater biodiversity that are covered by protected areas (SDG 15.1.2b)
- Sites (KBAs) for mountain biodiversity that are covered by protected areas (SDG 15.4.1)
- Red List Index (SDG 15.5.1)
- Total ODA commitments on conservation and sustainable use of biodiversity and ecosystems (SDG 15.A.1)
- Number of deaths, persons affected and economic losses by natural disasters (SDG 13.1.2),
    - annual average number of natural disaster-events
    - annual average number of deaths from natural disasters
    - annual average number of natural disaster-affected people
    - annual average economic losses from natural disasters
- Countries with national and local disaster risk reduction strategies (yes/no) (SDG 1.5.3)

Table 12: Governance

- Average annual rate of inflation
- Annual growth of food prices
- Annual growth of money supply
- Total government revenue (% of GDP)
- Total government expenditure (% of GDP)
- Fiscal balance (% of GDP)
- Tax revenue (% of GDP) (SDG 17.1.1)
- Net ODA and official aid received (SDG 17.2.1)
- Foreign direct investment, net inflows (SDG 17.3.1)
- Personal remittances, received (% of GDP) (SDG 17.3.2)
- Debt service (% of exports of goods, services and primary income) (SDG 17.4.1)
- Total ODA (gross disbursements) for technical cooperation (SDG 17.9.1)
- Exports of goods and services (% of GDP) (SDG 17.11.1)
- Proportion of medium and high-tech industry value added in total value added (SDG 9.B.1)
- Imports of goods and services (% of GDP)
- Intentional homicides (per 100,000 people) (SDG 16.1.1)
- Unsentenced detainees as a proportion of overall prison population (SDG 16.3.2)
- Bribery incidence (% of firms experiencing at least one bribe payment request) (SDG 16.5.2)
- Number of cases of killings of journalists and associated media personnel (SDG 16.10.1)
- Countries adopting and implementing guarantees for access to information (SDG 16.10.2)

Note on Statistical Sources for Human Development Indicators

The human development data presented in these tables have been collected with considerable effort from various international and national sources. For the most part, standardized international sources have been used, particularly the United Nations (UN) system and the World Bank data bank. The United Nations Development Programme (UNDP) and World Bank offices made their resources available to us for this report.

Countries in the indicator tables are arranged in descending order according to population size. Data for South Asia is the total (T) or weighted average value of eight countries: India, Pakistan, Bangladesh, Afghanistan, Nepal, Sri Lanka, Bhutan and the Maldives. While most of the data have been taken from international sources, national sources have been used where international data were not available. Such data have to be used with some caution, as their international comparability still needs to be tested.

Several limitations remain regarding coverage, consistency, and comparability of data across time and countries. The data series presented here shall be refined over time, as more accurate and comparable data become available.

In certain critical areas, reliable data are extremely scarce: for instance, for employment, income distribution, public expenditure on social services, military debt, foreign assistance for human priority areas, and so on. Information regarding the activities of non-governmental organizations (NGOs) in social sectors remains fairly sparse.

As the world is now heading towards achieving the SDGs and the 2030 Development Agenda, this year the 'Human Development Indicators' tables also provide available data for all the targets and indicators of the SDGs. Please see the annex 1 to track the SDGs targets and indicators in the data tables.

1. Basic Human Development Indicators

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Total estimated population (millions)										
2000	1,057	142	128	20.8	23.9	18.8	0.59	0.28	1,391T	5,037T
2018	1,353	212	161	37.2	28.1	21.7	0.75	0.52	1,814T	6,384T
2050	1,620	271	202	57	36.5	23.8	0.98	0.50	2,211T	8,248T
Annual population growth rate (%)										
1990-2000	1.9	2.8	2.2	5.3	2.4	0.8	1.1	2.3	2.1	1.6
2001-2018	1.4	2.2	1.3	3.2	0.8	0.8	1.3	3.5	1.5	1.3
Adult literacy rate (% of people ages 15 and above)										
2001	61.0	49.9[a]	47.5	…	48.6	90.7	52.8[a]	98.4[b]	58.8	77.7
2017-2018[c]	74.4	59.1	73.9	43.0	67.9	91.9	66.6	97.7[d]	72.1	84.0
Female literacy rate (% of females ages 15 and above)										
2001	47.8	35.4[a]	40.8	…	34.9	89.1	38.7[a]	98.4[b]	46.2	71.3
2017-2018[c]	65.8	46.5	71.2	29.8	59.7	91.0	57.1	98.1[d]	63.6	79.8
Gross combined 1st, 2nd and 3rd level school enrolment ratio (%)										
2003	55.7	34.8	52.9[a]	44.6	59.4	…	53.2[a]	72.0	53.2	61.1
2017-2018[c]	72.1	49.9	70.5	65.3[e]	74.1	78.8	71.1	…	69.4	72.7
Mortality rate, neonatal (per 1,000 live births) (SDG 3.2.2)										
2000	45	60	42	61	40	10	32	22	46	33
2018	23	42	17	37	20	5	16	5	24	19
GDP growth (annual %) (SDG 8.1.1a)										
2000	3.8	4.3	5.3	8.4[f]	6.2	6.0	6.9	3.8	4.1	5.6
2018	7.0	5.4	7.9	1.0	6.3	3.2	2.3	6.1	6.8	4.6
GDP per capita (PPP[g], constant 2011 international US$)										
2000	2,710	3,401	1,692	1,016[h]	1,527	5,543	3,433	9,803	2,682	4,971
2018	6,899	4,928	3,879	1,735	2,724	11,955	9,348	13,611	6,293	10,500
Human Development Index (HDI),										
. HDI value										
2018	0.647	0.560	0.614	0.496	0.579	0.780	0.617	0.719	0.632	0.686
. HDI rank (189 countries)										
2018	129	152	135	170	147	71	134	104	…	…
. life expectancy at birth (years)										
2018	69.4	67.1	72.3	64.5	70.5	76.8	71.5	78.6	69.4	71.1
. expected years of schooling (years)										
2018[i]	12.3	8.5	11.2	10.1	12.2	14.0	12.1	12.1	11.8	12.2
. mean years of schooling (years)										
2018[i]	6.5	5.2	6.1	3.9	4.9	11.1	3.1	6.8	6.2	7.4
. gross national income (GNI) per capita (2011 PPP $)										
2018	6,829	5,190	4,057	1,746	2,748	11,611	8,609	12,549	6,281	10,476
. HDI annual growth										
1990-2018	1.5	1.2	1.7	1.8	1.5	0.8	…	…	1.4	1.0

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Inequality-adjusted HDI (IHDI),										
. IHDI value										
2018	0.477	0.386	0.465	…	0.430	0.686	0.450	0.568	0.467	0.533
. IHDI overall loss (%)										
2018	26.3	31.1	24.3	…	25.8	12.1	27.1	21.0	26.5	22.3
. inequality in life expectancy (%)										
2018[i]	19.7	29.9	17.3	28.3	17.5	7.0	17.1	6.0	20.6	16.6
. inequality in education (%)										
2018[i]	38.7	43.5	37.7	45.4	40.9	7.4	41.7	29.3	38.9	25.6
. inequality in income (%)										
2018[i]	18.8	17.2	15.7	…	16.3	21.0	20.0	25.8	18.3	24.3
. income shares (%) held by, 2010-2017[c],										
.. poorest 40 %	19.8	21.1	21.0	…	20.4	17.7	17.5	17.4	20.0	17.6
.. richest 10 %	30.1	28.9	26.8	…	26.4	32.9	30.7	29.9	29.6	30.8
. Gini coefficient (%)										
2010-2017[c]	35.7	33.5	32.4	…	32.8	39.8	37.4	38.4	35.1	…
Gender Development Index (GDI),										
. GDI value										
2018	0.829	0.747	0.895	0.723	0.897	0.938	0.893	0.939	0.826	0.918
. GDI rank (out of five groups)										
2018[j]	5	5	5	5	5	3	5	3	…	…
. HDI, 2018,										
.. female HDI value	0.574	0.464	0.575	0.411	0.549	0.749	0.581	0.689	0.560	0.653
.. male HDI value	0.692	0.622	0.642	0.568	0.612	0.799	0.650	0.734	0.677	0.711
. life expectancy at birth (years), 2018,										
.. female	70.7	68.1	74.3	66.0	71.9	80.1	71.8	80.5	70.8	73.2
.. male	68.2	66.2	70.6	63.0	69.0	73.4	71.1	77.2	68.2	69.1
. expected years of schooling (years), 2018[i],										
.. female	12.9	7.8	11.6	7.9	12.7	14.2	12.2	12.2	12.1	12.2
.. male	11.9	9.3	10.8	12.5	11.7	13.7	12.0	12.0	11.5	12.2
. mean years of schooling (years), 2018[i],										
.. female	4.7	3.8	5.3	1.9	3.6	10.5	2.1	6.7	4.7	6.7
.. male	8.2	6.5	6.8	6.0	6.4	11.6	4.2	6.9	7.8	8.1
. estimated GNI per capita (2011 PPP $), 2018,										
.. female	2,625	1,570	2,373	1,102	2,113	6,766	6,388	7,454	2,497	6,804
.. male	10,712	8,605	5,701	2,355	3,510	16,852	10,579	15,576	9,804	14,040

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Gender Inequality Index (GII),										
. GII value										
2018	0.501	0.547	0.536	0.575	0.476	0.380	0.436	0.367	0.509	0.466
. GII rank (out of 162 countries)										
2018	122	136	129	143	115	86	99	81	…	…
. maternal mortality ratio (deaths per 100,000 live births) (SDG 3.1.1)										
2017	145	140	173	638	186	36	183	53	156	230
. adolescent fertility rate (births per 1,000 women ages 15-19)										
2015-2020[k]	13.2	38.8	83.0	69.0	65.1	20.9	20.2	7.8	24.5	46.8
. proportion of seats held by women in national parliaments (%) (SDG 5.5.1a)										
2018	11.8	20.6	20.3	27.7	32.7	5.8	8.5	5.9	14.1	22.6
. population with at least some secondary education (% ages 25 and older), (SDG 4.4.3), 2010-2018[c],										
.. female	39.0	26.7	45.3	13.2	29.0	82.6	7.6	44.9	38.0	55.0
.. male	63.5	47.3	49.2	36.9	44.2	83.1	17.5	49.3	59.7	65.8
. labour force participation rate (% ages 15 and older), 2018,										
.. female	23.6	23.9	36.0	48.7	81.7	34.9	58.2	41.9	26.4	46.6
.. male	78.6	81.5	81.3	82.1	84.4	72.2	74.5	82.0	79.3	76.6

Notes: a: Data refer to 2005. b: Data refer to 2006. c: Data refer to the most recent year available. d: Data refer to 2016. e: Data refer to 2014. f: Data refer to 2003. g: PPP means purchasing power parity. h: Data refer to 2002. i: Data refer to 2018 or the most recent year available. j: Countries are divided into five groups by absolute deviation from gender parity in HDI values. k: Data are average annual estimates for 2015-2020.

Sources: Rows 1-2: UN DESA 2019a; Rows 3, 9: World Bank 2019f; Rows 4-5, 7-8: World Bank 2019e; Row 6: World Bank 2019a; Rows 9-12: UNDP 2019 and World Bank 2019e.

2. Education Profile

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Enrolment rate at primary and secondary level (SDG 4.1.1),										
. gross primary (%)										
2000	94.3	70.9	101.6[a]	21.0	119.4	107.8[b]	76.2	128.1	92.2	98.1
2017-2018[c]	113.0	94.1	116.5	102.3	143.9	100.6	100.1	97.1	111.3	104.3
. net primary (%)										
2000	79.5	55.3[d]	93.7[a]	…	72.1	99.7[b]	57.3	96.7	78.6	81.7
2017-2018[c]	92.3[e]	67.7	90.5[f]	…	96.3	99.1	88.0	95.4	89.5	88.5
. gross secondary (%)										
2000	44.9	22.5[g]	49.8	12.3[b]	35.8	…	30.0	51.3	42.4	54.1
2017-2018[c]	73.5	42.8	72.7	53.8	74.1	98.0	90.1	…	69.9	72.4
. net secondary (%)										
2017-2018[c]	61.6[e]	38.5	63.7	48.6	57.5	89.0	70.2	…	59.3	62.3
Gross intake rate to the last grade of: (SDG 4.1.3), 2017,										
. primary education										
	94.4	70.9[h]	67.8[f]	…	121.7	102.3	100.0	97.4	90	…
. lower secondary education										
	85.0	46.9	80.4	53.0	94.6	96.4	81.4	108.2	80	…
Primary completion rate, total (% of relevant age group) (SDG 4.1.4)										
2005	80.0[g]	60.2	66.3	…	76.2	101.2	66.1	134.5	76.9	83.9
2017	94.4	70.9[h]	67.8[f]	…	121.7	102.3	100.0	97.4	89.8	87.9
Children out of primary school (SDG 4.1.5),										
. total (millions)										
2000	19.5	9.1[d]	0.7[i]	…	0.88	0.006[g]	0.047	0.0012	30.2T	96.8T
2017	2.9[e]	6.6	…	…	0.10	0.045[k]	0.010	0.0019	9.7T	57.6T
. % of primary school age										
2000	16.1	44.7[d]	4.3[i]	…	27.9	0.4[g]	42.4	2.1	17.9	16.5
2017	2.3[e]	27.7	…	…	3.5	2.6[k]	10.3	4.1	5.5	9.0
. female % of total										
2000	67	60[d]	35[i]	…	63	36[g]	53	39	64	58
2017	30[e]	58	…	…	…	67[k]	46	37	49	54
Proportion of children (36-59 months) who are developmentally on track in health, learning and psychosocial well-being (SDG 4.2.1)										
2010-2014[c]	…	…	63.9	…	64.4	…	71.5	…	…	…
Participation rate in organized learning (one year before the official primary entry age) (SDG 4.2.2)										
2017	…	…	35.3[f]	…	84.9	…	…	98.5	…	…
Gross enrolment ratio in pre-primary education and early childhood educational development (SDG 4.2.4)										
2000	3.5[b]	60.9	17.7	3.1[g]	12.1	…	1.1	60.5	10.8	26.1
2017	13.7	76.8	41.7	…	88.3	91.5[l]	29.0	91.5	25.7	47.1
School enrollment, tertiary (% gross) (SDG 4.3.2)										
2003	10.6	2.7	6.4	1.2	5.2	…	5.0[a]	0.2	9.2	16.6
2018	28.1	9.1	20.6	9.7	12.4	19.6	15.6	31.2[m]	24.5	33.0

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Technical and vocational enrolment (% of total secondary enrolment) (SDG 4.3.3)										
2003	0.9	1.4	1.2	0.5	0.9	…	1.5[a]	3.8	1.0	8.1
2017	1.3[n]	2.8	4.0	0.7	…	3.8	2.0	…	1.8	9.6
Percentage of adults (25 and over) who have attained at least (SDG 4.4.3), 2017,										
. primary	51.4[o]	48.8	57.4	…	40.5[o]	…	32.4	38.9[p]	51.5	…
. lower secondary	37.6[o]	36.4	42.6	…	26.9[o]	…	28.2	15.9[p]	37.7	…
. upper secondary	26.9[o]	27.3	29.8	…	16.8[o]	…	17.3	5.2[p]	27.0	…
. short cycle tertiary	9.9[o]	8.7	9.3	…	4.6[o]	…	10.2	1.7[p]	9.6	…
Literacy rate (SDG 4.6.2),										
. adult literacy rate (% of people ages 15 and above)										
2001	61.0	49.9[a]	47.5	…	48.6	90.7	52.8[a]	98.4[p]	58.8	77.7
2017-2018[c]	74.4	59.1	73.9	43.0	67.9	91.9	66.6	97.7[n]	72.1	84.0
. male literacy rate (% of males ages 15 and above)										
2001	73.4	64.1[a]	53.9	…	62.7	92.3	65.0[a]	98.4[p]	70.7	84.0
2017-2018[c]	82.4	71.1	76.7	55.5	78.6	93.0	75.0	97.3[n]	80.1	88.2
. female literacy rate (% of females ages 15 and above)										
2001	47.8	35.4[a]	40.8	…	34.9	89.1	38.7[a]	98.4[p]	46.2	71.3
2017-2018[c]	65.8	46.5	71.2	29.8	59.7	91.0	57.1	98.1[n]	63.6	79.8
. youth literacy rate (% of people ages 15-24 years)										
2001	76.4	65.1[a]	63.6	…	70.1	95.6	74.4[a]	99.3[p]	74.2	84.9
2017-2018[c]	91.7	74.5	93.3	65.4	92.4	98.9	93.1	98.8[n]	89.5	90.6
Inclusion in national curricular frameworks of issues relating to (SDG 4.7.1), 2005-2015[c],										
. gender equality	low	low	…	…	medium	…	medium	…	…	…
. human rights	high	high	…	low	medium	…	low	medium	…	…
. sustainable development	high	low	…	low	low	…	medium	medium	…	…
. global citizenship	low	low	…	low	medium	…	medium	low	…	…
Percentage of schools providing life skills-based HIV/AIDS education (SDG 4.7.2)										
	31.0	..	…	1.0	8.0	…	…	…	…	…
Percentage of primary schools with access to (SDG 4.A.1), 2016-2017[c],										
. basic drinking water										
	80.9	52.0	78.9	93.0	…	83.7[o]	…	100	77.8	…
. basic handwashing facilities										
	51.2	…	29.0	3.9	…	83.7[o]	…	100	…	…
. single-sex basic sanitation										
	89.3	…	36.6	30.7	…	90.5[o]	…	100	…	…
. electricity										
	49.3	…	43.3	20.7	…	96.7[o]	…	100	…	…
Total official development assistance (ODA) (gross disbursements) for scholarships (millions of constant 2017 US$) (SDG 4.B.1)										
2006	1.1	2.5	6.7	0.4	1.6	3.0	1.2	1.5	17.9T	…
2017	15.6	11.3	14.1	8.7	5.2	6.3	3.7	1.0	65.9T	…

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Trained teachers (% of total teachers) (SDG 4.C.1), 2015,										
. primary education										
	69.8	78.3[h]	50.4	…	97.3	85.5	100.0	90.1	69.6	84
. lower secondary education										
	76.6	54.5	67.2[n]	…	89.5	84.5	100.0	96.8	73.6	81
Government expenditure on education (SDG 1.A.2a),										
. % of GDP										
2000	4.3	1.8	2.1	…	3.0	…	5.5	…	3.8	…
2017	3.8[e]	2.9	2.5	4.1	5.1	2.8	7.0	4.1[n]	3.6	…
. % of total government expenditure										
2000	16.7	8.5	20.5	…	19.2	…	13.8	…	16.3	…
2017	14.1[e]	14.5	18.4	15.7	15.7	14.5	24.0	11.3[n]	14.6	…
Research and development (R&D) expenditure (% of GDP) (SDG 9.5.1)										
2005	0.8	0.4	…	…	…	0.2[p]	…	…	…	…
2015	0.6	0.2	…	…	…	0.1	…	…	…	…
Researchers in R&D (per million people) (SDG 9.5.2)										
2005	135.3	82.4	…	…	…	93.2[p]	…	…	…	…
2015	216.2	293.7	…	…	…	107.0	…	…	…	…

Notes: a: Data refer to 2005. b: Data refer to 2001. c: Data refer to the most recent year available. d: Data refer to 2002. e: Data refer to 2013. f: Data refer to 2010. g: Data refer to 2003. h: Data refer to 2018. i: Data refer to 2008. j: Data refer to 2003. k: Data refer to 2014. l: Data refer to 2015. m: Data refer to 2017. n: Data refer to 2016. o: Data refer to 2011. p: Data refer to 2006.

Sources: Rows 1, 9: World Bank 2019a; Rows 2, 10, 12-13: UNESCO 2017a; Rows 3, 7-8, 11, 16: World Bank 2019e; Row 4: UN 2019 and World Bank 2019e; Rows 5-6, 15: UN 2019; Row 14: UN 2019 and UNESCO 2017a; Rows 18-19: World Bank 2019f.

3. Health Profile

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Population using at least basic drinking water services (%) (SDG 6.1.1)										
2000	79.0	86.0	95.2	27.8	80.0	79.5	82.7	92.5	80.6	77.9
2017	92.7	91.5	97.0	67.1	88.8	89.4	97.2	99.3	92.3	87.7
Population using at least basic sanitation services (%) (SDG 6.2.1)										
2000	16.4	31.4	25.6	23.5	15.1	84.6	49.8	73.8	19.8	46.8
2017	59.5	59.9	48.2	43.4	62.1	95.8	69.3	99.4	58.7	68.5
Maternal mortality ratio (per 100,000 live births) (SDG 3.1.1)										
2000	370	286	434	1,450	553	56	423	125	382	377
2017	145	140	173	638	186	36	183	53	156	230
New HIV infections among adults 15-49 years old (per 1,000 uninfected population) (SDG 3.3.1)										
2000	0.29	0.00	0.01	…	0.40	0.05	…	…	0.23	…
2017	0.15	0.18	0.02	…	0.10[a]	0.02	…	…	0.14	…
Tuberculosis incidence (per 100,000 population) (SDG 3.3.2)										
2000	289	275	221	190	163	66	249	59	275	203
2017	204	267	221	189	152	64	134	39	210	157
Malaria incidence (per 1,000 population at risk) (SDG 3.3.3)										
2000	22.8	6.9	5.6	92.6	7.4	48.6	14.0	…	20.6	79.1
2017	7.7	4.9	1.9	23.0	0.5	0.0	0.0	…	6.9	59.3
Infants receiving three doses of hepatitis B vaccine (%) (SDG 3.3.4)										
2003	6[b]	62	11	63[c]	27[b]	32	95	98	14	71
2018	89	75	98	66	91	99	97	99	88	84
Reported number of people requiring interventions against neglected tropical diseases (millions) (SDG 3.3.5)										
2017	515.7	31.7	56.3	13.5	16.1	0.19	0.23	0.001	633.7T	…
Probability of dying from any of cardiovascular disease, cancer, diabetes or chronic respiratory disease (30 to 70 years) (SDG 3.4.1)										
2000	27	27	21	34	27	22	31	27	26	24
2016	23	25	22	30	22	17	23	13	23	20
Suicide mortality rate (per 100,000 population) (SDG3.4.2)										
2000	17.4	3.4	6.7	5.7	15.4	28.8	12.4	4.4	14.9	12.6
2016	16.3	2.9	5.9	4.7	8.8	14.6	11.4	2.3	13.5	10.0
Total alcohol consumption per capita (litres of pure alcohol, projected estimates, 15+ years of age) (SDG 3.5.2)										
2000	2.9	0.1	0.2	0.0	0.8	1.9	4.8	1.6	2.2	…
2016	5.7	0.3	0.0	0.2	2.0	4.3	0.6	2.7	4.4	…
Road traffic mortality rate (per 100,000 people) (SDG 3.6.1)										
2000	15.0	15.2	14.0	15.5	17.9	18.4	16.1	2.5	15.0	19.1
2016	22.6	14.3	15.3	15.1	15.9	14.9	17.4	0.9	20.7	20.0
Proportion of women of reproductive age who have their need for family planning satisfied with modern methods (%) (SDG 3.7.1)										
2016-2018[d]	67.2	48.5	72.6	42.2	56.0	74.3	84.6[e]	42.5[f]	65.1	…

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Mortality rate attributed to household and ambient air pollution (per 100,000 population) (SDG 3.9.1)										
2016	141	113	103	95	133	89	88	14	132.7	…
Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (per 100,000 population) (SDG 3.9.2)										
2016	18.6	19.6	11.9	13.9	19.8	1.2	3.9	0.3	17.8	13.9
Mortality rate attributed to unintentional poisonings (per 100,000 population) (SDG 3.9.3)										
2000	5.2	2.8	0.4	1.7	1.5	0.6	1.4	0.1	4.3	2.6
2016	2.4	2.3	0.3	1.2	0.4	0.4	0.6	0.0	2.1	1.6
Smoking prevalence (% of adults) (SDG 3.A.1), 2016,										
. female	1.9	2.8	1.0	…	9.5	0.3	…	2.1	2.0	3.9
. male	20.6	36.7	44.7	…	37.8	27.0	…	55.0	25.0	35.8
Diphtheria-tetanus-pertussis (DTP3) immunization (% of children ages 12-23 months) (SDG 3.B.1)										
2000	58.0	59.0	82.0	24.0	74.0	99.0	92.0	98.0	60.7	70.6
2018	89.0	75.0	98.0	66.0	91.0	99.0	97.0	99.0	88.0	84.9
Health worker density (SDG 3.C.1),										
. physicians (per 1,000 people)										
2001	0.54	0.68	0.24	0.20	0.05	0.44	0.18[b]	0.78[g]	0.5	1.0[g]
2015-2017[d]	0.78	0.98	0.53	0.28	0.65	0.96	0.37	1.04	0.8	1.2
. nurses and midwives (per 1,000 people)										
2001	1.2	0.4	0.3[h]	0.2	0.5[b]	0.8	0.8[b]	3.0[b]	1.0	1.3[g]
2015-2017[d]	2.1	0.5	0.3	0.3[i]	2.7	2.1	1.5	4.0	1.7	2.4
International Health Regulations (IHR) core capacity index (SDG 3.D.1)										
2016	98.2	52.6	75.6	42.3	71.6	79.2	76.4	60.5	89.3	…
Total net ODA disbursements to medical research and basic health sectors (millions of constant 2015 US$) (SDG 3.B.2)										
2017	195.7	379.9	218.2	202.4	60.1	46.1	2.6	0.6	1,106T	…
Domestic general government health expenditure (SDG 1.A.2b),										
. % of GDP										
2000	0.8	1.0	0.6	0.1[j]	0.6	2.3	3.4	2.6	0.8	1.9
2016	0.9	0.8	0.4	0.5	1.2	1.7	2.6	7.7	0.9	2.7
. % of general government expenditure										
2000	3.3	5.9	5.2	1.2[j]	4.2	10.1	7.6	8.8	3.8	…
2016	3.1	3.9	3.4	2.0	5.3	8.6	8.3	20.2	3.3	…

Notes: a: Data refer to 2016. b: Data refer to 2004. c: Data refer to 2007. d: Data refer to the most recent year available. e: Data refer to 2010. f: Data refer to 2009. g: Data refer to 2000. h: Data refer to 2003. i: Data refer to 2014. j: Data refer to 2002.

Sources: Rows 1, 2, 22: World Bank 2019f; Rows 3, 5-7, 9-10, 12, 17-19: World Bank 2019e; Rows 4, 8, 11, 13-16, 20-21: UN 2019.

4. Human Deprivation Profile

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Population below international poverty lines (2011 PPP[a]), (SDG 1.1.1a), 2015-2017[f],										
. below $1.90 a day (%)										
	21.2[b]	3.9	14.8	…	15.0[c]	0.8	1.5	7.3[d]	18.3	11.8
. below $3.20 a day (%)										
	60.4[b]	34.7	52.9	…	50.8[c]	10.1	12.0	24.4[d]	56.0	31.3
. below $5.50 a day (%)										
	86.8[b]	75.4	84.5	…	83.0[c]	40.4	38.6	54.3[d]	84.7	54.7
Population below national poverty lines, (SDG 1.2.1), 2015-2017[f],										
. national (%)	21.9[b]	24.3	24.3	54.5	25.2[c]	4.1	8.2	8.2	22.9	…
. rural (%)	25.7[b]	35.6	35.2	…	27.4[c]	7.6	16.7	…	27.5	…
. urban (%)	13.7[b]	18.2	21.3	…	15.5[c]	2.1	1.8	…	14.8	…
Population in multidimensional poverty (%)										
2016-2018[f]	27.9	38.3	41.7[e]	55.9	34.0	…	37.3[e]	0.8	31.0	23.1
Proportion of employed population below the international poverty line of US$1.90 per day (the working poor) (SDG 1.1.1b), 2016,										
. 15 to 24 years old,										
.. both sexes	15.0	7.9	65.2	84.8	7.5	4.6	5.7	7.4	20.0	…
.. female	16.7	8.4	67.9	87.6	8.5	3.0	6.4	7.3	21.6	…
.. male	14.5	7.8	63.7	84.1	6.6	5.4	5.1	7.5	19.4	…
. 15 years old and over,										
.. both sexes	12.1	7.6	63.9	82.9	7.7	4.0	4.0	5.9	17.6	…
.. female	13.3	8.7	66.2	87.2	7.8	3.9	4.3	6.5	18.9	…
.. male	11.7	7.3	62.7	82.0	7.6	4.1	3.8	5.4	17.1	…
. 25 years old and over,										
.. both sexes	11.6	7.5	63.6	82.1	7.8	4.0	3.8	5.6	17.1	…
.. female	12.7	8.8	65.8	87.0	7.5	4.0	4.0	6.3	18.5	…
.. male	11.2	7.2	62.4	81.2	8.0	4.0	3.6	5.1	16.7	…
Population without access to at least basic drinking water services,										
. number (millions)										
2000	221.6	19.9	6.1	15.0	4.8	3.8	0.102	0.021	271.4T	1,114.0T
2017	98.1	17.7	4.8	12.0	3.1	2.3	0.021	0.004	137.9T	774.1T
. % of total population										
2000	21.0	14.0	4.8	72.2	20.0	20.5	17.3	7.5	19.4	22.1
2017	7.3	8.5	3.0	32.9	11.2	10.6	2.8	0.7	7.7	12.3
Population without access to at least basic sanitation services,										
. number (millions)										
2000	883.6	97.7	94.9	15.9	20.3	2.9	0.297	0.073	1,115.7T	2,680.6T
2017	541.6	83.4	82.7	20.5	10.5	0.9	0.229	0.003	739.8T	1,986.8T
. % of total population										
2000	83.6	68.6	74.4	76.5	84.9	15.4	50.2	26.2	80.2	53.2
2017	40.5	40.1	51.8	56.6	37.9	4.2	30.7	0.6	41.3	31.5

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Illiterate adults,										
. number (millions)										
2001	274.2	47.3[g]	44.5	…	7.4	1.3	0.2[g]	0.0034[h]	374.9T	…
2017-2018[f]	252.9	54.9	30.4	12.1	6.3	1.3	0.2	0.0090[i]	357.9T	…
. % of total adult population										
2001	39.0	50.1[g]	52.5	…	51.4	9.3	47.2[g]	1.6[h]	41.3	…
2017-2018[f]	25.6	40.9	26.1	57.0	32.1	8.1	33.4	2.3[i]	27.9	…
Illiterate female adults,										
. number (millions)										
2001	177.9	29.8[g]	24.6	…	4.8	0.8	0.1[g]	0.0017[h]	237.9T	…
2017-2018[f]	162.8	35.0	16.7	7.2	4.5	0.8	0.1	0.0026[i]	227.0T	…
. % of total adult female population										
2001	52.2	64.6[g]	59.2	…	65.1	10.9	61.3[g]	1.6[h]	53.8	…
2017-2018[f]	34.2	53.5	28.8	70.2	40.3	9.0	42.9	1.9[i]	36.4	…
Malnourished children (proportion of children under 5 who are stunted) (SDG 2.2.1)										
1999-2001[f]	54.2	41.5	53.2	59.3[j]	57.1	18.4	47.7	31.9	52.5	37.0
2012-2016[f]	38.4	45.0	36.1	40.9	35.8	17.3	33.6[c]	20.3[d]	38.6	24.6
Under-five mortality rate (per 1,000 live births) (SDG 3.2.1)										
2000	92	112	87	129	81	17	78	39	93	84
2018	37	69	30	62	32	7	30	9	40	42
New HIV infections among adults 15-49 years old (per 1,000 uninfected population) (SDG 3.3.1)										
2000	0.29	0.00	0.01	…	0.40	0.05	…	…	0.23	…
2017	0.15	0.18	0.02	…	0.10[i]	0.02	…	…	0.14	…

Notes: a: PPP means purchasing power parity. b: Data refer to 2011. c: Data refer to 2010. d: Data refer to 2009. e: Data refer to 2014. f: Data refer to the most recent year available. g: Data refer to 2005. h: Data refer to 2006. i: Data refer to 2016. j: Data refer to 2004.

Sources: Rows 1, 4, 11: UN 2019; Row 2: UN 2019 and World Bank 2019e; Row 3: UNDP 2019; Rows 5-6: World Bank 2019f and UN DESA 2019a; Rows 7-10: World Bank 2019e.

5. Gender Disparities Profile

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Female population,										
. number (millions)										
2000	507	69	62	10.1	12.0	9.4	0.29	0.14	670T	2,439T
2018	650	103	80	18.1	15.3	11.0	0.36	0.19	877T	3,133T
. % of male										
2000	92	94	95	94	101	100	96	98	93	97
2018	92	94	98	95	120	108	89	59	94	97
Parity indices for all education indicators (SDG 4.5.1),										
. gender parity in literacy,										
.. adult										
2001	0.65	0.55[a]	0.76	…	0.56	0.97	0.59[a]	1.00[b]	0.65	…
2011-2017[c]	0.75	0.64	0.93	0.39	0.68	0.97	0.73	1.00	0.75	…
.. youth										
2001	0.80	0.69[a]	0.90	…	0.75	1.01	0.85[a]	1.00[b]	0.80	…
2011-2017[c]	0.91	0.82	1.03	0.52	0.89	1.01	0.93	1.00	0.90	…
. gender parity in gross school enrolment ratio in,										
.. primary										
2000	0.86	0.68	1.05[a]	0.46[d]	0.77	0.98[e]	0.88	1.00	0.85	0.91
2017-2018[c]	1.15	0.84	1.07	0.68	1.02	0.99	1.00	1.02	1.09	1.01
.. secondary										
2000	0.72	0.78[b]	1.03	0.35[f]	0.68	…	0.80	1.08	0.75	0.89
2017-2018[c]	1.02	0.85	1.16	0.57	1.07	1.05	1.13	…	1.00	0.99
.. tertiary										
2000	0.66	0.80[f]	0.50	0.28[f]	0.37	…	0.61[a]	2.47[f]	0.65	0.90
2017-2018[c]	1.07	0.88	0.71	0.35	1.07	1.48	0.99	3.60	1.01	1.08
.. primary to tertiary										
2000	0.79	0.78[b]	1.03[a]	0.54[f]	0.73	…	0.97[a]	1.00	0.81	0.90
2017-2018[c]	1.08	0.85	1.06	0.64[g]	1.02	1.05	1.07	…	1.04	1.01
. gender parity in school completion, 2017,										
.. primary	1.04	0.83[h]	1.08	…	1.10	0.99	1.09	0.94	1.02	0.99
.. lower secondary	1.06	0.86	1.21[h]	0.58	1.10	0.99	1.12	1.01	1.04	1.01
. gender parity in trained teachers, 2017,										
.. primary	1.02	0.79[i]	1.04	…	1.00	0.97	1.00	0.99	1.00	…
.. lower secondary	1.04	0.77	1.01[h]	…	1.01	1.01	1.00	0.98	1.01	…
Proportion of women subjected to physical and/or sexual violence in the last 12 months (% of women age 15-49) (SDG 5.2.1)										
2015-2016[c]	22.0	…	28.8	46.1	11.2	…	…	6.4[b]	23.0	…
Proportion of women aged 20-24 years who were married (SDG 5.3.1a), 2013-2016[c],										
. by age 15	6.6	2.8	22.4	8.8	7.0	0.9	6.2[j]	0.3[k]	7.6	…
. by age 18	27.3	21.0	58.6	34.8	39.5	9.8	25.8[j]	3.9[k]	29.6	…

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Female economic activity rate (aged 15 years and over) (% of male)										
2000	36.6	19.2	30.7	51.1	90.1	48.5	76.6	52.7	35.6	66.6
2018	30.0	29.3	44.3	59.3	96.8	48.3	78.1	51.1	33.3	60.8
Proportion of time spent on unpaid domestic and care work (SDG 5.4.1), 2007,										
. female	…	19.9	…	…	…	…	13.3	…	…	…
. male	…	1.8	…	…	…	…	5.1	…	…	…
Proportion of seats held by women in national parliaments (%) (SDG 5.5.1a)										
2000	9.0	21.1[d]	9.1	27.3[a]	5.9	4.4[d]	9.3	6.0	10.4	12.1
2018	11.8	20.6	20.3	27.7	32.7	5.8	8.5	5.9	14.1	22.6
Firms with female participation in ownership (% of firms) (SDG 5.5.2a)										
2013-2015[c]	10.7	11.8	12.7	2.2	21.8	26.1	43.3	…	11.2	33.7
Firms with female top manager (% of firms) (SDG 5.5.2b)										
2013-2015[c]	8.9	6.0	4.8	4.7	17.2	8.8	26.3	…	8.3	18.5
Female unemployment rate (%) (SDG 8.5.2a)										
2000	4.2	16.0	3.3	1.7	1.8	11.6	2.1	2.7	5.3	6.7
2017	3.8	10.7	4.6	12.6	2.7	8.8	3.1	3.9	4.8	6.2

Notes: a: Data refer to 2005. b: Data refer to 2006. c: Data refer to the most recent year available. d: Data refer to 2002. e: Data refer to 2001. f: Data refer to 2003. g: Data refer to 2014. h: Data refer to 2016. i: Data refer to 2015. j: Data refer to 2010. k: Data refer to 2009.

Sources: Row 1: UN DESA 2019a; Rows 2a, 2d, 7-10: World Bank 2019e; Row 2b: World Bank 2019a and c; Row 2c: UNESCO 2017b; Rows 3-4, 6: UN 2019; Row 5: World Bank 2019f.

6. Child Survival and Development Profile

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Population under-18,										
. number (millions)										
2000	433	66	58	11.1	11.3	6.1	0.28	0.14	586T	1,932T
2018	442	88	54	18.7	10.5	6.1	0.24	0.12	619T	2,041T
. % of total population										
2000	41	48	44	55	48	33	49	49	42	39
2018	33	41	34	50	37	29	31	23	34	33
Population under-five,										
. number (millions)										
2000	127	20	17	4.0	3.6	1.6	0.08	0.03	174T	545T
2018	116	27	15	5.6	2.7	1.7	0.06	0.04	168T	607T
. % of total population										
2000	12	15	13	20	15	9	14	12	13	11
2018	9	13	9	15	10	8	8	7	9	10
Births attended by skilled health staff (% of total) (SDG 3.1.2)										
2000	42.5	23.0[a]	12.1	12.4	11.9	96.0	23.7	70.3[a]	37.4	58.9
2014-2016[b]	81.4	69.3[c]	49.8	50.5	58.0	100.0[d]	89.0	95.6	76.4	78.5
Mortality rate, under-5 (per 1,000 live births) (SDG 3.2.1)										
2000	92	112	87	129	81	17	78	39	93	84
2018	37	69	30	62	32	7	30	9	40	42
Mortality rate, neonatal (per 1,000 live births) (SDG 3.2.2)										
2000	45	60	42	61	40	10	32	22	46	33
2018	23	42	17	37	20	5	16	5	24	19
Adolescent fertility rate (per 1,000 women aged 15-19 years) (SDG 3.7.2)										
2000	66.8	56.4	112.3	154.0	113.0	28.4	77.2	31.0	71.6	61.2
2017	13.2	38.8	83.0	69.0	65.1	20.9	20.2	7.8	24.5	46.3
Proportion of children under 5 who are stunted (height for age) (SDG 2.2.1)										
1999-2001[b]	54.2	41.5	53.2	59.3[e]	57.1	18.4	47.7	31.9	52.5	37.0
2012-2016[b]	38.4	45.0	36.1	40.9	35.8	17.3	33.6[f]	20.3[g]	38.6	24.6
Proportion of children under 5 who are wasted (weight for height) (2.2.2a)										
1999-2001[b]	17.1	14.2	12.7	8.6[e]	11.3	15.5	2.5	13.4	16.1	…
2012-2016[b]	21.0	10.5	14.3	9.5	9.7	15.1	5.9[f]	10.2[g]	18.8	7.9
Proportion of children under 5 who are overweight (2.2.2b)										
1999-2001[b]	2.9	4.8	0.9	4.6[e]	0.7	1.0	3.9	3.9	2.9	4.5
2012-2016[b]	2.1	4.8	1.4	5.4	1.2	2.0	7.6[f]	6.5[g]	2.4	4.7
Proportion of children aged 1-14 years who experienced any physical punishment and/or psychological aggression by caregivers (SDG 16.2.1)										
2011-2014[b]	…	…	82.3	74.4	81.7	…	…	…	…	…
Proportion of children under age 5 whose births have been registered (SDG 16.9.1)										
2014-2018[b]	79.7	42.2	20.2	42.3	56.2	97.2[d]	99.9[f]	98.8	69.3	66.8[h]
Share of youth not in education, employment or training, total (% of youth population) (SDG 8.6.1)										
2016-2018[b]	30.4	31.0	27.4	42.0	35.3	27.1	…	23.5	30.5	…

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Children in employment, (% of children ages 7-14) (SDG 8.7.1), 2011-2014[b],										
. female	1.6	13.5	4.2	5.1	44.1	8.5[g]	…	…	4.0	…
. male	1.9	12.5	5.7	13.1	41.5	13.0[g]	…	…	4.4	…
. total	1.7	13.0	5.0	9.3	42.8	10.7[g]	…	…	4.1	…
Unemployment, youth total (% of total labor force ages 15-24) (SDG 8.5.2b),										
. female										
2000	10.1	29.4	8.9	3.2	2.6	31.2	5.0	5.1	12.0	15.9
2017	9.8	15.1	10.3	23.9	3.7	29.5	11.0	9.2	10.9	15.4
. male										
2000	9.9	11.2	9.5	2.3	4.0	20.2	4.0	3.9	9.9	13.1
2017	9.4	9.2	10.6	17.1	6.2	17.8	7.9	6.4	9.7	12.7
. total										
2000	10.0	13.4	9.3	2.4	3.3	24.0	4.4	4.4	10.2	13.8
2017	9.5	10.6	10.5	18.5	5.0	21.9	9.4	7.6	10.0	13.4

Notes: a: Data refer to 2001. b: Data refer to the most recent year available. c: Data refer 2018. d: Data refer 2007. e: Data refer 2004. f: Data refer 2010. g: Data refer 2009. h: Data refer 2013.

Sources: Rows 1, 2: UN DESA 2019a and UNICEF 2019; Rows 3-9, 11-14: World Bank 2019e; Row 10: UN 2019.

7. Profile of Military Spending

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Defence expenditure (US$ millions)										
2000	14,288	2,973	741	125[a]	51	822	…	…	19,000T	…
2018	66,510	11,376	3,895	198	399	1,681	…	…	84,059T	…
Defence expenditure annual increase (%)										
1990-2000	3.9	0.8	6.0	…	3.3	12.9	…	…	3.9	…
2001-2018	4.8	4.6	5.9	0.1[b]	6.4	1.2	…	…	4.7	…
Defence expenditure (% of GDP)										
2000	2.9	4.2	1.4	2.4[a]	1.0	5.0	…	…	2.9	…
2018	2.4	4.0	1.4	1.0	1.4	1.9	…	…	2.4	…
Defence expenditure (% of central government expenditure)										
2000	11.5	22.4	12.3	16.1[a]	6.9	18.9	…	…	12.8	…
2018	8.7	18.5	10.2	3.7	4.5	10.1	…	…	9.8	…
Defence expenditure per capita (US$)										
2000	13.6	21.5	5.6	5.2[a]	2.2	43.8	…	…	13.7	…
2018	49.1	56.6	23.4	5.4	13.5	80.3	…	…	46.5	…
Armed forces personnel,										
. number (thousands)										
2000	2,372	900	137	400	90	204	6	5	4,114T	22,796T
2017	3,031	936	221	323	112	317	…	…	4,940T	22,022T
. % of total labour force										
2000	0.6	2.1	0.3	6.0	0.7	2.6	3	6	0.8	1.0
2017	0.6	1.3	0.3	2.4	0.7	3.7	…	…	0.7	0.8
Arms imports (at 1990 prices) (US$ million)										
2000	995	186	203	34[c]	11[d]	297	…	…	1,726T	9,426T
2018	1,539	777	100	240	7	99	1[e]	5[f]	3,945T	13,187T
Global militarization index (GMI)[g],										
. 2000 rank (out of 145 countries)										
	90	37	119	134[d]	127	58	…	…	…	…
. 2018 rank (out of 155 countries)										
	89	58	123	75	91	39	…	…	…	…

Notes: a: Data refer to 2004. b: Data refer to 2004-2018. c: Data refer to 2002. d: Data refer to 2001: e: Data refer to 2016. f: Data refer to 2013. g: The GMI represents the relative weight and importance of the military apparatus of a state in relation to society as a whole. Militarization is defined, in a narrow sense, as the resources (expenditure, personnel, and heavy weapons) available to a state's armed forces. For further information please see www.bicc.de. d: Data refer to 2003 and rank is out of 147 countries.

Sources: Rows 1-5: SIPRI 2019; Rows 6-7: World Bank 2019f; Row 8: BICC 2018.

8. Profile of Wealth and Poverty

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Total GDP (US$ billions) (SDG 17.13.1)										
2000	468.4	74.0	53.4	4.1[a]	5.5	16.3	0.44	0.62	622.4T	5,986T
2018	2,726.3	312.6	274.0	19.4	28.8	88.9	2.53	5.27	3,457.8T	31,717T
GDP growth (annual %) (SDG 8.1.1a)										
2000	3.8	4.3	5.3	8.4[b]	6.2	6.0	6.9	3.8	4.1	5.6
2018	7.0	5.4	7.9	1.0	6.3	3.2	2.3	6.1	6.8	4.6
GDP per capita growth (annual %) (SDG 8.1.1b)										
2000	2.0	1.5	3.3	3.9[b]	4.3	5.4	4.6	1.7	2.1	4.0
2018	5.9	3.3	6.7	-1.4	4.5	2.1	1.1	2.1	5.5	3.3
Sectoral composition of GDP (% of GDP),										
. agriculture value added										
2000	21.6	24.1	22.7	38.6[a]	38.2	19.9	26.8	8.8	22.0	12.3
2017	15.6	22.9	13.4	20.5	26.2	7.8	17.4	5.6	16.1	8.4
. industry value added										
2000	27.3	21.7	22.3	23.8[a]	20.7	27.3	35.2	15.0	26.4	35.8
2017	26.5	17.9	27.8	22.1	13.4	27.3	40.6	12.8	25.6	31.9
. services value added										
2000	42.5	47.2	50.6	36.2[a]	34.7	52.8	35.8	73.1	43.6	49.5
2017	48.5	53.1	53.5	52.7	51.6	55.7	37.2	67.4	49.4	53.8
Manufacturing value added (SDG 9.2.1),										
. % of GDP										
2000	15.2	10.1	13.5	17.2	8.1	20.1	7.6	2.9	14.5	…
2018	17.0	13.2	21.1	11.0	5.5	15.5	7.9	2.3	16.6	…
. per capita (at constant 2010 US$)										
2000	114.0	83.9	67.4	46.3	37.5	366.2	90.8	165.4	107.7	…
2018	353.0	164.8	244.2	68.8	42.9	630.0	245.3	200.6	314.4	…
Emissions of carbon dioxide per unit of manufacturing value added (kilograms per constant 2010 US$) (SDG 9.4.1)										
2000	1.5	1.9	0.5	…	1.3	0.1	…	…	1.4	…
2016	1.3	1.5	0.5	…	2.6	0.1	…	…	1.2	…
Gross capital formation (% of GDP)										
2000	25.9	17.2	23.8	18.0[c]	24.3	28.0	46.5[d]	…	24.8	25.7
2017-2018[e]	31.0	16.4	31.2	19.2	45.7	28.6	51.3	…	29.4	30.4
Gross savings (% of GDP)										
2000	26.1	20.4	27.8	-5.1[c]	21.7	22.1	53.0[d]	…	25.1	28.1
2017-2018[e]	30.9	18.5	33.3	20.8	45.6	25.5	29.4	…	29.7	30.7

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Trade (% of GDP)										
2000	26.9	28.1	29.3	103.1[a]	55.7	88.6	77.7	115.8[d]	29.7	50.1
2018	43.1	28.0	38.2	51.2[f]	54.3	52.9	78.6[f]	139.9[f]	41.5	51.2
Total ODA for trade commitments (millions of constant 2017 US$) (SDG 8.A.1)										
2006	930	296	250	879	105	262	32	0.34	2,755T	…
2017	3,708	928	1,885	810	489	262	54	29.56	8,165T	…
Total external debt (US$ billions)										
2000	101.1	33.0	15.6	0.2	2.9	9.2	0.21	0.20	163T	2,050T
2018	521.4	91.0	52.1	2.6	5.5	52.6	2.55	2.33	730T	7,810T
Strengthen the capacity of domestic financial institutions to expand access to banking, insurance and financial services for all (SDG 8.10.1), . number of commercial bank branches per 100,000 adults (SDG 8.10.1a)										
2004	8.9	7.4	7.1	0.4	2.6	8.8	14.4	10.1	8.4	4.7
2018	14.6	10.2	9.0	2.2	15.4	18.6[g]	17.0[f]	13.7	13.4	9.2
. number of automated teller machines (ATMs) per 100,000 adults (SDG 8.10.1b)										
2004	2.3[h]	0.75	0.13	0.02	…	9.4[i]	0.49	7.2	2.0	…
2017	22.1	10.4	8.1	1.27	10.3	17.2[g]	36.6	35.0	18.8	…
Material footprint per unit of GDP (kilogrammes per unit of constant 2005 US$) (SDG 8.4.1 and 12.2.1)										
2015	3.4	3.4	2.9	4.6	5.6	1.4	5.6	3.1	3.4	…
Domestic material consumption per unit of GDP (kilogrammes per unit of constant 2005 US$) (SDG 8.4.2 and 12.2.2)										
2017	2.8	3.7	2.4	3.1	5.1	1.3	3.5	0.9	2.9	…
Transmission rate for the Montreal Protocol and Basel, Rotterdam and Stockholm Conventions (%) (SDG 12.4.1), 2015,										
. Basel Convention										
	17	100	50	17	50	50	…	17	30	…
. Montreal Protocol										
	100	100	100	100	100	100	100	100	100	…
. Rotterdam Convention										
	94	65	0	10	31	69	…	10	79	…
. Stockholm Convention										
	83	33	67	17	67	50	…	17	74	…

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Growth rates of household income or expenditure per capita among the bottom 40 per cent and the total (SDG 10.1.1), 2015-2017[e],										
. bottom 40 per cent	…	2.7	1.4	…	…	4.2	1.6	…	…	…
. total population	…	4.3	1.5	…	…	4.7	1.7	…	…	…
Total resource flows (net ODA disbursements) for development (millions of current US$) (SDG 10.B.1)										
2000	2,286	17	1,039	157	331	298	38	10	4,175T	…
2017	22,914	3,368	6,325	3,863	1,319	816	121	18	38,744T	…
Poverty headcount ratio at $1.90 a day (2011 PPP[j]) (% of population) (SDG 1.1.1a)										
2004	38.2	18.0	25.7[h]	…	17.6[b]	8.3[a]	17.6[b]	10.0[a]	34.2	30.7[a]
2015-2016[e]	21.2[k]	3.9	14.8	…	15.0[l]	0.8	2.2[m]	7.3[c]	18.3	11.8
Proportion of population covered by social protection floors/systems (SDG 1.3.1a), 2016,										
. mothers with newborns	41.0	…	20.9	…	…	100.0	…	…	…	…
. older persons	24.1	2.3[l]	33.4	10.7[l]	62.5[l]	25.2	3.2[m]	99.7[m]	23	…
. persons with severe disability	5.4	…	18.6	…	…	20.8	…	…	…	…
. vulnerable	2.7	…	4.3	…	…	4.5	…	…	…	…
Proportion of population covered by (SDG 1.3.1b), 2009-2013[e],										
. labour market programmes	4.4	…	4.3	…	…	…	…	…	…	…
. social assistance programmes	17.3	11.2	13.1	15.3[i]	40.1	26.2	2.3	13.5	16.7	…
. social insurance programmes	17.7	6.0	1.5	0.5[i]	5.3	7.4	0.7	2.3	14.3	…

Notes: a: Data refer to 2002. b: Data refer to 2003. c: Data refer to 2009. d: Data refer to 2006. e: Data refer to the most recent year available. f: Data refer to 2017. g: Data refer to 2015. h: Data refer to 2005. i: Data refer to 2007. j: PPP means purchasing power parity. k: Data refer to 2011. l: Data refer to 2010. m: Data refer to 2012.

Sources: Rows 1-3: World Bank 2019e; Rows 4, 7-9, 11: World Bank 2019f; Rows 5-6, 10, 15, 17, 19-20: UN 2019; Rows 12, 16, 18: UN 2019 and World Bank 2019e; Row 13: UN 2019; Row 14: UN ESCAP 2017.

9. Demographic Profile

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Total population (millions)										
2000	1,057	142	128	20.8	23.9	18.8	0.59	0.28	1,391T	5,037T
2018	1,353	212	161	37.2	28.1	21.7	0.75	0.52	1,814T	6,384T
Annual population growth rate (%)										
1990-2000	1.9	2.8	2.2	5.3	2.4	0.8	1.1	2.3	2.1	1.6
2001-2018	1.4	2.2	1.3	3.2	0.8	0.8	1.3	3.5	1.5	1.3
Rural population (millions)										
2000	764	95	98	16.2	20.7	15.3	0.44	0.20	1,010T	3,008T
2018	892	134	102	27.7	22.5	17.7	0.45	0.31	1,198T	3,170T
Urban population (millions) (SDG 11.1.2a)										
2000	292	47	30	4.6	3.2	3.5	0.15	0.08	381T	2,028T
2018	460	78	59	9.5	5.5	4.0	0.31	0.21	617T	3,212T
Annual growth rate of urban population (%) (SDG 11.1.2b)										
1990-2000	2.7	3.6	4.0	5.7	6.7	0.7	5.6	3.0	3.0	2.9
2001-2018	2.5	2.8	3.8	4.1	2.9	0.8	3.9	5.5	2.7	2.6
Population living in slums (% of urban population) (SDG 11.1.1)										
2000	41.5	48.7	77.8	…	64.0	…	…	…	46.2	39.6
2016	35.4	40.8	49.4	71.3	51.0	…	…	32.1[a]	38.3	29.7[b]
Crude birth rate (per 1,000 live births)										
2000	26	35	27	48	32	18	27	21	28	24
2017	18	29	19	33	20	16	17	15	20	20
Crude death rate (per 1,000 live births)										
2000	9	9	7	12	9	7	9	5	9	9
2017	7	7	6	7	6	7	6	3	7	7
Total fertility rate (births per woman)										
2000	3.3	5.0	3.2	7.5	4.0	2.2	3.5	2.8	3.5	2.9
2017	2.2	3.6	2.1	4.6	2.0	2.2	2.0	1.9	2.4	2.6
Adolescent fertility rate (per 1,000 women aged 15-19 years) (SDG 3.7.2)										
2000	66.8	56.4	112.3	154.0	113.0	28.4	77.2	31.0	71.6	61.2
2017	13.2	38.8	83.0	69.0	65.1	20.9	20.2	7.8	24.5	46.3
Dependency ratio (dependents to working-age population)										
2000	64	85	69	105	81	49	78	79	67	63
2018	50	66	49	84	57	53	47	31	52	55
Total labour force (millions)										
2000	397	42	46	6.7	12.1	7.8	0.24	0.09	512T	2,232T
2018	512	73	69	14.0	16.2	8.6	0.37	0.27	694T	2,846T
Male labour force (millions)										
2000	295	36	36	4.5	6.2	5.2	0.14	0.06	383T	1,369T
2018	400	57	48	9.0	7.2	5.6	0.22	0.21	527T	1,766T

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Female labour force (millions)										
2000	101	6	10	2.2	5.9	2.6	0.10	0.03	129T	863T
2018	112	16	21	5.0	9.0	3.0	0.15	0.06	166T	1,079T
Annual growth in labour force (%)										
1990-2000	2.2	3.1	3.1	5.1	2.6	0.6	1.5	4.5	2.4	1.9
2001-2018	1.4	3.1	2.2	4.1	1.6	0.5	2.5	6.2	1.7	1.3
Manufacturing employment as a proportion of total employment (SDG 9.2.2)										
2000	10.7	11.5	7.3	4.6[c]	…	16.5[d]	2.0[e]	17.8[f]	10.5	…
2016-2017[g]	12.5[h]	15.3	14.4	6.8[h]	…	19.3	6.5[i]	11.0	13.0	…
Informal employment (% of total non-agricultural employment) (SDG 8.3.1)										
2015-2017[g]	74.8[h]	71.2	91.3	…	99.0[c]	62.1	…	47.0	76.2	…
Annual growth rate of GDP per person employed (constant 2011 PPP[j] US$) (SDG 8.2.1)										
2000-2018	5.5	1.5	3.7	4.1	2.1	4.7	4.2	0.5	4.8	4.2
Unemployment, total (% of total labor force) (SDG 8.5.2a),										
. total										
2000	4.3	7.2	3.3	1.1	2.0	7.7	1.7	2.0	4.5	6.4
2017	3.4	5.8	4.0	8.6	3.0	5.2	2.4	2.9	3.9	5.7
. female										
2000	4.2	16.0	3.3	1.7	1.8	11.6	2.1	2.7	5.3	6.7
2017	3.8	10.7	4.6	12.6	2.7	8.8	3.1	3.9	4.8	6.2
. male										
2000	4.3	5.6	3.3	1.0	2.2	5.8	1.5	1.6	4.3	6.1
2017	3.3	4.5	3.7	7.8	3.3	3.6	1.9	2.1	3.6	5.4
Proportion of adults (15 years and older) with an account at a bank/ financial institution/ mobile-money-service provider (SDG 8.10.2)										
2017	79.9	21.3	50.1	14.9	45.4	73.7	33.7[a]	…	68.7	…
Proportion of population covered by a mobile network, by technology (SDG 9.C.1), 2017,										
. proportion of population covered by at least a 2G mobile network										
	97	88	99	90	92	100	98	100	96	…
. proportion of population covered by at least a 3G mobile network										
	88	72	93	46	54	88	88	100	85	…
. proportion of population covered by at least a 4G mobile network										
	88	67	67	5	15	48	55	100	80	…
Fixed Internet broadband subscriptions per 100 inhabitants (SDG 17.6.2)										
2017	1.3	0.9	4.4	0.1	1.7	5.9	2.1	8.4	1.6	…
Individuals using the Internet (% of population) (SDG 17.8.1)										
2000	0.5	1.3[k]	0.1	0.1[f]	0.2	0.6	0.4	2.2	0.6	1.4
2017	34.5	15.5	15.0	13.5	34.0	34.1	48.1	63.2	30.2	43.0

Notes: a: Data refer to 2013. b: Data refer to 2014. c: Data refer to 2008. d: Data refer to 2002. e: Data refer to 2005. f: Data refer to 2003. g: Data refer to the most recent year available. h: Data refer to 2012. i: Data refer to 2015. j: PPP means purchasing power parity. k: Data refer to 2001.

Sources: Rows 1-5: UN DESA 2019a; Rows 6, 16-17, 20-22: UN 2019; Rows 7-9: World Bank 2019b; Rows 10, 18-19, 23: World Bank 2019e; Rows 11-15: World Bank 2019f.

10. Profile of Food Security and Natural Resources

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Food production net per capita index (2004-06 = 100)										
2000	99	98	98	107	94	99	90	102	99	…
2016	125	104	128	91	122	123	84	50	122	…
Food exports (% of merchandise exports)										
2000	12.8	10.5	7.6	52.5[a]	9.9	20.3	10.6[b]	53.7	12.7	9.2
2017-2018[c]	10.5	20.8	2.7[d]	65.1	26.1	26.0	6.9[e]	98.2	12.5	11.2
Food imports (% of merchandise imports)										
2000	4.7	14.1	16.5	17.4[a]	12.6	13.3	14.5[b]	23.6	7.2	7.8
2017-2018[c]	4.2	10.0	16.6[d]	32.3	18.1	13.4	13.7[e]	17.2	6.9	9.0
Cereal production (thousand metric tonnes)										
2000	234,931	30,461	39,503	1,940	7,116	2,896	107	0.10	316,953T	…
2017	313,610	44,097	53,332	4,897	9,759	1,823	189	0.20	427,708T	…
Cereal imports (thousand metric tonnes)										
2000	55	1,054	2,496	1,178	203	1,029	57	35	6,107T	…
2017	5,711	57	9,744	3,140	1,268	2,199	116	59	22,295T	…
Cereal exports (thousand metric tonnes)										
2000	2,822	2,087	0.7	…	0.0	2.0	9.3	…	4,921T	…
2017	13,193	2,958	4.8	…	1.6	88.5	0.7	…	16,246T	…
Crop production index (2004-06 = 100)										
2000	92.2	90.1	90.8	69.7	85.2	96.5	63.1	87.2	91.4	…
2016	142.2	118.6	145.5	147.2	139.2	130.4	108.3	62.9	139.8	…
Number of plant and animal genetic resources for food and agriculture secured in either medium or long-term conservation facilities (SDG 2.5.1),										
. number of accessions of plant genetic resources secured in conservation facilities under medium or long term conditions (SDG 2.5.1a),										
2000	241,668	19,392	17,836	…	…	6,435	29	…	285,360T	…
2016	395,001	31,066	31,476	954	4,671	8,808	1,151	…	473,127T	…
. number of animal genetic resources for food and agriculture secured in either medium or long-term conservation facilities (SDG 2.5.1b),										
.. number of locally adapted and exotic animal breeds kept in the country										
2013	8.2	…	0.0	…	0.0	…	10.8	0.0	19T	…
.. number of animal breeds for which sufficient genetic resources for food and agriculture are stored in medium or long-term conservation facilities										
2013	41.0	…	0.0	…	0.0	…	12.0	0.0	53T	…
.. number of animal breeds for which sufficient genetic resources for food and agriculture are stored for reconstitution in either medium or long-term conservation facilities										
2013	14.0	…	0.0	…	0.0	…	4.0	0.0	18T	…

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Local breeds classified as being at risk, not-at-risk or at unknown level of risk of extinction (SDG 2.5.2),										
. proportion of local breeds classified as being at-risk, not-at-risk or at unknown level of risk of extinction, 2017 (SDG 2.5.2a),										
.. at-risk	0.0	0.0	0.0	0.0	0.0	4.8	4.0	0.0	0.1	…
.. not-at-risk	3.1	0.0	0.0	0.0	0.0	33.3	84.0	0.0	2.8	…
.. unknown	96.9	100.0	100.0	100.0	100.0	61.9	12.0	100.0	97.2	…
. number of local breeds classified as being at risk, not-at-risk or at unknown level of risk of extinction, 2017 (SDG 2.5.2b),										
.. at-risk	0	0	0	0	0	1	1	0	2T	…
.. not-at-risk	7	0	0	0	0	7	21	0	35T	…
.. unknown	216	104	48	37	33	13	3	4	458T	…
Fisheries production (SDG 14.4.1),										
. thousand metric tons										
2000	5,669	626.6	1,661	1.3	31.7	301.2	0.1	119.4	8,411T	98,336T
2016	10,800	669.6	3,878	2.2	70.5	552.6	0.2	129.2	16,103T	169,975T
. annual growth										
1990-2000	3.9	2.7	7.0	-0.7	8.1	5.1	-4.8	4.1	4.4	5.2
2001-2016	4.1	0.7	5.3	3.8	5.1	4.9	5.0	0.1	4.1	3.7
Coverage of protected areas in relation to marine areas (SDG 14.5.1)										
2018	0.2	0.8	5.3	…	…	0.1	…	0.1	0.7	…
The agriculture orientation index for government expenditures (SDG 2.A.1)										
2001	0.23	0.02	0.20	0.13[f]	0.14[f]	0.36	0.27	0.22	0.21	…
2016	0.32	0.05	0.41	0.19[d]	0.33	0.75	0.76	0.02	0.30	…
Total official flows (ODA) (gross disbursements) to the agriculture sector (millions of 2017 constant US$) (SDG 2.A.2)										
2000	221	58	334	4	69	52	5.8	0.0	744T	…
2017	632	275	280	325	135	54	19.5	4.9	1,726T	…
Forest area as a proportion of total land area (SDG 15.1.1)										
2000	22.0	2.7	11.3	2.1	27.2	35.0	68.4	3.3	19.1	32.7
2016	23.8	1.9	11.0	2.1	25.4	32.9	72.5	3.3	20.0	31.9
Forest production,										
roundwood (thousand cubic metres)										
2000	318,553	33,560	28,459	3,039	14,023	6,596	4,355	13.2	408,597T	…
2018	353,953	33,593	26,408	3,617	13,292	5,375	5,320	16.4	441,575T	…
wood fuel (thousand cubic metres)										
2000	277,380	30,880	27,836	1,279	12,763	5,907	4,221	13.2	360,278T	…
2018	304,436	29,533	26,003	1,857	11,992	4,682	5,195	16.4	383,715T	…

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Progress towards sustainable forest management (SDG 15.2.1),										
. annual change in forest area (SDG 15.2.1a)										
1990-2000	0.2	-1.8	-0.2	0.0	-2.1	-0.4	0.4	…	-0.1	…
2000-2015	0.5	-2.4	-0.2	0.0	-0.5	-0.4	0.4	…	0.1	…
. proportion of forest area within legally established protected areas (SDG 15.2.1c)										
2010	22.8	…	17.4	…	14.5	…	32.0	…	22.1	…
2015	22.8	…	19.0	…	16.2	…	32.2	…	22.3	…
. proportion of forest area with a long-term management plan (SDG 15.2.1d)										
2010	45.0	…	60.0	…	41.0	…	10.0	…	46.5	…
. proportion of forest area certified under an independently verified certification scheme (SDG 15.2.1e)										
2010	0.7	0.0	0.0	0.0	14.2	23.2	0.0	0.0	1.1	…
Mountain Green Cover Index (SDG 15.4.2)										
2017	90.3	60.2	87.5	56.0	77.1	94.1	85.7	…	85.9	…
Water productivity, total (constant 2010 US$ GDP per cubic metre of total freshwater withdrawal) (SDG 6.4.1)										
2002	1.4	0.7	..	0.4	1.2	2.7	…	…	1.3	4.0
2014	2.8	1.1	4.1	1.0	2.0	5.6	5.7	487.0	2.8	8.4
Level of water stress: freshwater withdrawal as a proportion of available freshwater resources (SDG 6.4.2)										
2014	44.5	102.5	3.8	43.7	5.9	34.1	0.6	15.7	46.2	…
Total ODA (gross disbursements) for water supply and sanitation (millions of 2017 constant US$) (SDG 6.A.1)										
2000	173	14.8	84	4.3	59.0	32.0	5.7	0.6[g]	374T	…
2017	659	263.1	284	93.5	179.4	144.5	11.8	3.2	1,639T	…
Land area (thousand hectares)										
2000	297,319	77,088	13,017	65,286	14,335	6,271	3,980	30	477,326T	…
2017	297,319	77,088	13,017	65,286	14,335	6,271	3,814	30	477,160T	…
Land use,										
. arable land (% of land area)										
2000	54.1	40.3	64.1	11.8	16.4	14.6	2.7	10.0	44.3	…
2017	52.6	40.5	59.1	11.8	14.7	20.7	2.6	13.0	43.3	…
. permanent cropped area (% of land area)										
2000	3.1	0.9	3.5	0.1	0.8	15.9	0.5	16.7	2.4	…
2017	4.4	1.0	6.8	0.3	1.5	15.9	0.1	10.0	3.4	…
Agricultural irrigated land (% of total agricultural land)										
2001	32.2	48.2	51.3[h]	5.7	27.4	…	…	…	35.2	…
2016	36.8[i]	50.5	59.7	6.5	29.7[j]	…	…	…	39.7	…
Prevalence of undernourishment (% of population) (SDG 2.1.1)										
2000	18.2	23.4	20.8	46.1	22.0	18.6	…	14.0	19.4	17.7
2017	14.5	20.3	14.7	29.8	8.7	9.0	…	10.3	15.3	12.3

Notes: a: Data refer to 2008. b: Data refer to 2005. c: Data refer to the most recent year available. d: Data refer to 2015. e: Data refer to 2012. f: Data refer to 2003. g: Data refer to 2001. h: Data refer to 2004. i: Data refer to 2013. j: Data refer to 2010.

Sources: Rows 1, 4-7, 15, 21-22: FAO 2019b; Rows 2-3, 10, 18, 23: World Bank 2019f; Rows 8-9, 11-14, 16-17, 19-20: UN 2019; Row 24: World Bank 2019e.

11. Energy and Environment

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Energy use per capita (kilogrammes of oil equivalent)										
2000	419	462	139	…	342	446	281[a]	801[a]	395	884
2014	637	484	222	…	413	516	…	…	576	1,330
Total electricity production (billion kilowatt hours)										
2000	560.8	65.8	15.8	0.7	1.7	7.0	1.8	0.1	654T	…
2016	1,432.4	123.1	64.3	1.1[b]	4.2	14.4	8.0	0.6	1,648T	…
Access to electricity (% of population) (SDG 7.1.1),										
. total										
2000	59	70	32	…	27	…	31	84	57	74
2017	93	71	88	98	96	98	98	100	90	87
. rural										
2000	48	59	17	…	18	…	9	78	45	61
2017	89	54	81	97	95	97	97	100	85	77
. urban										
2000	89	94	81	…	84	…	97	100	89	93
2017	99	100	100	100	99	100	99	100	99	97
Access to clean fuels and technologies for cooking (% of population) (SDG 7.1.2)										
2000	22	22	7	13	19	20	33	58	20	…
2017	40	48	21	29	35	55	70	93	39	…
Renewable energy consumption (% of total final energy consumption) (SDG 7.2.1)										
2000	51.6	51.0	59.0	54.2	88.3	64.2	91.4	2.1	52.9	30.3
2015	36.0	46.5	34.7	18.4	85.3	52.9	86.9	1.0	38.3	23.0
Energy intensity level of primary energy (megajoules per US$ constant 2011 PPP GDP) (SDG 7.3.1)										
2000	6.9	5.5	3.5	1.7	9.3	3.3	21.8	3.3	6.5	7.4
2015	4.7	4.4	3.1	2.5	7.4	2.1	10.4	3.8	4.6	5.6
Passenger and freight volume, by mode of transport (SDG 9.1.2), 2015,										
. air transport (SDG 9.1.2a),										
.. freight volume (millions of tonne kilometres)										
	1,833.8	183.2	182.7	33.1	4.5	381.4	0.5	5.9	2,625T	44,820T
.. passenger volume (millions of passenger kilometres)										
	98.9	8.5	2.9	1.9	0.5	4.9	0.2	1.3	119T	1,373T
. rail transport (excluding passenger urban rail transport) (SDG 9.1.2b),										
.. freight volume (billions of tonne kilometres)										
	730	6.9	1.2	1.0	5.2	4.1	0.3	0.2	749T	…
.. passenger volume (billions of passenger kilometres)										
	1,136	21	7,446	…	…	…	…	…	1,164T	…
. road transport (SDG 9.1.2c)										
.. freight volume (billions of tonne kilometres)										
	1,509	168	17	7.0	16.2	11.9	1.0	0.7	1,730T	…
.. passenger volume (billions of passenger kilometres)										
	10,527	60	54	5.1	6.6	41.4	1.8	1.2	10,697T	…

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Total official flows (ODA) (gross disbursements) for infrastructure (millions of constant 2017 US$) (SDG 9.A.1)										
2000	2,997	478	626	0.4	114	75	31	12	4,333T	…
2017	6,277	1,755	2,208	500	324	466	39	23	11,594T	…
$PM_{2.5}$ air pollution, mean annual exposure (micrograms per cubic metre) (SDG 11.6.2)										
2000	84.2	61.1	63.0	64.9	88.9	30.9	39.7	11.1	78.9	52.2
2017	90.9	58.3	60.8	56.9	99.7	11.1	37.9	7.8	83.0	51.4
Proportion of urban solid waste regularly collected (SDG 11.6.1)										
	51	55	20	…	94	35	72	…	52	…
Proportion of wastewater safely treated (SDG 6.3.1)										
	29	18	17	…	12	…	10	…	26	…
Proportion of important sites (key biodiversity areas) for terrestrial biodiversity that are covered by protected areas (SDG 15.1.2a)										
2000	21.7	35.0	38.0	0.1	42.2	41.6	38.6	…	27.7	26.4
2018	26.0	36.6	48.0	6.1	54.6	49.8	42.9	…	32.8	34.6
Proportion of important sites (key biodiversity areas) for freshwater biodiversity that are covered by protected areas (SDG 15.1.2b)										
2000	13.2	36.3	20.8	0.1	22.0	72.6	23.1	…	21.4	22.7
2018	15.2	37.0	20.8	0.1	36.5	80.0	34.3	…	25.0	31.2
Proportion of important sites (key biodiversity areas) for mountain biodiversity that are covered by protected areas (SDG 15.4.1)										
2000	28.0	36.0	…	0.1	57.1	25.9	38.6	…	32.4	32.4
2018	35.4	36.0	…	12.3	67.1	40.2	43.0	…	39.5	40.5
Red List Index (SDG 15.5.1)										
2000	0.75	0.93	0.83	0.84	0.82	0.66	0.80	0.91	0.78	…
2019	0.67	0.85	0.76	0.84	0.83	0.56	0.80	0.84	0.67	…
Total ODA commitments on conservation and sustainable use of biodiversity and ecosystems (millions of constant 2017 US$) (SDG 15.A.1)										
2002	78.9	8.6	5.3	0.2	25.9	5.4	4.91	0.04[c]	129.3	…
2017	413.8	11.4	21.3	47.6	18.5	7.1	0.36	0.22	520.3	…
Number of deaths, persons affected and economic losses by natural disasters (SDG 13.1.2),										
. annual average number of natural disaster-events										
1990-2000	13	4	10	4	3	2	1	1	38T	…
2001-2017	17	7	6	7	3	3	1	1	45T	…
. annual average number of deaths from natural disasters										
1990-2000	4,791	617	13,651	1,028	613	24	120	0	20,844T	…
2001-2017	4,307	4,936	630	571	763	2,364	12	53	13,636T	…

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
. annual average number of natural disaster-affected people (thousands)										
1990-2000	37,774	1,920	7,870	315	102	374	22	24	48,401T	…
2001-2017	54,149	3,226	5,921	345	621	896	10	10	65,179T	…
. annual average economic losses from natural disasters (US$ millions)										
1990-2000	1,809	272	1,035	17	40	48	4	30	3,255T	…
2001-2017	3,655	2,146	844	29	658	314	0	470	8,117T	…
Countries with national and local disaster risk reduction strategies (yes/no) (SDG 1.5.3)										
2015	yes	yes	yes	yes	yes	yes	yes	…	…	…

Notes: a: Data refer to 2004. b: Data refer to 2017. c: Data refer to 2003.

Sources: Row 1: World Bank 2019f; Row 2: ADB 2019; Rows 3, 5: World Bank 2019e; Row 4: HEI 2019. Rows 6, 8, 12-16, 18: UN 2019; Row 7: UN 2019 and World Bank 2019e; Row 9: Greenpeace and AirVisual 2019; Row 10: UOL 2017; Row 11: UN ESCAP 2016 and WWAP 2017; Row 17: CRED 2018.

12. Governance

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Average annual rate of inflation (consumer price index) (%)										
2000	3.7	3.6	2.8	11.9[a]	3.4	6.2	4.0	-1.2	3.7	…
2018	3.4	3.9	5.8	0.2	4.2	4.3	2.7	-0.1	3.6	…
Annual growth of food prices (food consumer price index) (%)										
2000	1.6	2.2	2.6	9.1[a]	0.6	4.5	5.3[a]	-4.8	1.9	…
2018	0.4	2.8	7.1	-1.6	2.7	3.4	4.9	-1.1	1.3	…
Annual growth of money supply (%)										
2000	16.8	9.4	18.6	44.6[a]	21.8	13.0	16.1	4.2	16.7	…
2018	10.5	9.5	9.2	2.6	19.4	13.5	6.5	3.4	10.3	…
Total government revenue (% of GDP)[b]										
2010	10.6	14.2	13.0	23.6	18.1	13.0	27.4	19.3	11.6	…
2018	8.8	15.2	8.3	26.9	24.4[c]	13.4	21.4	25.1	10.1	…
Total government expenditure (% of GDP)[b]										
2010	15.4	20.4	14.8	29.5	19.5	19.3	35.6	33.2	16.2	…
2018	12.2	21.6	10.2	26.8	27.5[c]	18.7	32.3	31.3	13.7	…
Fiscal balance (% of GDP)[b]										
2010	-4.8	-6.0	-1.7	0.8	-1.4	-6.3	1.5	-12.9	-4.5	…
2018	-3.4	-6.5	-1.9	-0.4[c]	-3.1[c]	-5.3	-0.3	-5.5	-3.6	…
Tax revenue (% of GDP)[b] (SDG 17.1.1)										
2010	7.3	10.0	10.2	9.2	13.4	11.3	13.3	8.8	8.0	…
2018	6.9	13.0	7.4	7.3	21.0[c]	12.4[c]	15.5	18.6	7.9	…
Net ODA and official aid received (current US$ millions) (SDG 17.2.1)										
2000	1,383	707	1,174	136	386	278.4	53.4	19.2	4,138T	49,473
2017	3,094	2,283	3,740	3,804	1,258	297.0	118.5	41.9	14,637T	162,597
Foreign direct investment, net inflows (US$ millions) (SDG 17.3.1)										
2000	3,584	308	280	0.2	-0.5	172.9	2.4[d]	22.3	4,370T	146,238T
2018	42,117	2,354	2,940	139.2	160.8	1,610.5	2.6	551.8	49,877T	594,144T
Personal remittances, received (% of GDP) (SDG 17.3.2)										
2000	2.8	1.5	3.7	0.9	2.0	7.1	0.2[e]	0.4	2.8	1.3
2018	2.9	6.8	5.7	2.0	28.0	7.9	2.3	0.1	4.0	1.6
Debt service (PPG and IMF only, % of exports of goods, services and primary income) (SDG 17.4.1)										
2000	15.4	21.1	10.3	…	7.4	10.9	2.5[e]	4.0	15.3	12.7
2018	19.7	8.5	14.8	5.9[c]	8.8	22.8	29.1[c]	67.6[c]	17.6	24.3
Total ODA (gross disbursements) for technical cooperation (millions of current US$) (SDG 17.9.1)										
2000	415	544	198	3	19	119	21	14	1,333T	…
2017	462	1,221	697	763	235	126	21	7	3,531T	…

Continued

	India	Pakistan	Bangladesh	Afghanistan	Nepal	Sri Lanka	Bhutan	Maldives	South Asia (weighted average)	Developing countries
Exports of goods and services (% of GDP) (SDG 17.11.1)										
2000	13.1	13.4	12.3	32.4[d]	23.3	39.0	29.0	52.7[e]	13.9	27.1
2018	19.7	8.5	14.8	5.9[c]	8.8	22.8	29.1[c]	67.6[c]	17.6	25.5
Proportion of medium and high-tech industry value added in total value added (SDG 9.B.1)										
2000	41.3	25.2	21.1	13.6	12.1	9.4	…	2.6	36.5	…
2017	42.9	24.6	9.8	9.5	8.4	8.9	…	2.6	36.2	…
Imports of goods and services (% of GDP)										
2000	13.9	14.7	17.0	70.3[d]	32.4	49.6	48.3	66.4[e]	15.9	23.6
2018	23.4	19.4	23.4	45.3[c]	45.5	30.1	49.6[c]	72.2[c]	23.9	25.7
Intentional homicides (per 100,000 people) (SDG 16.1.1)										
2000	4.5	6.4	2.5	…	2.7	6.8[f]	3.1	…	4.5	…
2017	3.2[g]	4.2	2.2	7.1	2.2[g]	2.3	1.6	…	3.3	5.9[h]
Unsentenced detainees as a proportion of overall prison population (SDG 16.3.2)										
2005	67.9	57.8	64.0	81.0	…	52.4	…	…	66.5	…
2017	67.2	67.0	78.3	30.8	…	55.3	…	…	67.3	…
Bribery incidence (% of firms experiencing at least one bribe payment request) (SDG 16.5.2)										
2013-2015[i]	22.7	30.8	47.7	46.8	14.4	10.0[j]	0.9	…	26.0	21.6[k]
Number of cases of killings of journalists and associated media personnel (SDG 16.10.1)										
2018	6	5	1	16	0	0	0	0	28T	…
Countries (by year) adopting and implementing constitutional, statutory and/or policy guarantees for public access to information (SDG 16.10.2)										
	2005	2002	2008	2014	2007	2016	…	2014	…	…

Notes: a: Data refer to 2005. b: Data are for fiscal years: 1 July to 30 June for Pakistan, Bangladesh and Bhutan; 21 December to 20 December for Afghanistan; 1 April to 31 March for India; 16 July to 15 July for Nepal; and 1 January to 31 December for Sri Lanka and the Maldives. c: Data refer to 2017. d: Data refer to 2002. e: Data refer to 2006. f: Data refer to 2003. g: Data refer to 2016. h: Data refer to 2015. i: Data refer to the most recent year available. j: Data refer to 2011. k: Data refer to 2018.

Sources: Rows 1-7: ADB 2017 and 2019; Rows 8-11, 13-14, 16: World Bank 2019e; Rows 12, 17-18, 20: UN 2019; Row 15: World Bank 2019f; Row 19: UNESCO 2019a.

ANNEX: SUSTAINABLE DEVELOPMENT GOALS (SDGS), TARGETS AND INDICATORS BY DATA TABLE

SDGs	Targets	Indicators	Data table
1. No poverty	1.1	1.1.1 Proportion of population below the international poverty line, by sex, age, employment status …	4, 8
	1.2	1.2.1 Proportion of population living below the national poverty line, by sex and age	4
		1.2.3 Proportion of men, women and children of all ages living in (national) poverty in all its dimensions	…
	1.3	1.3.1 Proportion of population covered by social protection by sex, distinguishing children, unemployed persons …	8
	1.4	1.4.1 Proportion of population living in households with access to basic services	…
		1.4.2 Proportion of total adult population with secure tenure rights to land, with legally recognized documentation …	…
	1.5	1.5.1 Number of deaths, missing persons and persons affected by disaster per 100,000 people	11
		1.5.2 Direct disaster economic loss in relation to global gross domestic product (GDP)	11
		1.5.3 Number of countries with national and local disaster risk reduction strategies	11
	1.A	1.A.1 Proportion of resources allocated by the government directly to poverty reduction programmes	…
		1.A.2 Proportion of total government spending on essential services (education, health and social protection)	2, 3
	1.B	1.B.1 Proportion of government spending to sectors that disproportionately benefit women, the poor and vulnerable	…
2. Zero hunger	2.1	2.1.1 Prevalence of undernourishment	10
		2.1.2 Prevalence of food insecurity in the population, based on the Food Insecurity Experience Scale	…
	2.2	2.2.1 Prevalence of stunting (height for age) among children under 5 years of age	4, 6, 1s, 4s
		2.2.2 Prevalence of malnutrition (weight for height) among children under 5 years of age (wasting and overweight)	6
	2.3	2.3.1 Volume of production per labour unit by classes of farming/pastoral/forestry enterprise size	…
		2.3.2 Average income of small-scale food producers, by sex and indigenous status	…
	2.4	2.4.1 Proportion of agricultural area under productive and sustainable agriculture	…
	2.5	2.5.1 Number of plant and animal genetic resources for food and agriculture secured …	10
		2.5.2 Proportion of local breeds classified as being at risk, not-at-risk or at unknown level of risk of extinction	10
	2.A	2.A.1 The agriculture orientation index for government expenditures	10
		2.A.2 Total official flows (ODA plus other official flows) to the agriculture sector	10
	2.B	2.B.1 Producer Support Estimate	…
		2.B.2 Agricultural export subsidies	…
	2.C	2.C.1 Indicator of food price anomalies	…
3. Good health and well-being	3.1	3.1.1 Maternal mortality ratio	3, 1s
		3.1.2 Proportion of births attended by skilled health personnel	6, 4s
	3.2	3.2.1 Under-five mortality rate	4, 6, 4s
		3.2.2 Neonatal mortality rate	6, 1s
	3.3	3.3.1 Number of new HIV infections per 1,000 uninfected population, by sex, age and key populations	3, 4
		3.3.2 Tuberculosis incidence per 1,000 population	3
		3.3.3 Malaria incidence per 1,000 population	3
		3.3.4 Hepatitis B incidence per 100,000 population	3
		3.3.5 Number of people requiring interventions against neglected tropical diseases	3
	3.4	3.4.1 Mortality rate attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease	3
		3.4.2 Suicide mortality rate	3
	3.5	3.5.1 Coverage of treatment interventions for substance use disorders	…
		3.5.2 Harmful use of alcohol	3
	3.6	3.6.1 Death rate due to road traffic injuries	3
	3.7	3.7.1 Proportion of women (15-49 years) who have their need for family planning satisfied with modern methods	3, 4s
		3.7.2 Adolescent birth rate (aged 10-14 years; aged 15-19 years) per 1,000 women in that age group	6, 9, 1s
	3.8	3.8.1 Coverage of essential health services	…
		3.8.2 Number of people covered by health insurance or a public health system per 1,000 population	…
	3.9	3.9.1 Mortality rate attributed to household and ambient air pollution	3
		3.9.2 Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene	3
		3.9.3 Mortality rate attributed to unintentional poisoning	3
	3.A	3.A.1 Age-standardized prevalence of current tobacco use among persons aged 15 years and older	3

Continued …

SDGs	Targets	Indicators	Data table
	3.B	3.B.1 Proportion of the population with access to affordable medicines and vaccines on a sustainable basis	3
		3.B.2 Total net ODA to medical research and basic health sectors	3
	3.C	3.C.1 Health worker density and distribution	3
	3.D	3.D.1 International Health Regulations (IHR) capacity and health emergency preparedness	4
4. Quality education	4.1	4.1.1 Proportion of children and young people achieving at least a minimum proficiency level	2
		4.1.3 Gross intake rate to the last grade of primary and secondary	2
		4.1.4 Primary completion rate	2, 1s, 4s
		4.1.5 Children out of school	2, 4s
	4.2	4.2.1 Proportion of children developmentally on track in health, learning and psychosocial well-being, by sex	2
		4.2.2 Participation rate in organized learning (one year before the official primary entry age), by sex	2
		4.2.4 Gross enrolment ratio in pre-primary education and early childhood educational development	2
	4.3	4.3.1 Participation rate of youth and adults in formal and non-formal education and training, by sex	…
		4.3.2 School enrollment, tertiary	2
		4.3.3 Technical and vocational enrolment as a % of total secondary enrolment	2
	4.4	4.4.1 Proportion of youth and adults with ICT skills, by type of skill	…
		4.4.3 Percentage of adults (25 and over) who have attained at least primary, secondary or tertiary	2, 1s
	4.5	4.5.1 Parity indices for all education indicators	5
	4.6	4.6.1 Percentage of population with of proficiency in functional (a) literacy and (b) numeracy skills, by sex	…
		4.6.2 Youth/adult literacy rate	2, 4s
	4.7	4.7.1 Extent to which (i) global citizenship education and (ii) education for sustainable development ... are mainstreamed in: (a) national education policies, (b) curricula, (c) teacher education and (d) student assessment	2
		4.7.2 Percentage of schools providing life skills-based HIV/AIDS education	2
	4.A	4.A.1 Proportion of schools with access to: (a) electricity, (b) the Internet, (c) computers, (d) materials for disables, (e) basic drinking water, (f) single-sex basic sanitation facilities, and (g) basic handwashing facilities	2
	4.B	4.B.1 Volume of ODA flows for scholarships by sector and type of study	2
	4.C	4.C.1 Proportion of trained teachers in: (a) pre-primary, (b) primary, (c) lower, and (d) upper secondary	2
5. Gender equality	5.1	5.1.1 Legal frameworks are in place or not to promote, enforce and monitor equality and non-discrimination	5
	5.2	5.2.1 Proportion of women and girls aged 15 years and older subjected to violence	5
		5.2.2 Proportion of women aged 15 years and older subjected to sexual violence by persons other than partner	…
	5.3	5.3.1 Proportion of women aged 20-24 years who were married or in a union before age 15 and before age 18	5
		5.3.2 Proportion of girls and women aged 15-49 years undergone female genital mutilation/cutting, by age	…
	5.4	5.4.1 Proportion of time spent on unpaid domestic and care work, by sex, age and location	5
	5.5	5.5.1 Proportion of seats held by women in national parliaments and local governments	5, 1s
		5.5.2 Proportion of women in managerial positions	5
	5.6	5.6.1 Proportion of women (15-49 years) who make their decisions regarding sexual relations, contraceptive…	…
		5.6.2 Countries with laws and regulations that guarantee women access to sexual and reproductive health…	…
	5.A	5.A.1 (a) Agricultural population with ownership or rights over agricultural land; and (b) share of women…	…
		5.A.2 Proportion of countries where the legal framework guarantees women's equal rights to land ownership…	…
	5.B	5.B.1 Proportion of individuals who own a mobile telephone, by sex	…
	5.C	5.C.1 Proportion of countries with systems to track and make public allocations for gender equality…	…
6. Clean water and sanitation	6.1	6.1.1 Proportion of population using safely managed drinking water services	3
	6.2	6.2.1 Proportion of population using safely managed sanitation services	3
	6.3	6.3.1 Proportion of wastewater safely treated	11
		6.3.2 Proportion of bodies of water with good ambient water quality	…
	6.4	6.4.1 Change in water-use efficiency over time	10, 2s
		6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources	10, 1s, 2s
	6.5	6.5.1 Degree of integrated water resources management implementation (0-100)	…
		6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation	…
	6.6	6.6.1 Change in the extent of water-related ecosystems over time	…
	6.A	6.A.1 Amount of water- and sanitation-related ODA that is part of a government-coordinated spending plan	10
	6.B	6.B.1 Local administrative units with policies for participation of communities in water and sanitation management	…
7. Affordable and clean energy	7.1	7.1.1 Proportion of population with access to electricity	11, 3s
		7.1.2 Proportion of population with primary reliance on clean fuels and technology	11, 3s
	7.2	7.2.1 Renewable energy share in the total final energy consumption	11, 1s, 3s
	7.3	7.3.1 Energy intensity measured in terms of primary energy and GDP	11, 3s
	7.A	7.A.1 Mobilized amount of US dollars per year starting in 2020 accountable towards the US$ 100 billion commitment	…
	7.B	7.B.1 Investments in energy efficiency for infrastructure and technology to sustainable development services	…

Continued …

SDGs	Targets	Indicators	Data table
8. Decent work and economic growth	8.1	8.1.1 Annual growth rate of real GDP per capita	8, 1s, 5s
	8.2	8.2.1 Annual growth rate of real GDP per employed person	9, 5s
	8.3	8.3.1 Proportion of informal employment in non-agriculture employment, by sex	9
	8.4	8.4.1 Material footprint, material footprint per capita and material footprint per GDP	8
		8.4.2 Domestic material consumption (DMC), DMC per capita and DMC per GDP	8
	8.5	8.5.1 Average hourly earnings of female and male employees, by occupation, age and persons with disabilities	…
		8.5.2 Unemployment rate, by sex, age and persons with disabilities	5, 6, 9
	8.6	8.6.1 Proportion of youth (aged 15-24 years) not in education, employment or training	6
	8.7	8.7.1 Proportion and number of children aged 5-17 years engaged in child labour, by sex and age	6
	8.8	8.8.1 Frequency rates of fatal and non-fatal occupational injuries, by sex and migrant status	…
		8.8.2 Increase in national compliance of labour rights based on ILO textual sources and national legislation …	…
	8.9	8.9.1 Tourism direct GDP as a proportion of total GDP and in growth rate	…
		8.9.2 Number of jobs in tourism industries as a proportion of total jobs and growth rate of jobs, by sex	…
	8.10	8.10.1 Number of commercial bank branches and automated teller machines (ATMs) per 100,000 adults	8
		8.10.2 Proportion of adults with an account at a bank or other financial institution ...	9
	8.A	8.A.1 Aid for trade commitments and disbursements	8
	8.B	8.B.1 Government spending in social protection and employment programmes	…
9. Industry, innovation and infrastructure	9.1	9.1.1 Proportion of the rural population who live within 2 km of an all-season road	…
		9.1.2 Passenger and freight volumes, by mode of transport	11
	9.2	9.2.1 Manufacturing value added as a proportion of GDP and per capita	8
		9.2.2 Manufacturing employment as a proportion of total employment	9
	9.3	9.3.1 Proportion of small-scale industries in total industry value added	…
		9.3.2 Proportion of small-scale industries with a loan or line of credit	…
	9.4	9.4.1 CO2 emission per unit of value added	8
	9.5	9.5.1 Research and development expenditure as a proportion of GDP	2
		9.5.2 Researchers (in full-time equivalent) per million inhabitants	2
	9.A	9.A.1 Total official international support (ODA plus other official flows) to infrastructure	11
	9.B	9.B.1 Proportion of medium and high-tech industry value added in total value added	12
	9.C	9.C.1 Proportion of population covered by a mobile network, by technology	9
10. Reduced inequalities	10.1	10.1.1 Growth rates of household expenditure/income among bottom 40 per cent and total population	8
	10.2	10.2.1 Proportion of people living below 50 per cent of median income, by age, sex and persons with disabilities	…
	10.3	10.3.1 Population felt discriminated against or harassed, prohibited under international human rights law	…
	10.4	10.4.1 Labour share of GDP, comprising wages and social protection transfers	…
	10.5	10.5.1 Financial soundness indicators	…
	10.6	10.6.1 Proportion of members and voting rights of developing countries in international organizations	…
	10.7	10.7.1 Recruitment cost borne by employee as a proportion of yearly income earned in country of destination	…
		10.7.2 Number of countries that have implemented well-managed migration policies	…
	10.A	10.A.1 Proportion of tariff lines applied to imports from LDCs and developing countries with zero-tariff	
	10.B	10.B.1 Total resource flows for development, (e.g., ODA, FDI and other flows)	8
	10.C	10.C.1 Remittance costs as a proportion of the amount remitted	…
11. Sustainable cities and communities	11.1	11.1.1 Proportion of urban population living in slums, informal settlements or inadequate housing	9
	11.2	11.2.1 Population that has convenient access to public transport, by sex, age and persons with disabilities	…
	11.3	11.3.1 Ratio of land consumption rate to population growth rate	
		11.3.2 Proportion of cities with a direct participation structure of civil society in urban planning and management …	…
	11.4	11.4.1 Total expenditure spent on preservation, protection and conservation of all cultural and natural heritage …	…
	11.5	11.5.1 Number of deaths, missing persons and persons affected by disaster per 100,000 people	11
		11.5.2 Direct disaster economic loss in relation to global GDP, including amage to infrastructure and basic services	11
	11.6	11.6.1 Proportion of urban solid waste regularly collected and with adequate final discharge, by cities	11
		11.6.2 Annual mean levels of fine particulate matter (e.g. $PM_{2.5}$ and PM_{10}) in cities	11, 1s, 2s
	11.7	11.7.1 Average share of the built-up area of cities that is open space for public use for all, by sex, age …	…
		11.7.2 Persons victim of physical or sexual harassment, by sex, age, disability status and place of occurrence	…
	11.A	11.A.1 Population that implement urban and regional development plans integrating population projections …	…
	11.B	11.B.1 Local governments with strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030	…
		11.B.2 Number of countries with national and local disaster risk reduction strategies	11
	11.C	11.C.1 Financial support to LDCs allocated to the construction of sustainable ... buildings utilizing local materials	…

Continued

SDGs	Targets	Indicators	Data table
12. Responsive consumption and production	12.1	12.1.1 Number of countries with sustainable consumption and production national action plans …	…
	12.2	12.2.1 Material footprint, material footprint per capita and material footprint per GDP	8, 3s
		12.2.2 Domestic material consumption (DMC), DMC per capita and DMC per GDP	8, 3s
	12.3	12.3.1 Global food loss index	…
	12.4	12.4.1 Parties to international multilateral environmental agreements on hazardous waste and other chemicals	8
		12.4.2 Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatment	…
	12.5	12.5.1 National recycling rate, tons of material recycled	…
	12.6	12.6.1 Number of companies publishing sustainability reports	…
	12.7	12.7.1 Number of countries implementing sustainable public procurement policies and action plans	…
	12.8	12.8.1 Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (a) national education policies, (b) curricula, (c) teacher education, and (d) student assessment	…
	12.A	12.A.1 Support to DCs on R&D for sustainable consumption and production and environmentally sound tech	…
	12.B	12.B.1 Sustainable tourism strategies/policies and implemented plans with agreed monitoring/evaluation tools	…
	12.C	12.C.1 Amount of fossil-fuel subsidies on fossil fuels	…
13. Climate action	13.1	13.1.1 Number of countries with national and local disaster risk reduction strategies	3
		13.1.2 Number of deaths, missing persons and persons affected by disaster per 100,000 people	11
	13.2	13.2.1 Countries with plan to increase ability against the adverse impacts of climate change ... for food production	…
	13.3	13.3.1 Countries that have integrated mitigation, adaptation, impact reduction and early warning into ... curricula	…
		13.3.2 Countries communicating the strengthening of ... capacity-building to implement ... development actions	…
	13.A	13.A.1 Mobilized amount of US$ per year starting in 2020 accountable towards the US$ 100 billion commitment	…
	13.B	13.B.1 LDCs ... receiving ... support for mechanisms for raising capacities for effective climate change …	…
14. Life below water	14.1	14.1.1 Index of coastal eutrophication and floating plastic debris density	…
	14.2	14.2.1 Proportion of national exclusive economic zones managed using ecosystem-based approaches	…
	14.3	14.3.1 Average marine acidity (pH) measured at agreed suite of representative sampling stations	…
	14.4	14.4.1 Proportion of fish stocks within biologically sustainable levels	10
	14.5	14.5.1 Coverage of protected areas in relation to marine areas	10, 2s
	14.6	14.6.1 Progress by countries in ... implementation of international instruments aiming to combat illegal ... fishing	…
	14.7	14.7.1 Sustainable fisheries in small island developing States, LDCs and all countries	…
	14.A	14.A.1 Proportion of total research budget allocated to research in the field of marine technology	…
	14.B	14.B.1 Progress by countries in application of ... framework recognizing ... access rights for small-scale fisheries	…
	14.C	14.C.1 Countries making progress in ratifying ... ocean-related instruments that implement international law …	…
15. Life on land	15.1	15.1.1 Forest area as a proportion of total land area	10, 1s, 2s
		15.1.2 Proportion of important sites for terrestrial and freshwater biodiversity covered by protected areas	11, 2s
	15.2	15.2.1 Progress towards sustainable forest management	10
	15.3	15.3.1 Proportion of land that is degraded over total land area	…
	15.4	15.4.1 Coverage by protected areas of important sites for mountain biodiversity	11, 2s
		15.4.2 Mountain Green Cover Index	10
	15.5	15.5.1 Red List Index	11, 2s
	15.6	15.6.1 Countries adopting legislative ... frameworks to ensure fair and equitable sharing of benefits	…
	15.7	15.7.1 Proportion of traded wildlife that was poached or illicitly trafficked	…
	15.8	15.8.1 Countries adopting ... legislation and resourcing the prevention or control of invasive alien species	…
	15.9	15.9.1 Progress towards ... Aichi Biodiversity Target 2 of the Strategic Plan for Biodiversity 2011-2020	…
	15.A	15.A.1 ODA and public expenditure on conservation and sustainable use of biodiversity and ecosystems	11
	15.C	15.C.1 Proportion of traded wildlife that was poached or illicitly trafficked	…
16. Peace, justice and strong institutions	16.1	16.1.1 Number of victims of intentional homicide per 100,000 population, by sex and age	12
		16.1.2 Conflict-related deaths per 100,000 population, by sex, age and cause	…
		16.1.3 Proportion of population subjected to physical, psychological or sexual violence in the previous 12 months	…
		16.1.4 Proportion of population that feel safe walking alone around the area they live	…
	16.2	16.2.1 Proportion of children who experienced any physical ... aggression by caregivers	6
		16.2.2 Number of victims of human trafficking per 100,000 population, by sex, age and form of exploitation	…
		16.2.3 Proportion of young women and men aged 18-29 years who experienced sexual violence by age 18	…
	16.3	16.3.1 Proportion of victims of violence who reported their victimization to competent authorities …	…
		16.3.2 Unsentenced detainees as a proportion of overall prison population	12
	16.4	16.4.1 Total value of inward and outward illicit financial flows	…
		16.4.2 Proportion of seized small arms and light weapons that are recorded and traced …	…
	16.5	16.5.1 Proportion of persons who had at least one contact with a public official and who paid a bribe …	…
		16.5.2 Businesses that had at least one contact with a public official and that paid a bribe to a public official…	12

Continued …

SDGs	Targets	Indicators	Data table
	16.6	16.6.1 Primary government expenditures as a proportion of original approved budget, by sector	…
		16.6.2 Proportion of the population satisfied with their last experience of public services	…
	16.7	16.7.1 Proportions of positions in public institutions (national and local legislatures, public service and judiciary)	…
		16.7.2 Proportion of population who believe decision-making is inclusive and responsive, by sex, age …	…
	16.8	16.8.1 Proportion of members and voting rights of developing countries in international organizations	…
	16.9	16.9.1 Proportion of children under 5 years of age whose births have been registered with a civil authority, by age	6
	16.10	16.10.1 Cases of killing, kidnapping, enforced disappearance, arbitrary detention and torture of journalists …	12
		16.10.2 Countries adopting and implementing constitutional ... guarantees for public access to information	12
	16.A	16.A.1 Existence of independent national human rights institutions in compliance with the Paris Principles	…
	16.B	16.B.1 Population having felt discriminated against or harassed on the basis of a ground of discrimination ...	…
17. Partnerships for the Goals	17.1	17.1.1 Total government revenue as a proportion of GDP, by source	12
		17.1.2 Proportion of domestic budget funded by domestic taxes	…
	17.2	17.2.1 Net ODA, total and to LDCs, as a proportion of the OECD DAC donors' GNI	12
	17.3	17.3.1 FDI, ODA and South-South Cooperation as a proportion of total domestic budget	12
		17.3.2 Volume of remittances (in US dollars) as a proportion of total GDP	12
	17.4	17.4.1 Debt service as a proportion of exports of goods and services	12
	17.5	17.5.1 Number of countries that adopt and implement investment promotion regimes for least developed countries	…
	17.6	17.6.1 Number of science and/or technology cooperation agreements and programmes between countries …	…
		17.6.2 Fixed Internet broadband subscriptions per 100 inhabitants, by speed	9
	17.7	17.7.1 Total approved funding for DCs to promote the development ... of environmentally sound technologies	…
	17.8	17.8.1 Proportion of individuals using the Internet	9
	17.9	17.9.1 Dollar value of financial and technical assistance committed to developing countries	12
	17.10	17.10.1 Worldwide weighted tariff-average	…
	17.11	17.11.1 Developing countries' and least developed countries' share of global exports	12
	17.12	17.12.1 Average tariffs faced by developing countries, LDCs and small island developing states	…
	17.13	17.13.1 Macroeconomic dashboard	8
	17.14	17.14.1 Number of countries with mechanisms in place to enhance policy coherence of sustainable development	…
	17.15	17.15.1 Use of country-owned results frameworks and planning tools by providers of development cooperation	…
	17.16	17.16.1 Countries reporting progress in ... monitoring frameworks that support the achievement of the SDGs	…
	17.17	17.17.1 Amount of United States dollars committed to public-private and civil society partnerships	…
	17.18	17.18.1 Proportion of SDGs produced at the national level with full disaggregation when relevant to the target …	…
		17.18.2 Number of countries that have national statistical legislation …	…
		17.18.3 Number of countries with a national statistical plan that is fully funded and under implementation …	…
	17.19	17.19.1 Dollar value of all resources made available to strengthen statistical capacity in developing countries	…
		17.19.2 Countries that (a) have conducted at least one ... census in the last 10 years, and (b) have achieved 100 per cent birth registration and 80 per cent death registration	…

KEY TO INDICATORS

Indicator	Indicator table
Undernourishment, prevalence of (SDG 2.1.1),	10
% of total population	10
Unemployment rate (SDG 8.5.2a),	
female	5, 9
male	9
total	9
Unpaid domestic and care work, time spent on (SDG 5.4.1),	
female	5
male	5
W, X, Y, Z	
Youth,	
not in education, employment or training, total (SDG 8.6.1)	6
out-of-school youth (SDG 4.1.5b)	4s
unemployment (SDG 8.5.2b),	
female	6
male	6
total	6
Solid waste regularly collected, proportion of urban (SDG 11.6.1)	11
Wastewater safely treated (SDG 6.3.1)	11
Water,	
agricultural freshwater withdrawal	2s
availability per person	1s, 2s
level of water stress (SDG 6.4.2)	10, 1s, 2s
population using at least basic services,	
with access (SDG 6.1.1)	3
without access,	
number	4
%	4
productivity, total (SDG 6.4.1)	10, 2s
Women,	
married by age 15/ 18 (SDG 5.3.1a),	5
participation in ownership (SDG 5.5.2a)	5
seats held in national parliaments (%) (SDG 5.5.1a)	1, 5
subjected to physical and/or sexual violence (SDG 5.2.1)	5
top manager (SDG 5.5.2b)	5
who have their need for family planning satisfied with modern methods (%) (SDG 3.7.1)	3, 4s

Theme of the Reports on Human Development in South Asia

1997	The Challenge of Human Development
1998	The Education Challenge
1999	The Crisis of Governance
2000	The Gender Question
2001	Globalization and Human Development
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2002	The South Asian Challenge
2008	Pioneering the Human Development Revolution: An Intellectual Biography of Mahbub ul Haq
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Mahbub ul Haq Research Centre's 20th Annual Human Development in South Asia report on *Sustainable Development in South Asia* addresses the links between environmental deterioration, equity, empowerment and economic growth. The report highlights the economic, social and environmental challenges that need to be addressed to promote sustainable human development. It presents a policy framework for sustainable development in the context of achieving broader Sustainable Development Goals (SDGs) in a balanced and integrated manner in South Asia. The report demonstrates that sustainability is key to fostering human development, and can only be achieved through direct interventions that simultaneously focus on the eradication of poverty and hunger, reduction of inequalities, improvements in energy access for the poor, and minimization of environmental risks.

This research focuses on the following questions: How is environmental sustainability linked to equity and economic growth? What trends do we see along key environmental indicators in South Asia? What are the relevant laws, policies and programmes at the national, regional and global level, and how effective are they? What actions could be taken in South Asia that simultaneously ensure environmental sustainability, economic growth, equity and human development? Besides the analytical work, the wealth of data on the state of sustainable development in South Asia collected for this report will be valuable for policy makers and the academic community.

Human Development in South Asia 2017/2018 has been prepared under the direction of Mrs Khadija Haq and Dr Kamran Asdar Ali. In-house research was conducted by Nazam Maqbool. Several distinguished scholars from the region contributed to the report. They are: Fahmida Khatun of the Centre for Policy Dialogue (CPD) in Bangladesh, Thangavel Palanive of the UNDP, Human Development Report Office (HDRO) in New York and Rajeswari Raina of the Shiv Nadar University in India.

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