HUMAN DEVELOPMENT IN SOUTH ASIA 2017/2018

Sustainable Development in South Asia

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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.

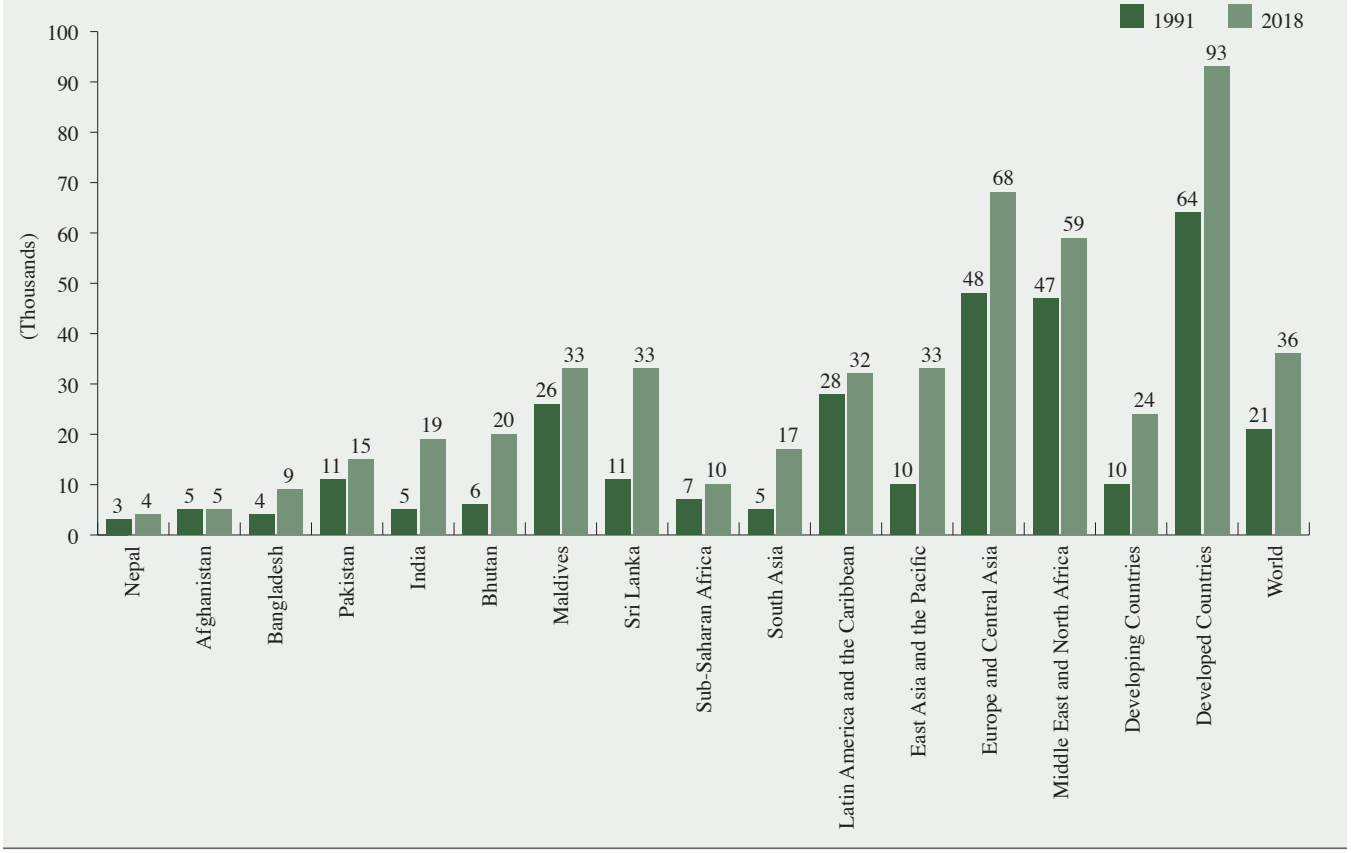
2017. This trend was set by India and followed by Bhutan, Bangladesh and Sri Lanka.

- 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.

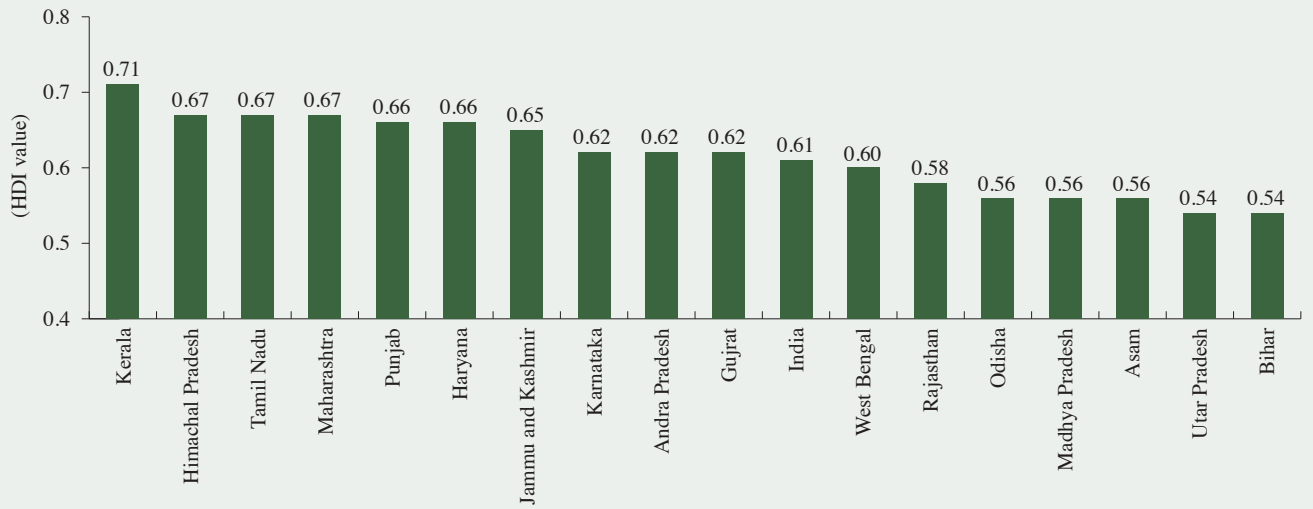
curs in all countries of South Asia and all regions of the world.

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

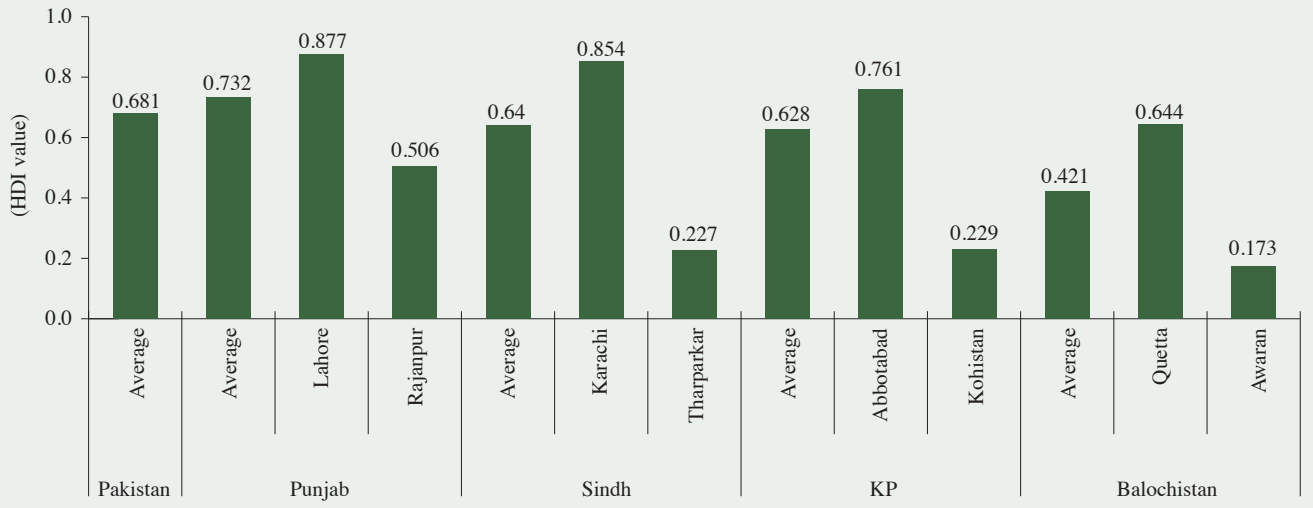


Source: Kundu 2015.

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

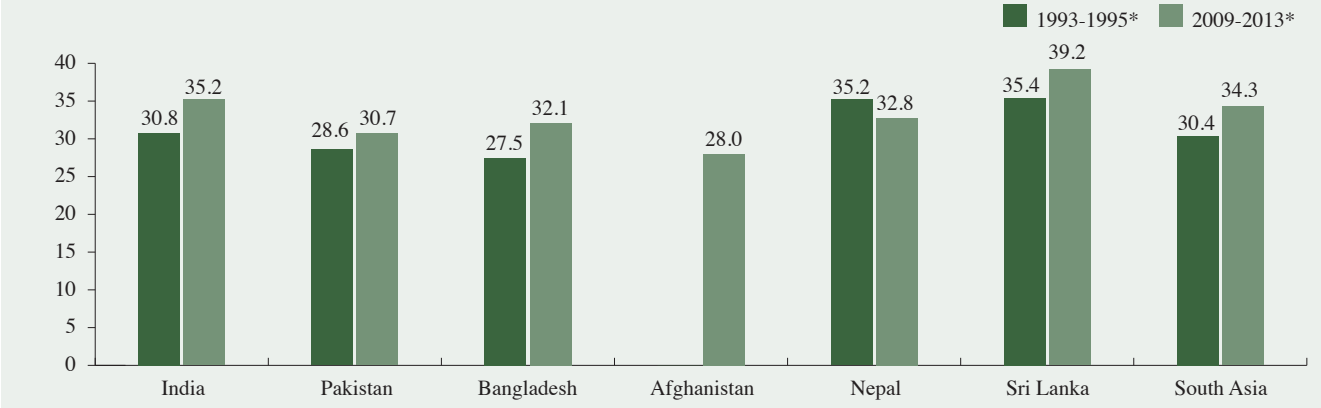
Rising income inequality

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*.

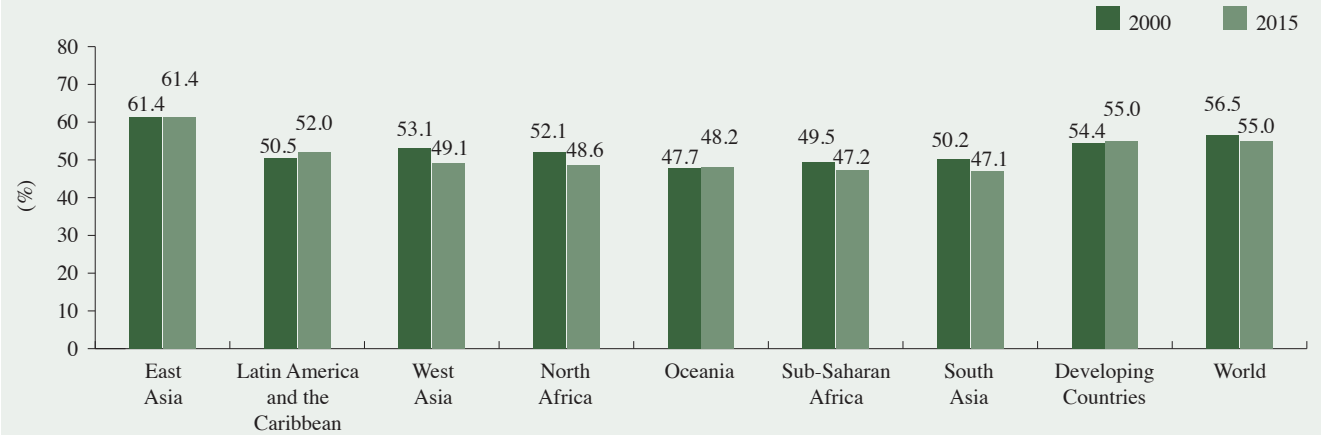
tured by the poor. In Pakistan, the poorest 20 per cent of the population accounted for 6.8 per cent of national income, while the richest 20 per cent for 48.9 per cent in 2013-14.[14] In India, between 1993-94 and 2009-10, the income of top 10 per cent of the urban population increased from 7.1 to 10.3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

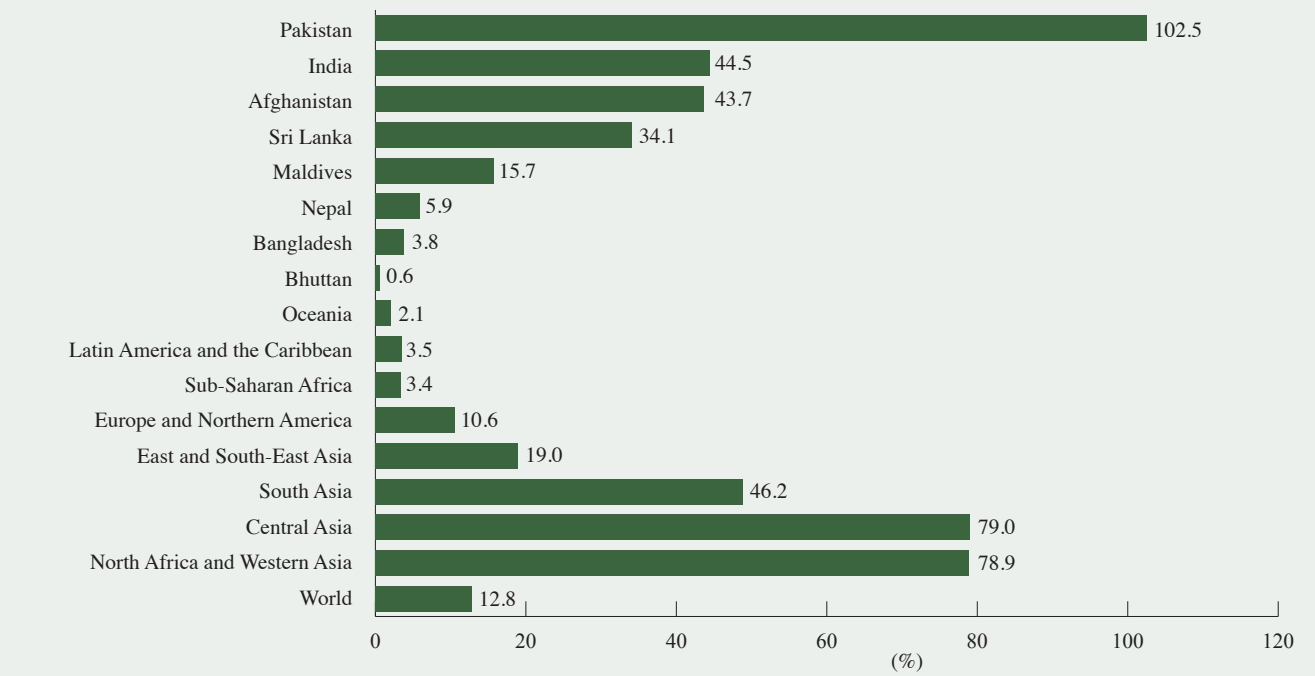
SHSs are small, household-level electrical systems powered by solar energy. They consist basically of a solar panel, inverter and battery. Depending on their size, they can power various domestic appliances, including lights, radios, televisions, fans and refrigerators. The system initially relied on 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.

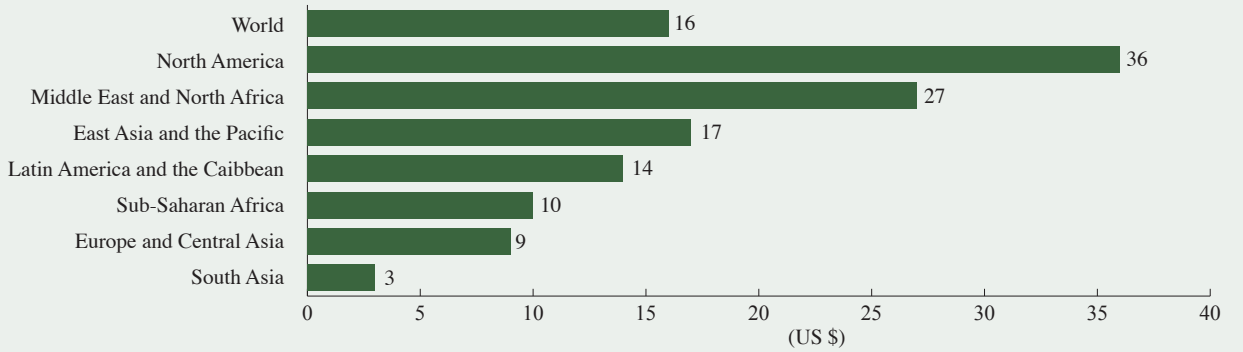
Greenhouse gases (GHGs) emissions

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.

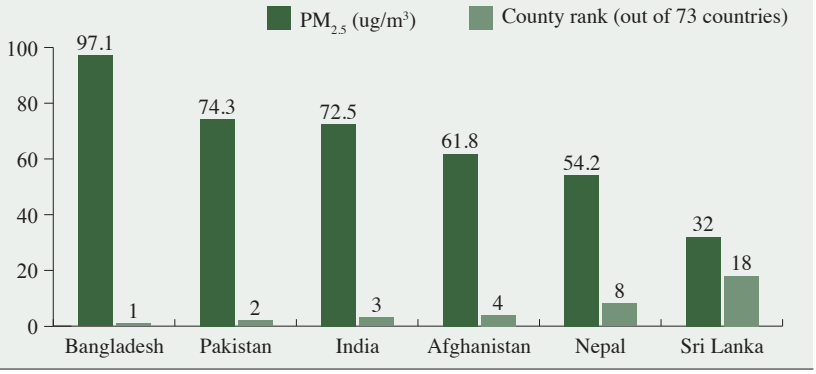
Sources: UN DESA 2019b and UNEP 2019a.

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.

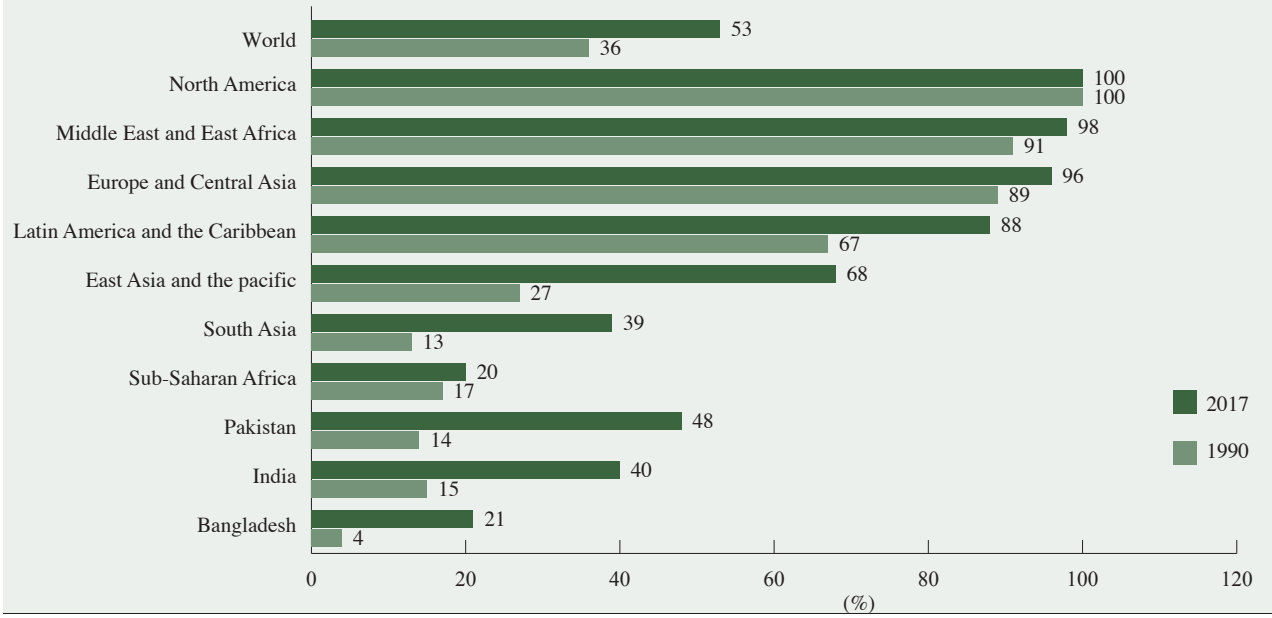
Figure 2.8 Estimated average $PM_{2.5}$ concentration (µg/m³) in South Asia, 2018



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	…	…

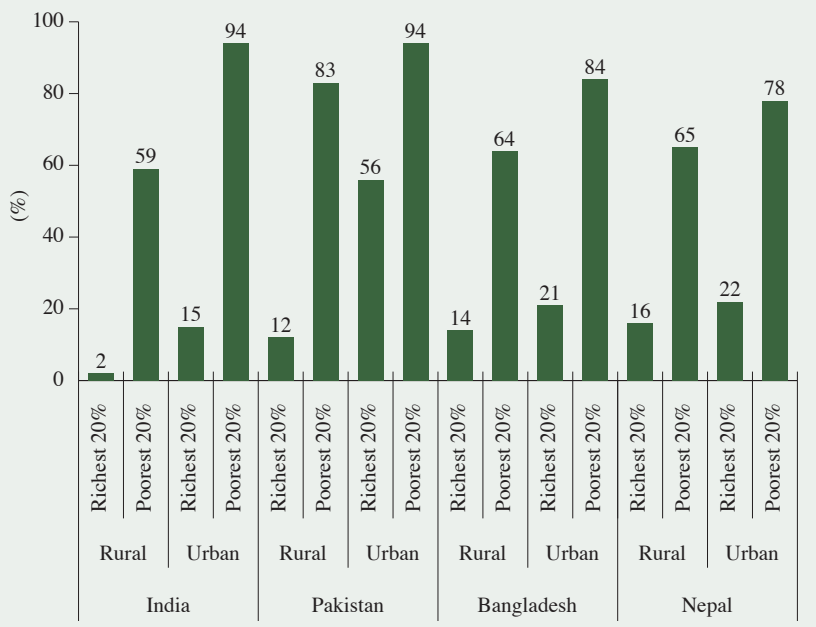
Sources: WWAP 2012 and UNEP 2019a.

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

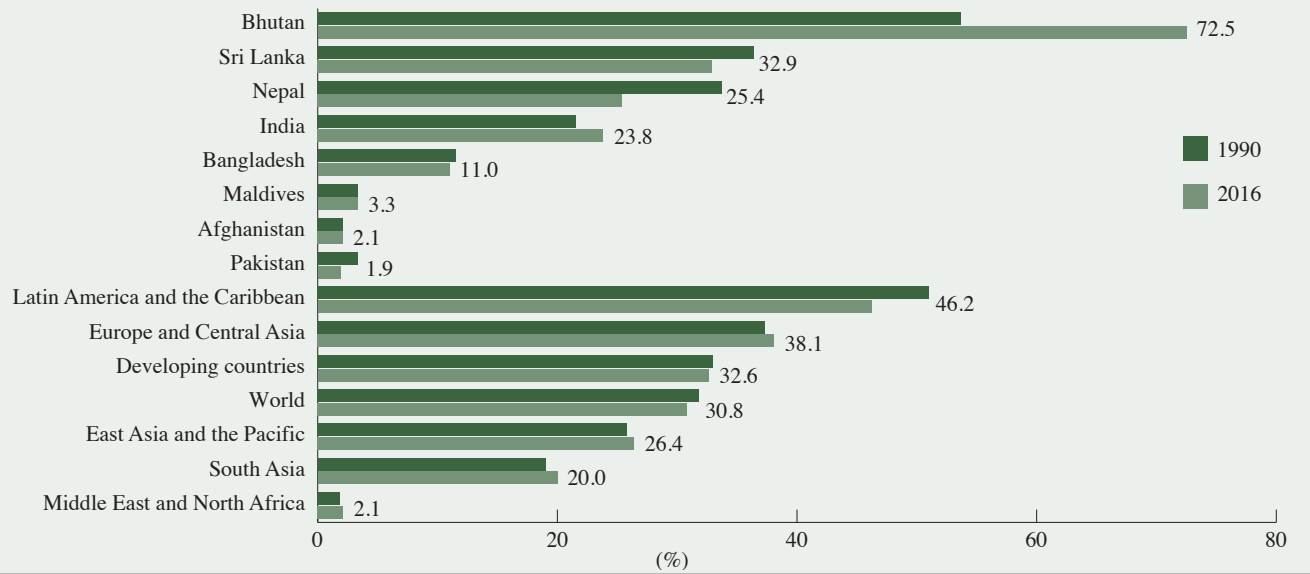
Deforestation, land degradation and loss of biodiversity pose major challenges to sustainable development and have affected the lives and livelihoods of millions of people. SDG 15 focuses specifically on managing forests sustainably, restoring degraded lands and successfully combating desertification, 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,

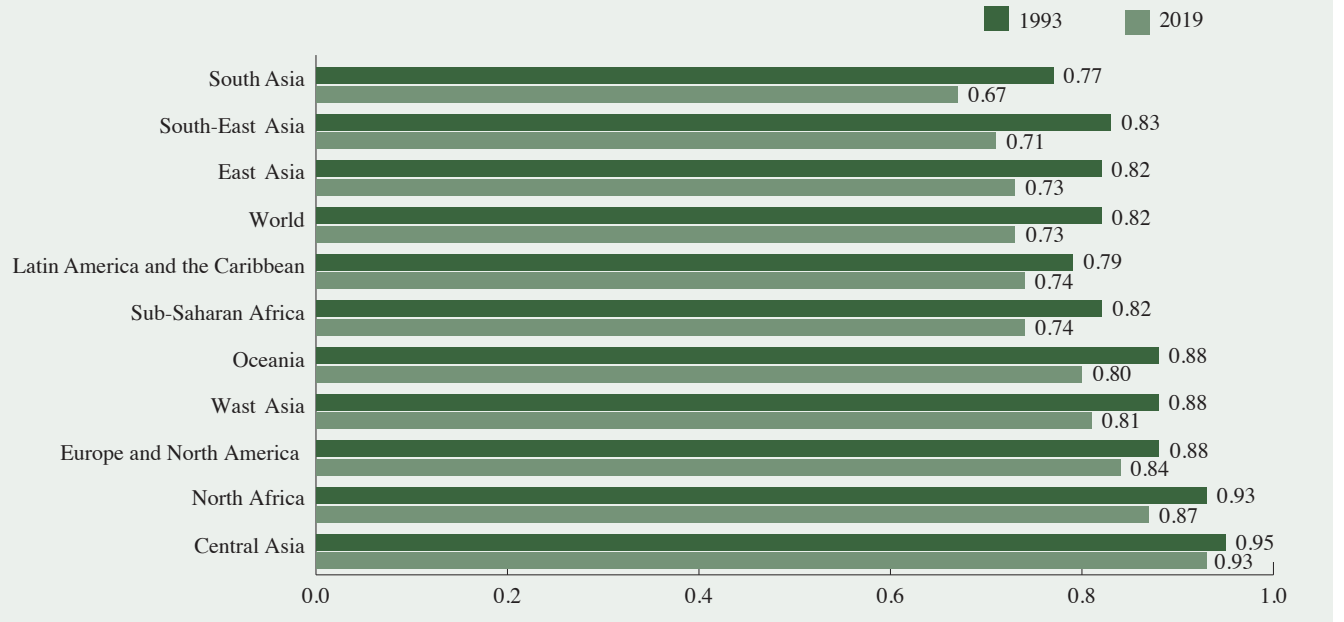
Table 2.15 Average proportion of each freshwater, terrestrial and mountain key biodiversity areas (KBAs) that is covered by protected areas, 2000-2018

(%)

	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.

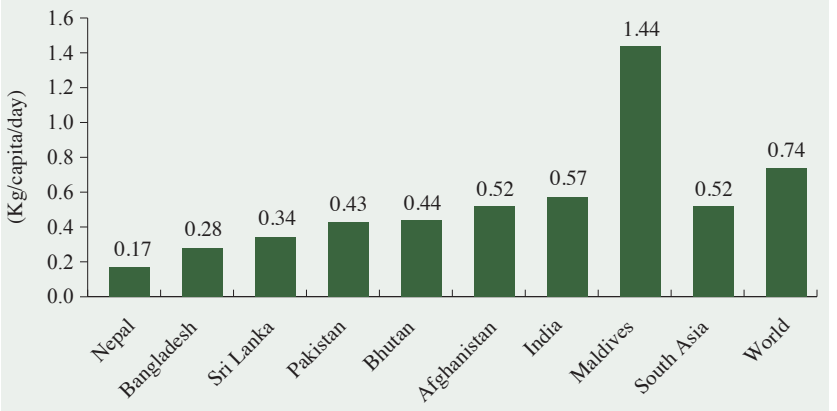
Waste collection: In South Asia, the waste collection rate is 51 per cent, which is lowest in the world only after Sub-Saharan Africa. Waste collection rates are higher for urban areas (77 per cent) than for rural areas (40 per cent), as waste management is typically an urban service.[63] The ratio varies 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.