United Nations | Department of Economic and Social Affairs

World Social Report 2021

Reconsidering Rural Development

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The *World Social Report* is a flagship publication of the United Nations Department of Economic and Social Affairs (UN DESA).

UN DESA is a vital interface between global policies in the economic, social and environmental spheres and national action. The Department's mission is to promote and support international cooperation in the pursuit of sustainable development for all. Its work is guided by the universal and transformative 2030 Agenda for Sustainable Development, along with a set of 17 integrated Sustainable Development Goals adopted by the United Nations General Assembly. UN DESA's work addresses a range of crosscutting issues that affect peoples' lives and livelihoods, such as social policy, poverty eradication, employment, social inclusion, inequalities, population, indigenous rights, macroeconomic policy, development finance and cooperation, public sector innovation, forest policy, climate change and sustainable development.

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Foreword

The COVID-19 pandemic has caused immense suffering around the world. It has taken millions of lives, reversed decades of development progress, exacerbated gender inequality and made the task of achieving the Sustainable Development Goals (SDGs) by 2030 even more difficult.

Through response and recovery efforts, however, opportunities exist to build a greener, more inclusive and resilient future. The experience of the pandemic has shown, for example, that where high-quality Internet connectivity is coupled with flexible working arrangements, many jobs that were traditionally considered to be urban can be performed in rural areas too.

This change has opened up new opportunities for rural development, which is fundamental to achieving the SDGs. Some 67 per cent of the populations of low-income countries and 60 per cent of lower-middle-income countries are rural. Rural areas contain most of the planet's natural capital, which is currently being depleted and degraded. Furthermore, about 80 per cent of those below the poverty line live in rural areas, and about one-fifth of rural people live in extreme poverty – a rate that is four times higher than for the urban population.

In this context, the *World Social Report 2021* calls for a reconsideration of rural development, aimed at ending the rural-urban divide and better protecting the health of the planet. It calls for renewed attention to in situ urbanization as a model of rural development that can both raise the living standards of rural people and mitigate urban ills. It also urges greater investment in sustainable agriculture and infrastructure and expanding rural access to the Internet, since rural household access is generally half that of urban areas.

I commend this report to all policymakers and other stakeholders committed to ending the rural-urban divide and accelerating efforts to deliver the Sustainable Development Goals.

António Guterres
Secretary-General of the United Nations

Acknowledgements

The *World Social Report* is the flagship publication of the United Nations Department of Economic and Social Affairs (UN DESA) on major social development issues.

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Explanatory notes

The following symbols have been used in the tables throughout the report:

- A minus sign indicates deficit or decrease, except as indicated.

. A full stop is used to indicate decimals.

/ A slash between years indicates a crop year or financial year, for example, 2020/21.

– Use of an en-dash between years, for example, 2020–2021, signifies the full period involved, including the beginning and end years.

Reference to "dollars" ($) indicates United States dollars, unless otherwise stated.

Details and percentages in tables do not necessarily add to totals, because of rounding.

The designations employed and the presentation of the material in this present publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country or territory or of its authorities, or concerning the delimitation of its frontiers. The term "country" as used in the text of this report also refers, as appropriate, to territories or areas. The designations of country groups in the text and the tables are intended solely for statistical or analytical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of the names of firms and commercial products does not imply the endorsement of the United Nations.

The following abbreviations have been used:

AI	artificial intelligence
CIS	Commonwealth of Independent States
EEA	European Environment Agency
ELCI	Environment Liaison Centre International
FAO	Food and Agriculture Organization of the United Nations
GDP	gross domestic product
GNI	gross national income
GVC/s	global value chain/s
ICT	information and communication technology
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
ILO	International Labour Organization
IPBES	Intergovernmental Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
IRP	International Resource Panel
ITU	International Telecommunication Union
LDCs	least developed countries
m^3	cubic metres
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
OECD	Organisation for Economic Co-operation and Development
OPHI	Oxford Poverty and Human Development Initiative
PPP	purchasing power parity
SAR	Special Administrative Region
SDG/s	Sustainable Development Goal/s
SIDS	small island developing States
UN DESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNECE	United Nations Economic Commission for Europe
UNECLAC	United Nations Economic Commission for Latin America and the Caribbean
UNEP	United Nations Environment Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNESCWA	United Nations Economic and Social Commission for Western Asia
UN-Habitat	United Nations Human Settlements Programme
UNICEF	United Nations Children's Fund
WFP	World Food Programme
WHO	World Health Organization
WRI	World Resources Institute
WWAP	World Water Assessment Programme

For analytical purposes, unless otherwise specified, the following country groupings and subgroupings have been used:

Developed economies	Australia, Canada, European Union, Iceland, Japan, New Zealand, Norway, Switzerland, United States of America.
Major developed economies (G7)	Canada, France, Germany, Italy, Japan, United Kingdom of Great Britain and Northern Ireland, United States of America.
European Union	Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden.
Economies in transition	*South-Eastern Europe*: Albania, Bosnia and Herzegovina, Montenegro, Republic of North Macedonia, Serbia. *Commonwealth of Independent States (CIS)*: Armenia, Azerbaijan, Belarus, Georgia,[a] Kazakhstan, Kyrgyzstan, Republic of Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine,[b] Uzbekistan.
Developing economies, Africa	*North Africa*: Algeria, Egypt, Libya, Mauritania, Morocco, Sudan, Tunisia. *Central Africa*: Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea, Gabon, Sao Tome and Principe. East Africa: Burundi, Comoros, Democratic Republic of the Congo, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Rwanda, Somalia, South Sudan, Uganda, United Republic of Tanzania. *Southern Africa*: Angola, Botswana, Eswatini, Lesotho, Malawi, Mauritius, Mozambique, Namibia, South Africa, Zambia, Zimbabwe. *West Africa*: Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, Togo.
Developing economies, Asia	*East Asia*:[c] Brunei Darussalam, Cambodia, China, Democratic People's Republic of Korea, Fiji, Hong Kong SAR,[d] Indonesia, Kiribati, Lao People's Democratic Republic, Malaysia, Mongolia, Myanmar, Papua New Guinea, Philippines, Republic of Korea, Samoa, Singapore, Solomon Islands, Taiwan Province of China, Thailand, Timor-Leste, Vanuatu, Viet Nam. *South Asia*: Afghanistan, Bangladesh, Bhutan, India, Iran (Islamic Republic of), Maldives, Nepal, Pakistan, Sri Lanka. *Western Asia*: Bahrain, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, State of Palestine, Syrian Arab Republic, Turkey, United Arab Emirates, Yemen.
Developing economies, Latin America and the Caribbean	*Caribbean*: Bahamas, Barbados, Belize, Guyana, Jamaica, Suriname, Trinidad and Tobago. *Mexico and Central America*: Costa Rica, Cuba, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama. *South America*: Argentina, Bolivia (Plurinational State of), Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Uruguay, Venezuela (Bolivarian Republic of).
Least developed countries[e]	Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Lao People's Democratic Republic, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Sao Tome and Principe, Senegal, Sierra Leone, Somalia, South Sudan, Solomon Islands, Sudan, Timor Leste, Togo, Tuvalu, Uganda, United Republic of Tanzania, Yemen, Zambia.

a Georgia officially left the Commonwealth of Independent States on 18 August 2009. However, its performance is discussed in the context of this group of countries for reasons of geographic proximity and similarities in economic structure.

b Starting in 2010, data for the Ukraine excludes the temporarily occupied territory of the Autonomous Republic of Crimea and Sevastopol.

c Throughout the report the term "East Asia" is used in reference to this set of developing countries, and excludes Japan.

d Special Administrative Region.

e As of February 2021.

Small island developing States and areas	American Samoa, Anguilla, Antigua and Barbuda, Aruba, Bahamas, Bahrain, Barbados, Belize, Bermuda, British Virgin Islands, Cabo Verde, Cayman Islands, Commonwealth of Northern Marianas, Comoros, Cook Islands, Cuba, Curaçao, Dominica, Dominican Republic, Federated States of Micronesia, Fiji, French Polynesia, Grenada, Guadeloupe, Guam, Guinea-Bissau, Guyana, Haiti, Jamaica, Kiribati, Maldives, Marshall Islands, Martinique, Mauritius, Montserrat, Nauru, New Caledonia, Niue, Palau, Papua New Guinea, Puerto Rico, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, Sao Tome and Principe, Seychelles, Singapore, Sint Maarten, Solomon Islands, Suriname, Timor-Leste, Tonga, Trinidad and Tobago, Turks and Caicos Islands, Tuvalu, U.S. Virgin Islands, Vanuatu.
Landlocked developing countries	Afghanistan, Armenia, Azerbaijan, Bhutan, Bolivia (Plurinational State of), Botswana, Burkina Faso, Burundi, Central African Republic, Chad, Eswatini, Ethiopia, Kazakhstan, Kyrgystan, Lao People's Democratic Republic, Lesotho, Malawi, Mali, Mongolia, Nepal, Niger, North Macedonia, Paraguay, Republic of Moldova, Rwanda, South Sudan, Tajikistan, Turkmenistan, Uganda, Uzbekistan, Zambia, Zimbabwe.
High-income economies, by per capita gross national income (GNI)[f]	Australia, Austria, Bahamas, Bahrain, Barbados, Belgium, Brunei Darussalam, Canada, Chile, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong SAR,[d] Hungary, Iceland, Ireland, Israel, Italy, Japan, Kuwait, Latvia, Lithuania, Luxembourg, Malta, Mauritius, Netherlands, New Zealand, Norway, Oman, Panama, Poland, Portugal, Qatar, Republic of Korea, Romania, Saudi Arabia, Singapore, Slovakia, Slovenia, Spain, Sweden, Switzerland, Taiwan Province of China, Trinidad and Tobago, United Arab Emirates, United Kingdom of Great Britain and Northern Ireland, United States of America, Uruguay.
Upper-middle-income economies, by per capita gross national income (GNI)[f]	Albania, Argentina, Armenia, Azerbaijan, Belarus, Belize, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, China, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Equatorial Guinea, Fiji, Gabon, Georgia, Guatemala, Guyana, Indonesia, Iran (Islamic Republic of), Iraq, Jamaica, Jordan, Kazakhstan, Lebanon, Libya, Malaysia, Maldives, Mexico, Montenegro, Namibia, North Macedonia, Paraguay, Peru, Russian Federation, Samoa, Serbia, South Africa, Suriname, Thailand, Turkey, Turkmenistan, Venezuela (Bolivarian Republic of).
Lower-middle-income economies, by per capita gross national income (GNI)[f]	Algeria, Angola, Bangladesh, Benin, Bhutan, Bolivia (Plurinational State of), Cabo Verde, Cambodia, Cameroon, Comoros, Congo, Côte d'Ivoire, Djibouti, Egypt, El Salvador, Eswatini, Ghana, Honduras, India, Kenya, Kiribati, Kyrgyzstan, Lao People's Democratic Republic, Lesotho, Mauritania, Mongolia, Morocco, Myanmar, Nepal, Nicaragua, Nigeria, Pakistan, Papua New Guinea, Philippines, Republic of Moldova, Sao Tome and Principe, Senegal, Solomon Islands, Sri Lanka, State of Palestine, Timor-Leste, Tunisia, Ukraine United Republic of Tanzania, Uzbekistan, Vanuatu, Viet Nam, Zambia, Zimbabwe.
Low-income economies, by per capita gross national income (GNI)[f]	Afghanistan, Burkina Faso, Burundi, Central African Republic, Chad, Democratic People's Republic of Korea, Democratic Republic of the Congo, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Rwanda, Sierra Leone, Somalia, South Sudan, Sudan, Syrian Arab Republic, Tajikistan, Togo, Uganda, Yemen.

f As of June 2020. The threshold levels of GNI per capita are established by the World Bank. Countries with less than $1,035 GNI per capita are classified as low-income countries, those with between $1,036 and $4,045 as lower-middle-income countries, those with between $4,046 and $12,535 as upper-middle-income countries, and those with incomes of more than $12,535 as high-income countries. GNI per capita in dollar terms is estimated using the World Bank Atlas method, based on data for 2019.

Sustainable Development Goals

Goal 1. End poverty in all its forms everywhere

Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Goal 3. Ensure healthy lives and promote well-being for all at all ages

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Goal 5. Achieve gender equality and empower all women and girls

Goal 6. Ensure availability and sustainable management of water and sanitation for all

Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all

Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Goal 10. Reduce inequality within and among countries

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable

Goal 12. Ensure sustainable consumption and production patterns

Goal 13. Take urgent action to combat climate change and its impacts

Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

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Executive summary

Rural development is essential to achieving the 2030 Agenda for Sustainable Development. It is also a reflection of the Agenda's guiding principle of leaving no one behind. As such, rural development must now be reconsidered. Instead of being viewed as a sideshow or an appendix to urban development, rural development should be pushed to the centre stage of global sustainable development efforts. Several key factors have made a reconsideration of the role and strategies of rural development urgent.

First, the deep challenges of poverty and inequality persist in rural areas—home to four out of every five people living below the international income poverty line. Rural populations also have less access to education, health and other services. In some countries, these rural-urban disparities also contribute to rural discontent and grievances, polarization in society, and unrest.

Second, the current strategies of rural development are proving inadequate for protecting the health of the planet. The continued loss of forests and wilderness contributes to climate change and is also one of the reasons for the increased frequency of zoonotic diseases, such as COVID-19. Climate change in turn is having greater adverse effects on agriculture and rural economies, thus creating a vicious cycle.

Third, and on the brighter side, the advent and spread of digital and other frontier technologies are changing the fundamentals of the present rural-urban divide. Rapid technological progress is creating the possibility of ending this divide—a goal that has been cherished by many progressive thinkers since the nineteenth century.

Finally, recent experience has shown that, in this era of globalization, steady decline of the share of agriculture in the gross domestic product, or of the rural population in the total population, is not the only way in which a country can transform itself into a high-productivity country. Rather, it is possible to industrialize, even with these shares remaining high.

The share of rural population in national population differs greatly from country to country, and so does the depth of the rural development challenge. Rural population comprises about 67 and 60 per cent of the population in low-income and lower-middle-income countries, respectively, making rural development the central issue for them. Even in high-income countries, rural population comprises about one fifth of the population. More importantly, rural areas are critical for the ecology and environment of a country, so that the strategies of rural development assume greater significance for upper-middle-income and high-income countries than it may appear on the basis of the shares of rural population in the total population of these countries.

Rural development, as it is proceeding now in many low-income and lower-middle-income countries, is not likely to meet the socioeconomic Sustainable Development Goals (SDGs) established in the 2030 Agenda for Sustainable Development. In other countries, where achieving the socioeconomic Goals is less of a challenge, achieving the environmental Goals is proving elusive. The need for resetting rural development is therefore general, applying to both developing and developed countries.

World Social Report 2021: Reconsidering Rural Development offers strategic principles, programmes of action, and a set of policies that can be combined to help realize the potential of rural development and to achieve the SDGs. To develop these principles, programmes, and policies, the *World Social Report 2021* reviews and analyzes the recent experiences in rural development regarding economic growth and transformation, reducing poverty and inequality, and protecting the health of the planet.

Accelerating the process of rural economic transformation

The experience of both the early and newly industrialized countries shows that progress in agriculture and the rural economy can have a *preceding* role in the overall socioeconomic transformation of a country. In Europe, agricultural productivity growth preceded industrialization in England and France. In Asia, Japan, Republic of Korea, Taiwan Province of China and, later, China all experienced significant improvement in agricultural productivity that preceded, and later overlapped, with the industrialization process of these countries. The experience of the Green Revolution in the 1960s in India and several other developing countries showed how agricultural productivity growth can have an autonomous and catalytic role in spurring national development. Rural development, therefore, needs to be considered central to a sustainable development process, instead of as an appendage of urban industrial development.

Urbanization so far has generally taken two basic forms: (i) *classical* and (ii) *greenfield*. The classical model refers to urbanization through the migration of rural inhabitants into pre-existing urban centres. In the greenfield model, new cities develop in what were previously rural areas.

In situ urbanization—despite its name—is actually a model of rural development in which improvements in the standard of living in existing rural communities take place without migration or conversion into urban areas. This "place-based" model has proved particularly effective in fostering long-term economic growth and spatial equity between rural and urban areas. China, Japan and Sri Lanka all provide examples of in situ modernization of rural areas.

Achieving the vision of inclusive economic growth set out in the 2030 Agenda requires solutions tailored for the challenges of rural communities, starting with unlocking the potential of agricultural productivity. Only with substantial gains in productivity can rural communities create new economic opportunities for firms to provide farm and non-farm goods and services. At the macro level, labour and other resources then become available for use elsewhere in the economy, sustaining a virtuous cycle of economic development.

The improvement in agricultural productivity alone is not sufficient for successful rural transformation. Strong linkages are needed between the different sectors to transfer the gains from agriculture into demand for labour, inputs and services in non-farm activities. This process should also encourage investment, entrepreneurship and job growth in the non-farm economy as rural economies thrive.

Several factors are critical for improving both agricultural productivity and the development of a strong rural non-farm economy. The stability of prices of agricultural products in global markets; sufficient investment in agricultural research; and farmers' access to technology are all factors that contribute to higher agricultural productivity. Inclusive rural financing also helps by expanding the options for households and firms to adopt more advanced technologies, to invest in education and capacity-building, and to scale-up their productive activities, thereby improving productivity in both rural farm and non-farm sectors. Financial intermediation also allows better cash flow and risk management—both critical factors for effective agricultural and non-agricultural businesses.

New digital technologies offer new opportunities to accelerate rural economic transformation by helping to make agricultural production more efficient and profitable. Farmers can access services that help increase their yields and productivity, including detailed weather forecasts, mobile payment systems, crowdfunding platforms for access to finance, extension services for technical advice, and many others. E-commerce and transportation platforms are also helping rural producers sell their products to urban consumers and in international markets. Rural business ventures and start-ups based on digital technologies make it possible for goods and services to be sourced and sold directly in rural communities, helping to build the local economy and narrowing the rural-urban divide.

Each country must identify and act on the specific policies that target the context-specific barriers to

agricultural productivity growth as well as the factors that can accelerate growth in non-farm activities. In all cases, policies can be immediately implemented that both have quick results and that lay the foundations for longer-term changes. These include policies to promote investment in education and the development and retention of local talent and skills for both public and private activities. Because of its catalytic role in rural transformation and development, the use of technology should be greatly encouraged and accelerated. This requires that countries build the underlying infrastructure and supportive financial and regulatory environment with specific attention to the needs of rural communities.

Governments looking to advance the goal of sustainable rural development must also take an in-depth look at the existing land and energy price and subsidy policies that so directly impact the overall footprint of agriculture and other non-farm activities. This includes reviewing why so many well-meaning economic initiatives often fail to reach the poor and how they can be better designed to ensure that the benefits accrue to local communities and those most in need.

Reducing poverty and inequality and building social capital

Poverty remains mainly a rural phenomenon. In many countries of sub-Saharan Africa, for instance, more than half of the rural population lives in extreme poverty. The COVID-19 pandemic has further compounded the already vulnerable position of the rural poor by reducing incomes, limiting mobility and reducing food security.

In recent decades, income poverty has fallen more sharply in rural than urban areas, but this success has not always led to lower rural inequalities or the closing of the rural-urban divide. A key factor explaining the decline in poverty in rural areas has been the substantial investment that countries have made in enhancing access to basic infrastructure and public services. The average progress in improving school attendance, reducing stunting, and increasing access to electricity, for example, has been faster in rural than in urban areas since the 1990s.

Despite this progress, rural inequalities in access to basic services and opportunities are persistently high for specific social groups. For indigenous peoples and ethnic minority groups, for example, income, wealth and opportunity gaps are greater in rural than in urban areas. The intersection of gender with rural residence confers additional disadvantages to women, who face more obstacles than men or women in urban areas. Overall, even if the progress observed in these dimensions of well-being continues, rural communities will still lag far behind urban areas by 2030.

Persistent and rising inequality can be detrimental to economic growth and poverty reduction. Ending poverty will require substantial income increases for poor people in rural areas. Inclusive agricultural growth is estimated to be two to four times as effective in reducing poverty as growth in other sectors, and it benefits mainly the poorest in society. The benefits of promoting inclusive agricultural development are both direct, through higher income and food security, and indirect, through increased investment in health and education.

However, as populations and economies grow, constraints on available land may arise. Policy choices can influence whether increased competition for land leads to inclusive development or a scramble for resources. A fair distribution of and secure access to land and natural resources is required, regardless of whether tenure is based on individual or collective rights. Moreover, it is vital to ensuring rural women's equal access to land and natural resources and to ending discriminatory laws and practices.

Social protection coverage in rural areas is generally lower than in urban areas and few programmes are explicitly tailored to match rural specificities. Improved social protection requires that existing legal frameworks and contribution schemes be adjusted and expanded to account for different rural employment types. Subsidies can also enhance the participation of rural labour in contributory social protection schemes.

Rural development within planetary boundaries

To achieve the SDGs by 2030, the current patterns of rural development need to shift towards a greater balance between the Goals concerning material prosperity and those focusing on the health of the planet.

The current rural development strategies are not proving environmentally sustainable. Although successful in terms of increasing global food production and helping to reduce hunger and malnutrition, agricultural practices have contributed to the depletion, degradation and pollution of water and land resources. Over the last century, there has been a nearly sixfold increase in the use of global freshwater resources—twice the rate of population growth during the same period. Agriculture remains by far the largest sector in terms of overall water consumption, accounting for about 70 per cent of all freshwater withdrawals, mostly for irrigation. Climate change is further disrupting the availability of renewable freshwater resources for drinking water and irrigation.

Large-scale withdrawals for irrigation purposes have diminished freshwater flows reaching the sea, thereby affecting marine life, impacting biodiversity of the estuaries, and contributing to global ocean degradation. The global growth of agricultural production has been driven by more intensive use of inputs such as chemical fertilizers and synthetic pesticides (to a lesser extent in sub-Saharan Africa). This growing use of chemicals, however, has caused runoff that pollutes irrigation and drinking water and leads to eutrophication of coastal waters. The rapidly increasing use of plastic products in agriculture is another growing source of water pollution in rural areas. Agriculture, as a result, has overtaken industry as the major source of pollution of inland and coastal waters.

The rapid expansion of croplands and pastures, under the current patterns of agricultural and rural development, is responsible for the loss of some 30 per cent of the global forest cover; for 20 per cent of the standing forest being degraded between 1990 and 2015; and the alarming rate of extinction of species and loss of biodiversity. Moreover, the Intergovernmental Panel on Climate Change attributes between 21 and 37 per cent of total greenhouse gas emissions to the global food system. Land-use and land-cover changes increase the release of carbon dioxide by disturbing soils and vegetation, and are the main driver of deforestation, particularly when followed by agriculture. This means that rural land management practices have a direct impact on climate change. Soil erosion is also a growing problem, because of both the sheer size of agricultural land and unsustainable farming practices. Also, the construction of roads, electricity and water infrastructure has caused irreplaceable loss to natural habitats.

Making rural development more conducive to the achievement of the SDGs by 2030 will require (i) a rethinking of current strategies and practices, particularly in agriculture, with a particular focus on deploying the power of technology; (ii) promoting a shift to circular and conservation practices; and (iii) investing in institutions for better management of natural resources. New technologies are particularly important to improving the efficiency of irrigation and thus to keeping global water demand at a sustainable level. Precision farming can also substantially improve water-use efficiency and reduce the need for harmful chemicals. More widespread application of sensor technologies that measure surface and groundwater levels can also provide local governments and water utility companies with a more complete picture of available resources to meet current and projected water demand. Furthermore, greater focus on improving rainwater harvesting by relying on nature-based solutions is critical to improving water supply. Moreover, an investment in improving the energy supply—through solar units, for example—is essential for small farmers in developing countries, as significant energy is needed to pump water from the ground and surface sources and to distribute water in the field, and for many applications in the agricultural value chain.

Various technologies are available to help increase the efficiency of fertilizer application in agriculture. These include conservation tillage practices that reduce surface runoff, including nitrogen in water bodies. The development of new seed varieties is also ena-

bling more sustainable agricultural intensification by fostering better soil health, thereby reducing the need for both fertilizer use and agricultural land expansion.

The scaling up of circular and conservation practices, particularly in agriculture, is critical for achieving sustainable rural development. Organic farming has the potential to become a major alternative to conventional farming with lower environmental impacts. While conventional agriculture has historically produced higher yields than organic farming, the depletion of the soil quality has reduced this advantage over time. Conservation agriculture is another practice that aims to ensure that conventional farming uses key land resources, such as the soil, in a sustainable manner. A shift in agricultural practices must also be accompanied by changes in food consumption patterns in both rural and urban areas, including a shift in diets and a reduction in food waste. The adoption of circular approaches is also critical for reducing water use and pollution stemming from rural industries. Reusing wastewater for agricultural and rural industrial purposes means less pollution, more conservation, and additional resources for recharging aquifers.

The collective management of forests and wilderness has proved to be more effective than relying on individuals or central authorities, particularly when it comes to the restoration of degraded forests. Land and water rights also have an important role to play in improving the management of natural resources. Secure water rights, for example, create incentives for improved irrigation management by farmers—including the adoption of more advanced technology—and landowners are generally more likely to invest in long-term land improvement if they have secure land tenure. Subsidies that encourage the exploitation of natural resources should be eliminated and replaced with economic instruments that incentivize sustainable water and land management and provide ecosystem services.

Resetting rural development for the 21st century

Achieving sustainable development, including the SDGs, by 2030 will require a resetting of rural development for the twenty-first century. Such a reset will require resetting strategic principles, cross-cutting programmes, and sectoral policies.

Resetting strategic principles

Going forward, rural development efforts need to adopt the following strategic principles:

i. Assigning rural development an active and preceding role in the overall development process, instead of treating it as an appendage of an urban-centred development model;
ii. Utilizing the potential of in situ urbanization as a model of rural development and for achieving a more sustainable rural-urban spatial combination;
iii. Directing rural development away from environmental damage and towards environmental protection;
iv. Being aware that the new digital and frontier technologies are undercutting the technological basis of the rural-urban divide and making active use of these technologies for ending this division;
v. Recognizing that the potential of new technologies is not limited to agriculture only but extend to the expansion of remote work, manufacturing based on 3D printing, and a whole range of new activities that can revitalize and rejuvenate rural societies;
vi. Choosing agricultural models after re-examining them through the prism of sustainable development; and
vii. Acknowledging that rural development strategy has to be country specific because of its greater dependence on the local physical and institutional conditions.

Resetting cross-cutting programmes

In realizing the new potential of rural development, it will be important to internalize the spillovers that exist among efforts geared to achieving economic, social, and environmental objectives. Priority should therefore be given to those programmes that can help achieve

multiple SDGs simultaneously. These include comprehensive public investment directed at:

i. Improving basic infrastructure (including roads, electricity supply, clean drinking water and sanitation facilities);
ii. Human capital development (including quality education, healthcare, cultural facilities);
iii. Adequate provision of public administrative services; and
iv. Broad-band Internet and other information and communications technology services.

Resetting sectoral policies

Concrete policies are also needed for achieving the objectives in the particular areas of economic, social, and environmental dimensions of rural development. These include:

i. Raising agricultural productivity and expanding non-farm activities;
ii. Enhancing smallholder farmers' access to land;
iii. Strengthening social protection of rural labour;
iv. Implementing strategies that give special attention to rural women, indigenous peoples, older persons and young people;
v. Protecting water and land resources from depletion, degradation, and pollution;
vi. Advancing circular economic practices in both agricultural and non-agricultural activities; and
vii. Promoting mixed and organic farming.

The above strategies, cross-cutting programmes, and sectoral policies, when brought together, can provide the foundation for resetting rural development for the twenty-first century, enabling countries to achieve the 2030 Agenda for Sustainable Development.

Chapter I

UN Photo/Kibae Park

Introduction

Nearly half of the world's population, including four out of five people living below the poverty line, live in rural areas. Extreme poverty is concentrated mainly in rural areas. Rural people also generally have less access to education, health and other essential services. Additionally, production and distribution of agricultural products—such as coffee, tea, bananas and palm oil—which largely engage rural people, often involve human rights abuses. Gender inequality, poor working conditions and the violation of indigenous land rights, for example, have often been reported in the supply chains of these products. Clearly, inclusion and improvement of the well-being of the rural population must become a focus or sustainable development cannot be achieved. The general principle of the 2030 Agenda for Sustainable Development to leave no one behind also highlights this imperative. However, the rural populations need not be viewed as *passive* recipients of attention. Instead, with the adoption of appropriate strategies, rural development can play an active role, serving as a driver for achieving the Sustainable Development Goals (SDGs).

The role of rural development is not limited to achieving the prosperity-related SDGs only. The natural capital of humankind lies predominantly in rural areas. Agriculture, the primary economic activity in rural areas, is more intimately connected with nature than are urban economic activities. Appropriate rural development strategies are therefore intrinsic to protecting the health of the planet—a critical and unifying objective for all.

It is possible to adopt two views of the role of the rural population in sustainable development. One is the *narrow* view, focusing on the connection between rural development and the SDGs regarding poverty (SDG 1), hunger (SDG 2), and equality (SDG 5 and SDG 10). The other is the *broader* view that emphasizes the wider range of connections, including those between rural development and SDG 6 (clean water and sanitation), SDG 7 (clean energy), SDG 8 (economic growth and decent work), SDG 9 (infrastructure), SDG 11 (sustainable communities), SDG 12 (responsible consumption and production), SDG 13 (climate change), SDG 14 (life below water) and SDG 15 (life on land). That so many SDGs are connected with rural development should not be surprising because the SDGs themselves are interrelated.

The discussion of rural development has so far focused more on its relationship with the SDGs related to poverty, hunger and inequality. However, given the above noted persistence of poverty and other material deprivations in rural areas, it is necessary to re-examine the current rural development strategies from the viewpoint of those SDGs, too. That is indeed one of the goals of the *World Social Report 2021*.

The other major goal of this report is to expand the discussion to include the role of rural development in achieving the wider set of SDGs. In doing so, it will pay particular attention to the connections of rural development with SDGs 6, 8, 9, 11, 13, 14 and 15. However, an exhaustive discussion of all aspects of these connections is beyond the scope of a single report. Attention will therefore be focused on those connections that have a potential nexus role, capable of exerting influence in multiple directions.

Several recent events have highlighted the importance of rethinking current rural development strategies. First is the COVID-19 tragedy, which has pointed to the necessity of protection of forests and wilderness in order to prevent frequent occurrences of zoonotic epidemics and pandemics, such as COVID-19 itself. Needless to say, greater protection of forests and wilderness would require modifications of the current rural development strategies. Second, unprecedented farmers' protests, such as the one seen recently in India, and resentment of rural people towards national authorities, as observed in many other countries,[1]

1 The Yellow Vest movement in France and elsewhere, for example, contained an element of protest against rural-urban disparity.

show that neglect of the rural population and agricultural policy issues can expand the rural-urban divide into a political problem. Third, digital technologies of the fourth industrial revolution are undercutting the very economic rationale of the rural-urban divide, thus changing the paradigm within which rural development has so far been considered and discussed. Finally, the adverse effects of climate change are gathering force, including their negative impact on agriculture and rural economies. Coping with these effects also requires rethinking rural development strategies. These recent events, along with existing challenges, have combined to make a reconsideration of current rural development patterns urgent.

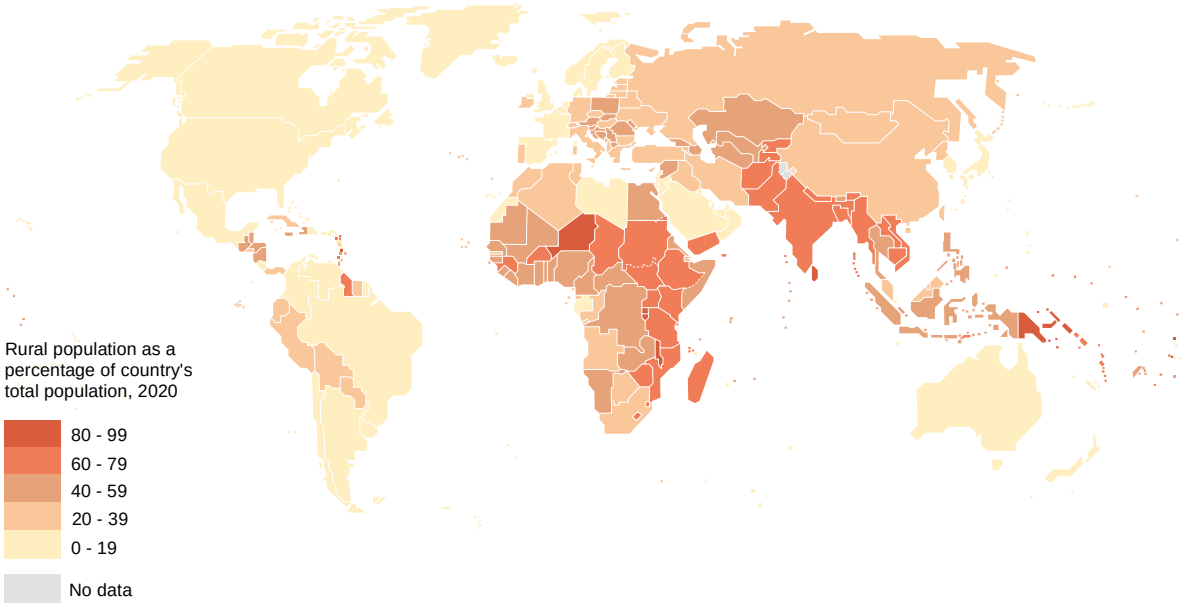
The rural world: an overview

To begin with, it is important to be aware that the importance and state of the rural economy and population differ widely across countries. The discussion of rural development must therefore begin by establishing the broad facts regarding this variation.

The share of rural population in national population differs greatly from country to country, and so does the depth of the rural development challenge. About 90 per cent of the world's rural population lives in countries where rural population constitutes at least 30 per cent of the national population (table I.1 and figure I.1). In fact, more than 50 per cent lives in countries where the rural population constitutes more than 60 per cent of the national population. Also, about 70 per cent of the world's rural population lives in low-income or lower-middle-income countries (figure I.2), and rural population comprises about 60 and 67 per cent of the population in lower-middle income and low-income countries, respectively (figure I.3). It is therefore clear that the issue of rural development is central for low- and lower-middle-income countries. However, even in high-income countries, rural populations comprise about one fifth of the population, making rural development important for these countries also. More importantly, rural areas are critical for the ecology and environment of a country, so that that the importance of rural development cannot be gauged only by the share

Figure I.1

Rural population as a percentage of country's total population, 2020



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.
Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan.
The final status of Jammu and Kashmir has not yet been agreed upon by the Parties.
Final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined.
A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).

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Map No. 4623.1 Apr 2021

Source: UN DESA, based on data from United Nations (2019b).

Table I.1

Rural population as a percentage of total population across countries, 2020

Rural population as a percentage of country's total population	Countries	Number of countries	Millions of rural people (percentage of global rural population)
0 to < 5	Anguilla, Belgium, Bermuda, Cayman Islands, Gibraltar, Guadeloupe, Holy See, Hong Kong SAR, Kuwait, Macao SAR, Monaco, Nauru, Qatar, Réunion, San Marino, Singapore, Sint Maarten (Dutch part), United States Virgin Islands, Uruguay	19	0.4 (0.01)
5 to < 10	Argentina, Gabon, Guam, Iceland, Israel, Japan, Jordan, Luxembourg, Malta, Netherlands, Northern Mariana Islands, Puerto Rico, Turks and Caicos Islands	13	17 (0.5)
10 to < 20	American Samoa, Andorra, Australia, Bahamas, Bahrain, Brazil, Canada, Chile, Colombia, Costa Rica, Curaçao, Denmark, Dominican Republic, Finland, France, French Guiana, Greenland, Lebanon, Libya, Martinique, Mexico, New Zealand, Norway, Oman, Palau, Republic of Korea, Saint Pierre and Miquelon, Saudi Arabia, Spain, Sweden, United Arab Emirates, United Kingdom, United States, Venezuela (Bolivarian Republic of), Western Sahara	35	196 (5.7)
20 to < 30	Algeria, Belarus, Bolivia (Plurinational State of), Botswana, Brunei Darussalam, Bulgaria, Cook Islands, Cuba, Czechia, Djibouti, Dominica, El Salvador, Equatorial Guinea, Falkland Islands (Malvinas), Germany, Greece, Hungary, Iran (Islamic Republic of), Iraq, Italy, Malaysia, Marshall Islands, New Caledonia, Peru, Russian Federation, São Tomé and Príncipe, State of Palestine, Switzerland, Taiwan Province of China, Turkey	30	180 (5.3)
30 to < 40	Albania, Angola, Armenia, Cabo Verde, China, Congo, Cyprus, Dem. People's Republic of Korea, Ecuador, Estonia, French Polynesia, Gambia, Ireland, Latvia, Lithuania, Mongolia, Montenegro, Morocco, Panama, Paraguay, Portugal, South Africa, Suriname, Tunisia, Tuvalu, Ukraine	26	644 (18.9)
40 to < 50	Austria, Azerbaijan, Cameroon, Côte d'Ivoire, Croatia, Fiji, Georgia, Ghana, Guatemala, Haiti, Honduras, Indonesia, Isle of Man, Jamaica, Kazakhstan, Kiribati, Liberia, Mauritania, Namibia, Nicaragua, Nigeria, Poland, Romania, Saint Vincent and the Grenadines, Serbia, Seychelles, Slovakia, Slovenia, Syrian Arab Republic, TFYR Macedonia, Thailand, Trinidad and Tobago, Turkmenistan, Uzbekistan	34	395 (11.6)
50 to < 60	Aruba, Belize, Benin, Bhutan, Bosnia and Herzegovina, British Virgin Islands, Central African Republic, Democratic Republic of the Congo, Egypt, Eritrea, Faeroe Islands, Guinea-Bissau, Maldives, Mali, Mauritius, Mayotte, Niue, Philippines, Republic of Moldova, Saint Helena, Senegal, Sierra Leone, Somalia, Togo, Zambia	25	233 (6.8)
60 to < 70	Bangladesh, Barbados, Burkina Faso, Channel Islands, Grenada, Guinea, India, Kyrgyzstan, Lao People's Democratic Republic, Madagascar, Mozambique, Myanmar, Pakistan, Saint Kitts and Nevis, Sudan, Timor-Leste, United Republic of Tanzania, Viet Nam, Yemen, Zimbabwe	20	1,405 (41.1)
70 to < 80	Afghanistan, Antigua and Barbuda, Cambodia, Chad, Comoros, Ethiopia, Guyana, Kenya, Lesotho, Micronesia (Fed. States of), Nepal, Solomon Islands, South Sudan, Eswatini, Tajikistan, Tonga, Uganda, Vanuatu	18	262 (7.7)
80 to < 90	Burundi, Liechtenstein, Malawi, Niger, Papua New Guinea, Rwanda, Saint Lucia, Samoa, Sri Lanka	9	83 (2.4)
90 to 100	Montserrat, Tokelau, Wallis and Futuna Islands	3	0.02 (0.001)
Total		**232**	**3,417 (100.0)**

Source: UN DESA, based on data from United Nations (2019b).

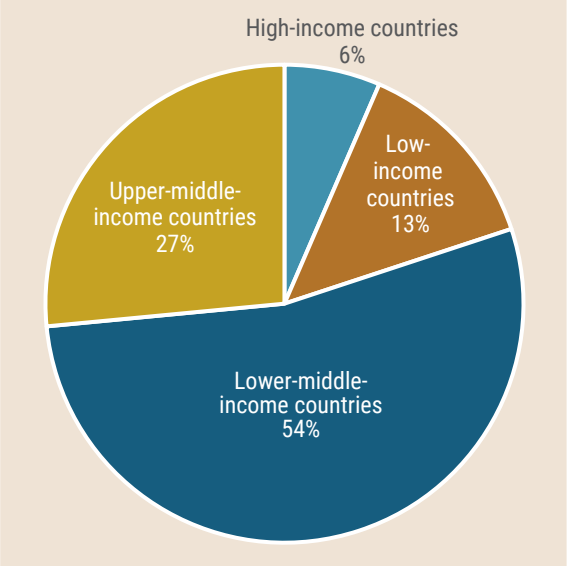
of population living in rural areas. From this viewpoint, strategies of rural development assume much greater significance for upper-middle-income and high-income countries than it may appear if focusing just on the shares of rural population in total population in these countries.

While table I.1 and figures I.1, I.2 and I.3 show the *location* of the rural population across the world, they do not provide the information regarding the ***depth*** of the rural development challenge. One reflection of this challenge is the rural-urban disparity. Although this disparity is multidimensional, rural-urban differences in per capita income can be an important indicator. Unfortunately, per capita income data, disaggregated by rural and urban areas, are not readily available. Therefore, table I.2 and figure I.4 use the per capita (of the agricultural population) agriculture value added as a proxy for per capita rural income. Needless to say, this approach has a number of weaknesses, because many people in rural areas are engaged either entirely or partly in non-farm activities, so that per capita rural income may differ from the per capita agricultural value added. Be that as it may, even this imperfect proxy can help to throw some light on the rural-urban disparity across the world.

The numbers in table I.2 show that for most country categories, the per capita agricultural gross domestic product (GDP) is much lower than the per capita GDP of the country as a whole. This is true for all countries with up to $5,000 per capita agricultural GDP. This is also true for countries belonging to such upper ranges as $20,000–$30,000 and also $30,000–$40,000 of per capita agricultural GDP. For many groups, the ratios of per capita agricultural GDP to per capita total GDP were exceedingly low, ranging from 55 to 65 per cent. Clearly, these ratios would have been even lower if the per capita agricultural GDP was compared with per capita *non-agricultural* GDP and not with per capita ***total*** GDP. Table 1.2 also reveals the other side of the picture, namely that for some categories of countries, per capita agricultural GDP was higher than per capita total GDP. This shows that agriculture does not necessarily have to be the sector with lower productivity. With the upgradation of technology to the industrial level, agriculture can achieve higher labour productivity than in other sectors of the economy, including manufacturing.

Figure I.2

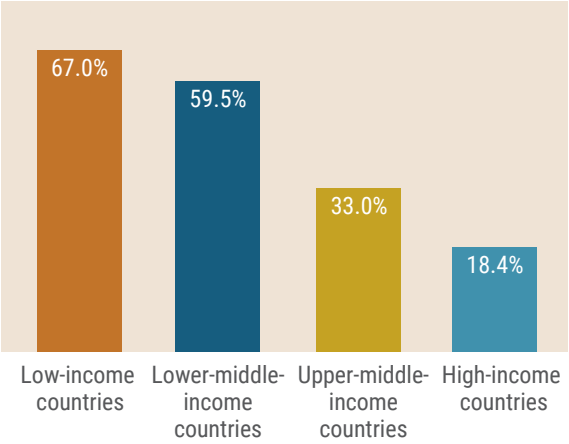
Share of world's rural population by country income group, 2020



Source: UN DESA, based on data from World Bank (2021).

Figure I.3

Share of rural population in total population by country income group, 2020



Source: UN DESA, based on data from United Nations (2019b) and World Bank (2021).

Despite the contrary examples, table I.2 shows that 71.3 per cent of the world's rural population lives in countries where the agricultural per capita income is lower than the per capita income of the country as a whole. This shows that the rural-urban income disparity is real, pervasive and, for many countries, quite high. Table I.2 also shows that the problem of rural-urban

Table I.2

Gap between the per capita income in the agriculture sector and per capita GDP across countries, 2019

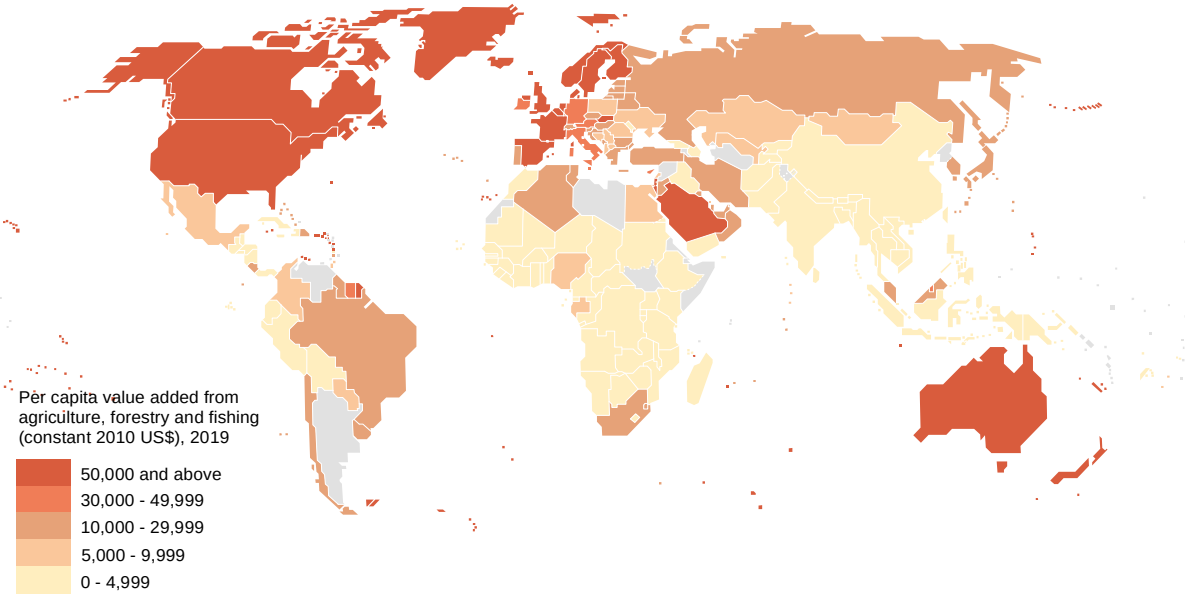
Per capita value added from agriculture, forestry and fishing (AFF) (US$)	Countries	Number of countries	Population size (percentage of global population)		Population-weighted average of AFF per capita value added (US$)	Population-weighted average of gross GDP per capita (US$)	Ratio of population-weighted AFF per capita value added to population-weighted gross GDP per capita (%)
			Total	Rural			
0 to < 500	Burundi, Central African Republic, Democratic Republic of Congo, Madagascar, Mozambique, Zimbabwe	6	179 (2.3)	109 (3.2)	353	525	67
500 to < 1,000	Ethiopia, Guinea, Guinea-Bissau, Lao PDR, Liberia, Malawi, Nepal, Niger, Rwanda, Uganda, United Rep. of Tanzania, Timor-Leste, Zambia	13	349 (4.5)	258 (7.5)	694	811	86
1,000 to < 2,000	Afghanistan, Angola, Bangladesh, Bhutan, Bolivia (Plurinational State of), Botswana, Burkina Faso, Cambodia, Cameroon, Chad, Congo, Equatorial Guinea, Gambia, Georgia, Haiti, India, Iraq, Kenya, Lesotho, Mali, Mauritania, Myanmar, Pakistan, Sierra Leone, Tajikistan, Togo, Viet Nam, Yemen	28	2,253 (29.2)	1,432 (41.9)	1,785	1,887	95
2,000 to < 3,000	Azerbaijan, Benin, Comoros, Côte d'Ivoire, El Salvador, Fiji, Guatemala, Honduras, Kyrgyz Republic, Nicaragua, Papua New Guinea, Peru, São Tomé and Príncipe, Senegal, Sri Lanka	15	175 (2.3)	85 (2.5)	2,616	3,034	86
3,000 to < 4,000	Cuba, Ecuador, Ghana, Moldova, Morocco, Philippines, Saint Lucia, Thailand	8	277 (3.6)	129 (3.8)	3,402	4,203	81
4,000 to < 5,000	Belize, Cabo Verde, China, Indonesia, Jamaica, Namibia, Panama, Samoa, Singapore, Sudan	10	1,749 (22.7)	714 (20.9)	4,178	7,363	57
5,000 to < 10,000	Albania, Bahrain, Bosnia and Herzegovina, Colombia, Egypt, Gabon, Kazakhstan, Lebanon, Maldives, Mexico, Mongolia, Nigeria, North Macedonia, Paraguay, Poland, Romania, Serbia, Tonga, Trinidad and Tobago, Ukraine, Uzbekistan	21	676 (8.8)	266 (7.8)	6,124	5,195	118
10,000 to < 20,000	Algeria, Bahamas, Belarus, Brazil, Bulgaria, Chile, Costa Rica, Croatia, Dominican Republic, Eswatini, Hong Kong SAR, Iran, Jordan, Kuwait, Latvia, Lithuania, Malaysia, Mauritius, Montenegro, Oman, Portugal, Qatar, Republic of Korea, Russian Federation, South Africa, Saint Vincent and the Grenadines, Tunisia, Turkey, West Bank and Gaza	29	827 (10.7)	177 (5.2)	14,948	11,416	131
20,000 to < 30,000	Czech Republic, Estonia, Greece, Guyana, Hungary, Japan, Slovenia, Switzerland, United Arab Emirates, Uruguay	10	184 (2.4)	24 (0.7)	25,150	40,154	63
30,000 to < 40,000	Austria, Brunei Darussalam, Cyprus, Ireland, Luxembourg, Suriname	6	16 (0.2)	6 (0.2)	36,236	56,650	64
40,000 to < 50,000	Germany, Italy, Malta	3	142 (1.8)	36 (1.1)	43,369	41,771	104
50,000 and above	Australia, Belgium, Canada, Denmark, Finland, France, Iceland, Israel, Netherlands, New Zealand, Norway, Saudi Arabia, Slovak Republic, Spain, Sweden, United Kingdom, United States	17	679 (8.8)	116 (3.4)	75,667	49,105	154
Total		166	7,507 (97.3)	3,352 (98.2)			

Source: UN DESA, based on data from United Nations (2019b) and World Bank (2021).

Figure I.4

Per capita value added from agriculture, forestry and fishing, 2019

Constant 2010 US$



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A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).

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Map No. 4623.2 Apr 2021

Source: UN DESA, based on data from United Nations (2019b) and World Bank (2021).

disparity is not confined to developing countries, but applies to many developed countries too.

As already noted, income cannot be the sole indicator of the performance of the rural development strategy. Even using a broader set of socioeconomic indicators may not be sufficient for that purpose. The environmental dimension, or the impact of rural economic activities on the natural environment, also needs to be taken into consideration. Indeed, the lives and livelihoods of the rural population depend on the complex interaction between their economic activities, the quality of their social condition, and the management of their environment. It does them little good if rural income is high (economic) but concentrated in the hands of a few (social). It also hurts everyone if economic growth depends on the depletion and degradation of natural resources.

The motivation behind rural transformation often begins with economic growth and employment expansion; but the impacts on social and environmental outcomes may vary depending on the specific strategies adopted for improving agricultural productivity and expansion of the rural non-farm economy. Growth of the non-farm economy without equitable access to productive resources, including education, financing, business services and infrastructures, may widen rural inequality, even as it raises income and reduces poverty in rural areas. Improvement in agricultural productivity could also come at great environmental cost, unless there is more effective use and management of water and land resources. Without concerted policy efforts dedicated to protecting nature, adding industrial and service sectors in rural areas would simply replicate the environmental challenges that these sectors pose in cities.

Many countries have already experienced considerable deforestation and loss of wilderness in paving the way for expansion of agriculture, and now must attempt to redress some of the damage that has been done to the ecology and environment. Other countries are currently in the early stages of the same processes and can still take the necessary measures to pre-

vent or minimize potential damage. Finally, there are countries where these processes are yet to unfold on a large scale who can avoid these issues altogether. While the socioeconomic imperatives for a re-examination of the current rural development strategies may be more urgent for many low-income countries, the environmental imperative may be even higher for many developed and rapidly developing countries.

From either perspective, this question remains: how can rural development be achieved in a way that is oriented towards sustainable development in general and conducive to achieving the SDGs in particular? To address this question, it is useful to take note of the various perspectives that have emerged and influenced rural development strategies—perspectives that reflect the actual experiences of countries over time.

Different perspectives on rural development

Experiences of rural development have differed over time and across regions and countries. The theories of rural development evolving from these experiences have, by necessity, also differed. It is thus not always clear which theoretical perspective is more useful for a country or region at a particular period of time. Moreover, the situations keep changing with each passing year. In particular, the pace of technological innovation has accelerated, and technological changes and globalization are reinforcing each other in ways that change ground conditions rapidly. Strategies of rural development have to be thought of, and adjusted, in the light of these changes.

The history of the early industrializing countries shows that improvements in agricultural productivity had a preceding role in the causation of the first industrial revolution. However, following World War II, many countries became independent after long periods of colonial rule, during which there was rural regress rather than progress, resulting in large rural populations engaged in low productivity activities. This post-colonial reality gave rise to theories of development in the early 1950s that assumed lower labour productivity in rural areas compared with that in urban areas, and viewed transfer of (surplus) labour from the former to the latter as the main engine of economic growth and development. This view was captured well in the Lewis model of development, put forward in 1954.[2] The Lewis model supported the structural change view of development, according to which development meant the rapid decline of the share of agriculture in the economy and the rise of the shares of industry and services. The model also supported the "urbanization view," according to which development entails large-scale migration from rural to urban areas. This view of development assigned rural areas a residual role—namely that of supplying (surplus) labour to urban areas. Under this scenario, rural labour productivity too increased over time, as less labour was available to produce the same previous or greater levels of agricultural output. However, this productivity increase was a subsequent and not a preceding outcome, and the role of rural areas in development was passive, not active.

About the same time as the above theories of development gained ground, robust agricultural growth took place in several East Asian countries, providing a strong foundation for subsequent broad-based industrial growth. This was possible mainly because of the radical land redistribution carried out in these countries, following World War II and the 1949 Chinese Revolution. The experience of these newly industrialized countries again lent support to the possibility of the preceding role of rural development in a country's overall economic transformation process.

Meanwhile, agricultural productivity received a big boost with the Green Revolution in the 1960s, when high-yielding varieties of many crops were introduced, accompanied by controlled irrigation and increased use of chemical fertilizers and pesticides. The experience of the Green Revolution showed that the productivity increase of rural labour did not always have to be a residual process; instead, it could be an independent, if not preceding, process as well.

Theories of rural development are therefore as diverse as actual experiences, making it essential to take note of these experiences in order to develop a proper understanding of how to approach rural devel-

2 This view was most famously articulated by the Nobel Laureate economist Arthur Lewis through his celebrated article, "Economic Development with Unlimited Supplies of Labour" (Lewis, 1954).

opment as a force for sustainable development. While the classical type of structural change—with rapidly declining share of agriculture in the GDP—has indeed taken place, technological changes and the new stage of globalization have opened up the possibilities for non-classical types of structural change and other ways of orienting rural development.[3] Also, in view of agriculture's high dependence on local conditions, it is clear that rural development cannot be the same everywhere. The differences in circumstance and need pose tremendous challenge in creating successful strategies for sustainable rural development.

Different models of rural-urban spatial combination

Problematic nature of rural-urban distinction

The challenge begins with the very issue of demarcation between rural and urban areas. The criteria for distinguishing between the two are problematic. As noted earlier, the most widely used criteria are the size and density of population. However, what is considered to be small or dense for one country may be viewed as large and sparse in another.[4] Another possible criterion is the nature of the predominant economic activity, with areas dominated by agriculture regarded as rural and areas dominated by commerce and industry as urban. A closer observation reveals that the economic criterion actually underpins the population density criterion. Areas dominated by agriculture are, by necessity, sparsely populated, as agricultural activity requires a great deal of open land. By contrast, commerce and industry require many people working in close proximity, so that areas dominated by them are also areas with high density of population, thus qualifying as urban.

There was a time when cities were intentionally separated from surrounding rural areas through the erection of walls, which had the dual purpose of defence (against outside predators) and regulation of flows of people, goods and services between cities and the outside areas. Subsequent developments of technology made walls redundant as a means of defence. The accompanying socioeconomic development also made walls unacceptable as a barrier between rural and urban areas. However, the spatial distinction between rural and urban areas still persists.

Three models of rural-urban spatial combination

Determination of the appropriate rural-urban spatial combination is a nexus issue, because it influences the role of rural development in achieving both the narrow and broader sets of SDGs.

In reviewing the world experience, it is possible to distinguish broadly two models of urbanization, namely the (i) classical and the (ii) greenfield. The classical model refers to urbanization through migration, so that pre-existing towns grow in size to become much larger urban centres, as has actually happened in history and is supported theoretically by the Lewis model, discussed earlier. The greenfield model refers to the growth of new cities through conversion of previously rural areas.[5] Meanwhile, in situ urbanization is a new concept that refers to improvement of the standard of living of the rural population, such that it approximates or equals the one experienced by residents of cities, without migration or conversion into urban areas. While the classical and greenfield models clearly represent urbanization in its proper sense, in situ urbanization is more a model of rural development, in which the standard of living of rural people is raised to similar levels as

3 See Islam and Iversen (2018) for a recent discussion.

4 It may be noted in this context that the United Nations Statistical Commission in 2020 adopted "Degree of Urbanization" as a new method to define rural/urban. It identifies three types of settlements: cities, towns and semi-dense areas, and rural areas, based on population size and density.

5 Sometimes this conversion takes place in areas that are close to pre-existing cities, so that the processes of classical and greenfield urbanization may overlap. In other cases, however, they may be distinct.

Table I.3
Different agriculture models distinguished by technology, scale and ownership pattern

Size of land holding	Institutional setting and farm unit					
	Industrial			Transition technology-based	Pre-industrial	
	Corporate	Family farm	Cooperative	Family farm	Family farm	Cooperative
Large-scale	Land-rich, industrialized countries; Land-rich developing countries with foreign-owned plantations	Land-rich, industrialized countries	Former socialist countries in Eastern Europe			China, Viet Nam, and other socialist, developing countries when they were at their early industrialization stages
Small- and medium-scale		Industrialized countries with limited land		Developing countries, yet to be fully industrialized and with limited land	Developing countries at initial levels of industrialization and that use mainly pre-industrial agriculture technology	

Source: UN DESA.

that experienced in urban areas, without changing the rural character of the area where they live.

Two drivers of rural-urban spatial combination

In terms of the driving forces that determine rural-urban spatial combination, two different, nearly opposite types may be distinguished, namely *spontaneous* and *guided*. Under the former, spontaneous economic forces are allowed to determine the rural-urban boundaries. Under the latter, administrative decisions are used to guide the formation of these boundaries.

The spontaneous model is more prevalent in land-rich countries, where easy availability of land allows the authorities to be less concerned about rural-urban boundaries. The philosophy of governments also plays a role, with those either committed to the laissez-faire principle or less concerned about the environmental impact of economic processes often being more favourable to the spontaneous model. By contrast, countries endowed with a limited amount of land and more concerned about the environmental impact of economic processes tend more towards the guided model. Administrative cities present a special situation. These cities are built mainly to perform administrative functions and do not rely on the concentration of commerce and industry. They represent a special example of the guided model and may be seen in land-rich countries too.

Both the classical and greenfield urbanization models can be the outcome of either spontaneous or guided processes. In most cases, these two driving forces combine, although one may be more influential than the other. Spontaneous processes may lead to the conversion of rural land into an urban area through agglomeration; they may also take the form of further

growth of an existing urban area.[6] Similarly, the guiding force of administrative decisions may promote urbanization of an area. In some cases, they may also discourage or even prevent urbanization. Administrative decisions may also take the form of restrictions on the mobility and resettlement of people, directly and intentionally altering the economic character of an area.[7] The in situ urbanization model generally depends more on guidance.

Rural development models are inextricably related to the models of urbanization. How to draw the boundaries and optimally combine the rural and urban characteristics of land, and how to determine what role the spontaneous and guided processes can play in achieving this outcome, are important challenges in formulating a rural development strategy conducive to sustainable development. The choice of the model of rural-urban spatial combination therefore has a direct bearing on growth, industry and infrastructure; rural-urban inequality; poverty and hunger; health and education; and water, land-use, energy and sanitation.

Models of agricultural development

Another important question of rural development strategy concerns determination of the agricultural model to promote. Agriculture has been and remains the main economic activity of rural areas, and the inherent reason for their rural characteristic. It is therefore important to take note of the different models of agriculture that have emerged over time.

Agriculture has three interrelated sides, namely resources (e.g., land and labour availability); technology; and institutions (e.g., ownership and management). Based on variations along these three dimensions, different models of agriculture can be distinguished as follows: (i) large-scale, industrial, corporate model; (ii) large-scale, industrial, family farm model; (iii) small- or medium-scale, industrial, family farm model; (iv) small-scale, transition technology-based, family farm model; (v) small-scale, pre-industrial, family farm model; (vi) large-scale, industrial, cooperative model; and (vii) large-scale, pre-industrial, cooperative model (table I.3).[8] The classification of agricultural models presented in table I.3 is illustrative, and the different models listed often intersect to create hybrid models. Also, different models generally co-exist in a particular country.

Apart from its effect on the socioeconomic outcomes of rural development, the choice of agricultural model has direct bearing on life on land and under water; climate change; and sustainability of communities. Different models of agriculture have different strengths and weaknesses regarding these various issues, and a country may decide to promote one or the other depending on the specifics of its situation. The issue of which agricultural model to promote is

6 However, the spontaneous model may lead to de-urbanization too. Departure of concentrated economic activities can lead to a decline in the population density of an area, undermining its urban character. For example, globalization, accompanied by off-shoring of labour-intensive production operations, led to urban decay and hollowing out of towns and cities in many advanced countries. A more benign process of decline in urban density was seen in the form of suburbanization, which, in turn, took two forms, namely (i) shift in residence only and (ii) shift in both residence and workplace. Under the former, people moved to places outside the cities in order to enjoy the more expansive living conditions of rural areas while commuting to their workplaces that remained within the cities. Under the latter, even the workplaces moved to outside the city perimeters, along with the workers. In both cases, the suburbanization was facilitated by construction of highways, expansion of car ownership, etc.

7 The *hukou* (household registration) system of China is an example, under which rural people are not free to migrate and take up residences in cities.

8 Broadly speaking, models (i) and (ii) preponderate in land-rich, industrialized countries, such as Australia, Canada and the United States. Modified versions of these models are also prevalent in some land-rich developing countries. Modified versions of model (i) sometimes take the form of foreign-owned plantations in developing countries. Model (iii) preponderates in industrialized countries where land availability is limited, as is the case in many European countries as well as Japan. Model (iv) is prevalent in developing countries, which are yet to be fully industrialized and where land availability is limited. Model (v) is prevalent in countries that are at initial levels of industrialization and where the technology of agriculture still remains largely pre-industrial, depending heavily on the muscle power of humans and animals. Model (vi) prevailed in the former Soviet Union and other former socialist countries of Eastern Europe (except Poland). With the fall of the socialist regimes in these countries, this model is now in transition, retaining its original characteristics in some cases, while transitioning to other models in other places. Similarly, model (vii) was prevalent in China, Viet Nam, and other socialist countries in the developing world and is now undergoing transformation into mostly model (iv).

another nexus issue of rural development, as it can influence the role of this development in achieving a host of SDGs.

Rural development in the age of COVID-19

The experience of COVID-19 is, as noted earlier, one of the reasons why a reconsideration of rural development strategies is necessary. The COVID-19 pandemic has brought significant changes to the economic, social and environmental activities, complicating further the linkages between rural development and the achievement of the SDGs. In the immediate term, the pandemic has imposed unprecedented restrictions on people's movements, with implications for rural migrant workers and for remittances sent back to rural areas. In the long run, COVID-19 could reverse some of the rural-to-urban migration, as the lockdown measures worldwide have, in effect, introduced a large-scale experiment that demonstrated the feasibility of remote work. For many, it presents the possibility to live in rural areas while still gaining access to employment opportunities that are traditionally confined to cities. COVID-19 also disrupts food production and the global value chain, thereby posing downside risk to agricultural productivity and injecting volatility into agricultural prices. On the other hand, the pandemic has played a role in accelerating digitalization and technology adoption in many segments of the agricultural value chains, which could have positive impact in the long run.

Also, the distributional consequences of COVID-19 in the context of rural development and the rural-urban divide cannot be ignored. While urban populations so far appear to suffer greater employment and income loss, COVID-19 compounds the already vulnerable position of the rural poor by affecting livelihoods, limiting mobility and reducing food security. The shift to remote learning amid lockdowns is also shown to have more detrimental effects on rural students as many of them have limited access to necessary digital technologies.

Environmentally, there are concerns that the pandemic has led to greater depletion and degradation of forests and associated biodiversity loss. These losses are due, in some cases, to an increase in illegal logging, poaching, charcoal production and land-use changes—an increase resulting from reduced monitoring by public sector agencies and to farmers' need to make up for loss of income caused by COVID-19. Such developments have at least partially offset the temporary, positive environmental benefits of COVID-19 in the form of lower greenhouse gas emissions, cleaner coastlines, reduced crowds in ecotourism sites—all of which lead to a regeneration of nature.

Clearly, COVID-19 has had multidimensional impact on rural populations and on the rural-urban divide. It has triggered many processes (such as the possibility of remote work) that may unfold on a greater scale in the future. As noted earlier, it has also been observed that current rural and agricultural development strategies that led to deforestation and loss of wilderness contributed to the emergence of zoonotic diseases, including COVID-19. Thus, from the perspective of both its impact and origin, COVID-19 has made a reconsideration of rural development not only urgent but also inescapable.

Road map

The *World Social Report 2021* aims at examining a wide range of connections between rural development and the SDGs. Given the interrelated nature of the SDGs themselves, organizing the discussion by Goal is not efficient. The report therefore adopts the three dimensions of sustainable development as its organizing principle and divides the chapters accordingly: economic, social and environmental aspects of rural development. Although these three dimensions are also interrelated, it is relatively more manageable to consider interconnections in this three-dimensional framework, which is also the generally accepted framework for the discussion of sustainable development. The reader is however encouraged to read and consider the chapters as parts of a single, overarching story. A concluding chapter synthesizes the conclusions and policy recommendations that emerge from the three main chapters.

The following provides a brief road map of the main content of the chapters.

Rural development for inclusive growth and a balanced settlement of the population

Chapter II focuses on the economic dimension of rural development, paying particular attention to issues of growth, investment, productivity, employment, expansion of non-farm activities, and the optimal rural-urban spatial combination. The primary focus of the chapter is on SDG 8 and SDG 9, and it views rural development through the prism of overall structural transformation. It notes the classical pattern of structural change that has dominated in the past and the possibilities of various non-classical variants of the structural change paradigm created by the new stage of globalization, which began in the 1980s. The chapter considers the role of agricultural productivity growth as a precondition for rural development and draws attention to the fact that, under the current trajectory, it may not be possible to achieve SDG target 2.3—to double agricultural productivity and incomes of small farmers—by 2030.

The chapter emphasizes the necessity for agricultural productivity growth to be translated into expansion of productive non-farm activities and employment in order to contribute effectively to successful rural transformation. It observes that the lack of successful rural transformation in many countries, including some in sub-Saharan Africa, may be due to a failure to achieve such expansion. The chapter discusses several causes for slow agricultural productivity growth in many countries, including the lack of investment and access to financing.

In considering the issue of rural-urban spatial combination, the chapter examines the option of in situ urbanization. It presents three variants of in situ urbanization based on the experiences of China, Japan and Sri Lanka. The chapter explains the uniqueness of these variants, each of which arises from the specific history and local physical and institutional settings of the three countries.

The chapter pays particular attention to the role of new technologies in bringing about the desired rural transformation. In particular, it examines their role in boosting agricultural productivity; helping to match rural producers with consumers in urban centres and around the world through e-commerce; easing of access to funds through fintech innovations; and expanding non-farm opportunities and employment. Overall, the chapter shows that the current speed of rural development is not sufficient to meet the economic growth and employment-related SDGs by 2030, and that a major change in the direction of rural development strategy is needed. It also charts out this new direction.

Poverty, inequality and rural development

Chapter III looks into the relationship between rural development and the SDGs related to poverty (SDG 1) and inequality (SDG 5 and SDG 10). Over the last decades, the developing world has witnessed a faster reduction of income poverty in rural than in urban areas. However, there has been little success in lifting the living standards of the poorest. People living in the most extreme forms of poverty—often in remote, marginal areas—have been left behind. Similarly, rural-urban disparities in opportunities are declining, although within-rural inequality in opportunities remains high in many countries.

The chapter notes that declining rural poverty has not always led to reductions in rural inequalities or in rural-urban income disparities. The same forces that drive reductions in rural poverty can in fact exacerbate inequality. It also warns that, left unaddressed, persistent and growing rural inequalities can undermine continued poverty declines. In other words, eradicating rural poverty will require addressing inequality—in incomes, assets and opportunities—both within rural areas and between rural and urban areas; it will also entail reaching the poorest. The chapter further notes that countries that have succeeded in reducing both rural poverty and inequality have invested in infrastructure and public services. They have promoted inclu-

sive agricultural growth, access to land, and expanded social protection in rural areas.

Rural development within planetary boundaries

Chapter IV examines the environmental dimension of rural development, with particular focus on SDG 6 (water and sanitation), SDG 7 (energy for all), SDG 13 (climate change), SDG 14 (life below water) and SDG 15 (life on land). The chapter has two main objectives: ***first***, to examine the impact of the current patterns of rural development on land, water, air and biodiversity in general, and how this is affecting the achievement of the SDGs, and, ***second***, to suggest ways in which rural development can be made more conducive to the protection of the health of the planet. It highlights that the rapid growth that has taken place in agriculture, industry, infrastructure and settlement in rural areas in past decades has resulted in major depletion, degradation and pollution of the environment and natural resources. In particular, the chapter calls for more effective use and management of water and land resources because of their impact on the achievement of almost all of the SDGs. The chapter also presents a baseline and an optimistic scenario in three areas—depletion of water, pollution of water, and sustainable agriculture and food security—to demonstrate that economic development in rural areas can be made more sustainable, and the SDGs can indeed be achieved by 2030, with the adoption of the right policies, management practices and technologies.

Policy recommendations

The concluding chapter synthesizes the conclusions and policy recommendations offered by the three preceding chapters. It first notes broader issues such as the necessity of (i) assigning an active and preceding role to rural development; (ii) considering in situ urbanization as a preferable model of rural development; (iii) adopting a guided approach towards determination of the optimal rural-urban spatial combination, rather than leaving it to a spontaneous process; and (iv) avoiding a "one-size-fits-all" approach regarding rural development, which is more dependent on local conditions.

Next, the chapter presents the policy recommendations that are cross-cutting in nature, impacting more than one of the three dimensions. These include the necessity of a comprehensive programme of public investment in (i) rural basic infrastructure, including improved road connection and 100 per cent electrification; (ii) development of rural human capital, ensuring adequate opportunities for education, health care and cultural development; and (iii) ensuring Internet connection, allowing rural populations equal opportunities to make use of the new technologies that depend on digital platforms. The chapter recommends that policymakers carefully choose the agricultural models most suitable in terms of country-specific conditions, and that they consider the potential role of the communal management of natural resources in promoting equity and protection of these resources. Finally, the chapter summarizes the policy recommendations that are particular for the economic, social, and environmental dimensions of rural development.

The chapter notes that it is important to also consider the political consequences of development policies. A large number of people in rural communities can be affected by policies that impact prices, subsidies, taxes, investments and the environment, among other issues. History is full of examples of policies that, however well intentioned, are not well received by a population that does not see itself as a willing martyr for larger national goals and feels threatened by changes to its livelihood. The interests of the existing population must be a high priority in any policy design. In fact, rural development starts from the proposition that the lives and livelihoods of rural populations must be improved, not sacrificed, and requires their participation and support.

Chapter II

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Rural development for inclusive growth and a balanced settlement of the population

Introduction

Achieving sustainable development is a challenge that is not limited by geography, demography or even national status. Joblessness, poverty, hunger, illness and conflict, among many, are manifestations of unmet goals and exist everywhere. But even as populations concentrate in growing cities, development challenges are particularly acute in rural communities and smaller urban settings. It follows that realizing the vision set in the 2030 Agenda for Sustainable Development requires solutions tailored specifically for the challenges of rural communities. This chapter will examine the role of rural development in achieving inclusive economic growth and will explore the barriers to and solutions for unlocking the potential of the rural sector.

The sustainable development of rural communities involves the realization of all the Sustainable Development Goals (SDGs), integrating economic, social and environmental goals. This chapter will focus on the economic aspects of this journey, particularly on SDG 8—which calls for the promotion of sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all—and SDG 2.3, which addresses agricultural productivity and incomes. At the same time, affluent rural areas, if achieved, could help make cities safe and sustainable by reducing rural-urban migration, or building sustainable transport. This chapter is one part of the argument that sustainable and equitable development must give urgency to the economic, social and environmental development of rural areas.

The objectives of this chapter are threefold: first, to highlight the importance of rural communities for achieving the economy-related SDGs; second, to highlight patterns of economic growth and development that do not require the mass migration of people to large cities; and third, to give policymakers inspiration from empirical findings as well as examples of successful in situ development that unlocks jobs and incomes, and kick-starts a broader structural transformation of economies. The chapter takes note of the multitude of publications by the United Nations and other organizations on rural development. It hopes to add value by highlighting key findings and elevating the visibility of the issues to policymakers who may not otherwise be aware of this line of work.

Following this introduction, chapter II is organized as follows: The first section describes the historical evidence and logic that explains how nationwide and rural economic structures move in conjunction with national incomes and improved living standards. It follows that national and rural development requires highly productive agriculture and better rural value chains, but also more value from rural non-farm agricultural activities. In this light, the transformation of economies towards producing higher-valued goods and services, when done in a socially responsible and sustainable way, should be viewed as a positive force that accelerates sustainable development. This section also examines different types of urbanizing processes that have impacted rural areas in developing countries. It highlights the idea and practice of place-based improvements in the standard of living of rural communities—often called *in situ* urbanization—in

promoting new employment opportunities and raising the standard of living in rural populations. This process helps reduce rural-urban inequality and avoid the urban overcrowding and squalor caused by rural-urban migration.

Section two describes two necessary conditions for the economic transformation and development of rural areas: improvement in agricultural productivity and the absorption of these gains by local non-farm activities. It explains how such rural development leads to favourable patterns of long-term growth in rural areas, ultimately leading to convergence of rural and urban income levels. This section argues that agricultural productivity growth does not necessarily translate into an expansion of the rural non-farm economy and explores reasons why neither has advanced adequately in many countries. The current speed of rural development is insufficient to meet the goals set by the 2030 Agenda, and a decisive change in the direction of national development planning is much needed.

Section three examines the role of digital technologies in accelerating the process of rural development and transformation. It describes how technologies rooted in digital systems and connectivity are being applied to agriculture with the potential to vastly increase both productivity and incomes for all farmers. The section provides examples of technologies that are helping food production become more profitable. Digital technologies provide farmers with advice and services that help to produce their crops and also provide regulators with tools to better monitor the quality of the food supply. E-commerce platforms help farmers bring their goods to market, connecting rural producers and the increasingly urban consumers. Fintech innovations ease access to finance and insurance. The result has been more employment opportunities and higher incomes from both agriculture and non-farm employment, as well as more prosperous rural communities.

The last section summarizes the main findings and lists the logical priorities for policymakers that emerge from the discussion. It finds that, among national priorities, the process of economic transformation must be supported and accelerated, but also directed towards sustainable objectives. Priorities must include how to lead rural sectors towards a more productive and prosperous future. Rural transformation, including in situ urbanization, must start with increasing farm productivity (as a precedent for further growth), but must also expand the linkages between the farm and non-farm sectors and encourage entrepreneurship. Further gains in agriculture would subsequently follow, creating a virtuous cycle. Promoting education to develop local talent and skills is important, as is the retention and attraction of talent to public and private activities. Policies must review why many well-meaning economic initiatives often fail to reach the poor and should be designed to ensure that benefits accrue to communities and those most in need. Finally, the use of technology should be greatly accelerated and encouraged for its catalyst role in rural transformation and development. This requires building the underlying infrastructure and supportive financial and regulatory environment with attention to the needs of rural communities.

Structural and rural transformation are fundamental aspects of economic activity and development

Economic growth and development are closely associated with, and in part defined by, the structural transformation of economies. This transformation is thought of primarily as changes in the sectoral composition of the gross domestic product (GDP); as a country becomes less dependent on agriculture, it diversifies its economy, and more people find employment in other sectors (FAO, 2017c).[1] The long-run reallocation of economic resources from agriculture to the manufacturing and services sectors can be clearly seen in historical data

1 The literature on structural transformation is too extensive to be listed. For a summary of the more recent literature, see Lin and Xing (2020). A recent summary of stylized facts is available in Herrendorf, Rogerson, and Valentinyi (2014). Islam and Iversen (2018) discuss how structural change relates to development concepts, including the Sustainable Development Goals.

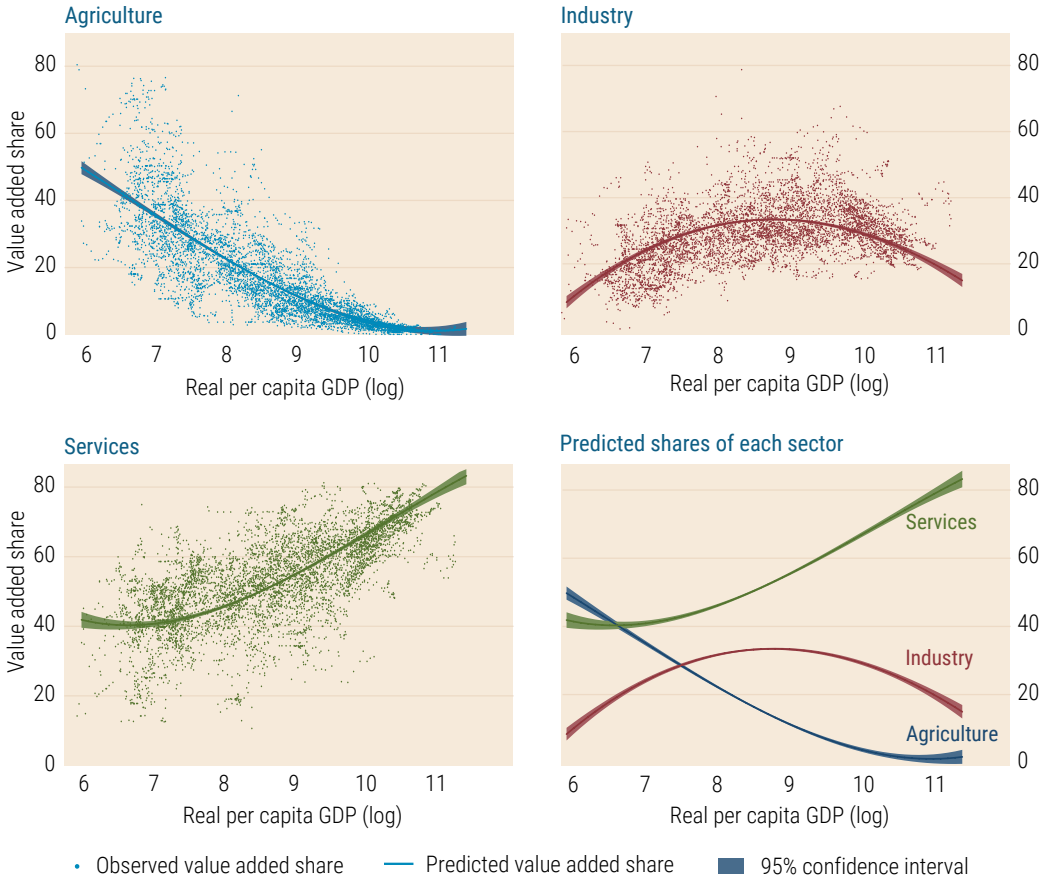
and is one of the major stylized factors of long-term growth. As countries become richer, the importance of agriculture declines, replaced by manufacturing at first. The services sector gains in importance and eventually becomes the dominant sector (figure II.1).

Growth and development, on the one hand, and structural transformation, on the other hand, are mutually enhancing. Productivity growth in agriculture releases labour and other resources to the other sectors while maintaining the required food supply for urban population growth. Simultaneously, the growth and diversification of the urban economy boosts demand for food and raw materials (IFAD, 2016). This process continues throughout a country's history of development and constitutes the core of modern economic growth (Herrendorf, Rogerson, and Valentinyi, 2014).

The chronicle of economic development is filled with examples that showed the importance of agricultural productivity improvement for economic diversification into other sectors. The first industrial revolution began in the United Kingdom of Great Britain and Northern Ireland in the late eighteenth century, made possible by the British Agricultural Revolution that started in the century before (Rostow, 1959; Deane, 1979). Development in the British agricultural sector helped to feed the growing population that worked in the industrial sector. Agricultural growth led to rising purchasing power, which increased demand for industrial products and provided financial capital for industrialization. The experience of East Asian economies in the second half of the twentieth century provides a more recent illustration of this dynamic at work:

Figure II.1

Structural transformation: sectoral shares of value added according to real per capita GDP, 1970–2018



Source: UN DESA, based on data from United Nations Statistics Division and Feenstra, Inklaar and Timmer (2015).

Note: The dataset includes annual data for 125 countries. The fitted line shows the predicted share in value added for a given level of GDP per capita, following the methodology of Herrendorf, Rogerson, and Valentinyi (2014).

economies such as Japan, Republic of Korea, Taiwan Province of China and, later, China all experienced significant improvement in agricultural productivity that preceded, and later overlapped, with the industrialization process that dramatically increased their income levels and allowed noteworthy income convergence with developed economies.[2]

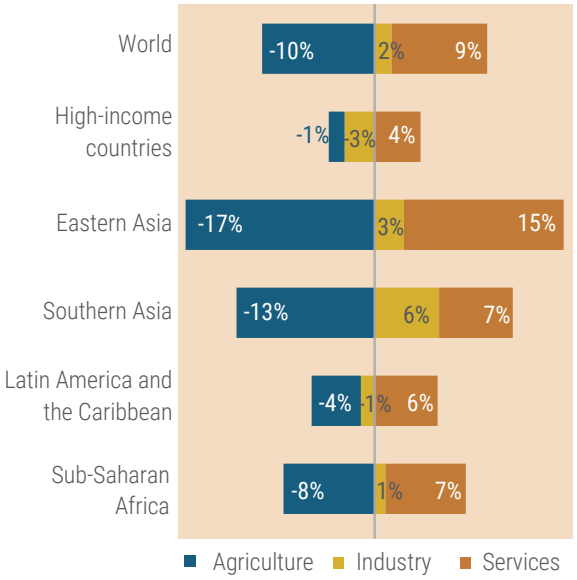
There are, however, notable departures from this general pattern as some countries shift from agriculture directly into services in a process of stalled industrialization and even "premature de-industrialization". Data on employment shares from 2005 and 2019 show that the global decline in the share of agricultural employment was mostly offset by employment share growth in the service sector (figure II.2). In high-income countries, industry employment shares declined at a faster rate than in agriculture. Southern Asia was the only region where the growth in employment in the industrial sector was similar to gains in the service sector. This pattern is thought of as a function of country-specific factors that influence the course of structural change, such as participation in global value chains, national resource endowments, geographical location, institutional capacity, and political leadership (Islam and Iversen, 2018).

Urbanization and the rural-urban divide

As economies have shifted away from agricultural to economic structures based on industrialization and services, so has their population moved from rural communities into cities. Factories and houses are built in the previously undeveloped sites; new networks of roads and railways are constructed to allow the movement of goods and people more efficiently within and between areas, and; people migrate from one place to another to find new jobs and build new lives. The so-called urban area or city is expanded, or newly born, as the result of the greater concentration of people and non-farm activities.

Figure II.2

Percentage point change in the share of total employment by sector between 2005 and 2019



Source: UN DESA, based on data from ILOSTAT.

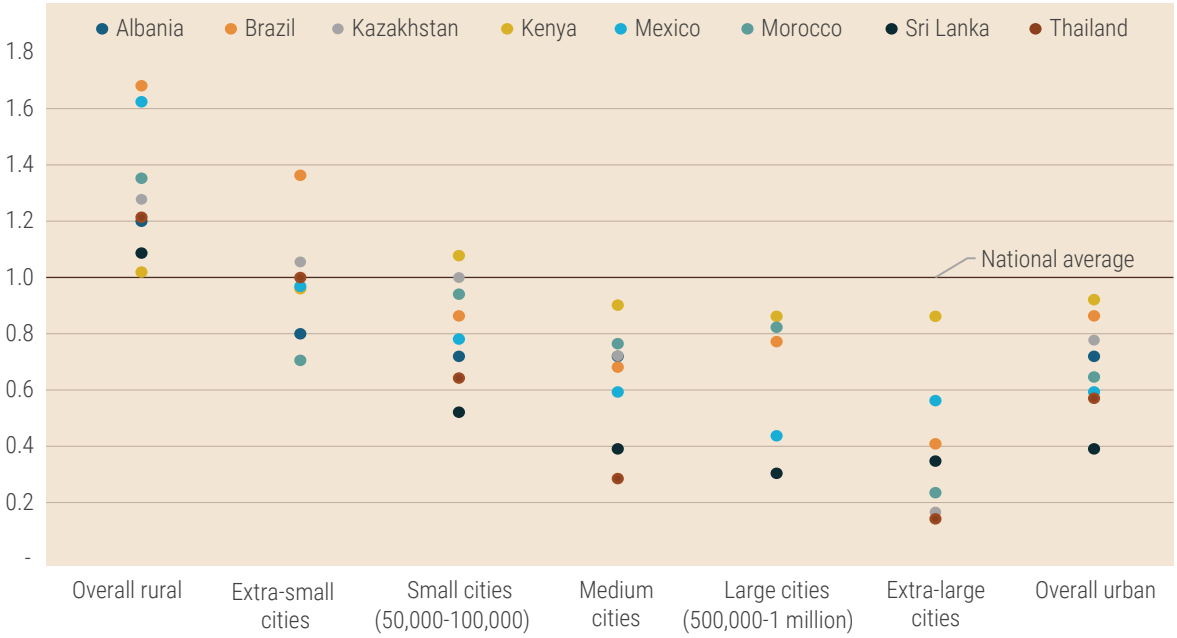
In 2015, a majority of the world population was living in areas classified as urban, up from 39 per cent in 1980 (United Nations, 2019b). This share is expected to grow to 68 per cent by 2050. The population in rural areas will decline in absolute numbers, from 3.4 billion in 2015 to an expected 3.1 billion in 2050.[3] An urban area emerges with the creation of industrial belts, geographic agglomeration of a certain industry, a transportation hub, or a financial centre. At the same time, unmanaged urbanization creates air pollution, unsafe water and noise, traffic congestion and the emergence of urban slums. The emergence or expansion of urban areas necessitates urban or regional planning—a political and technical process that examines the develop-

2 See Helble, Long, and Le (2019) for an empirical exercise that shows how the move out of agriculture into higher-productivity industrial and services sectors in economies in the Asia and Pacific region contributed to rapid productivity growth, leading to a significant increase in income levels. The paper also made an interesting and important observation: many Asian economies actually saw a major reallocation from agriculture to services, skipping the manufacturing phase. They found that such reallocation helped to increase labour productivity. The paper argued that its results contradict the narrative regarding how premature industrialization cannot generate sustained growth.

3 See the introduction to this publication for a discussion on the difficulty in distinguishing what is a rural area and what is a city. These binary categories often reflect arbitrary definitions that are inconsistent across space and time. In parts of India, for instance, areas currently classified as rural have populations of more than 250,000 people in high-density towns and have significant non-farm economies (Van Duijne, 2019).

Figure II.3

Poverty headcount by region and city size relative to national poverty headcount, selected countries and years



Source: United Nations (2020e, table 4.1), based on Ferré, Ferreira and Lanjouw (2012).
Note: A ratio below (or above) 1 indicates that the prevalence of poverty in cities of a given size is below (or above) the national average.

ment and design of land use, environment and socioeconomic infrastructure.

Urbanization is seen to have contributed to these classical urban and rural structures via industrialization and centralization of people and commercial activity. Jobs, infrastructure and public services are more available in cities, and explains the rural-urban divide. The growth of urban areas is, however, often seen as a negative phenomenon in the context of the SDGs: for example, 24 per cent of the urban population lived in slums in 2018; air pollution caused 4.2 million premature deaths in 2016; and over 90 per cent of COVID-19 cases are in urban areas.[4]

Rural areas are viewed as the source of migrants, undeveloped and poorer segments of the national economy, on the other hand. In fact, as discussed in chapter III, the gap between rural and urban poverty remains high even as the world has made significant progress in reducing poverty. Rural areas continue to face social, economic and political marginalization and there is a concern that the population in rural communities is being further left behind. Notably, poverty remains much higher in rural areas. Rural areas have been treated as a challenge rather than a solution to growth and sustainable development.

The absolute and relative deprivations experienced in rural communities are also experienced in cities, according to their size (figure II.3). Smaller cities have higher rates of poverty and their social and economic conditions reflect a more limited availability of education, water, sanitation, and other social services and infrastructure (United Nations, 2020e, chap. 4). This pattern emerges regardless of the definition of "rural" and "urban" used in the analysis. Using data that links socioeconomic outcomes with population density, a study of 20 sub-Saharan countries by Gollin, Kirchberger and Lagakos (2020) finds not only that urban households are better off than rural households, but that the outcomes improve in line with population density, a proxy for the degree of "urbanization". This result

4 Sustainable Development Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable.

extends to public services and infrastructure such as electricity, piped water, sewage systems, paved roads, school quality, police stations and health facilities. It is no surprise, then, that net migration flows from rural areas to towns and cities.

Urbanization also benefits rural communities

But not all the news is bad, and the process of structural transformation and urbanization provides important benefits to rural communities and smaller cities. A sustained investment to enhance productivity in agriculture and the broader rural economy (farm and non-farm activities) has a large impact on both growth and poverty reduction (FAO, 2017c). Rising agricultural productivity is consistent with urban growth as the rural sector provides cities with essential ingredients, including the food for a growing population, the labour needed for expanding the industrial and service sectors and the savings to help finance the more capital-intensive economic activities.

For rural households, the migration of workers to cities creates new permanent and temporary work opportunities to rural households. Asada (2020) examines how the expansion of transportation infrastructure has vastly increased the opportunities for non-farm employment in Sri Lanka (see box II.4). More generally, Suttie and Vargas-Lundius (2016) show that temporary, seasonal and permanent migration have significant benefits on income diversification, resilience and productivity-enhancing investments to households. Migration to urban regions increases the wages in rural jobs and provides remittance incomes to rural communities. There are also indirect impacts on multidimensional poverty as rural households benefit from enhanced food security, better education and health care, and other services (FAO et al., 2018).

For those who stay in rural communities, non-farm activities are an important pathway out of poverty. The pace of non-agricultural sector growth is associated with a faster decrease in rural poverty around the world, although there are important differences across countries (IFAD, 2016). A study of more than 3300 individuals from rural households in the United Republic of Tanzania found that about half of those who escaped poverty benefited from the rural non-farm economy or secondary towns (Christiaensen, Weerdt and Todo, 2013). This effect was significantly larger than the poverty-reducing effect of moving to big cities. The authors suggest that "the development discourse would benefit from shifting beyond the rural-urban dichotomy and focusing more instead on how best to urbanize and develop its rural non-farm economy and secondary towns".

In situ urbanization: the transformation of rural areas for inclusive development

Urbanization is *a process* of reallocation of people and economic activity that occurs within an area or across different areas. In the history of many developed countries, industrialization and centralization have shaped the classical urban substructure and facilitated rapid urban growth. In the process, new local governance structures appeared and, with urban planning, socioeconomic infrastructure was strengthened and the health status and educational achievement of the residents improved. It is a process that makes an area "more urban". Urbanization in a rural area is the transformation of the area to include more urban features, infrastructure and services, and is part of the structural transformation of the national economy.

Transforming rural areas into urban areas can reduce rural poverty and narrow the gap in living standards between rural and urban areas. Japan is an earlier example of the successful transformation of rural areas into urban communities, while experiencing the classical urbanization of large cities (box II.2) The rural transformation makes it possible for the country to achieve a more geographically balanced settlement of people, at least in the second half of the twentieth century.

In the late 1980s, the importance of local non-farm activities began to be recognized in rural-to-urban transformation in the areas adjacent to large cities in Indonesia. They called such adjacent areas desakota, coming from the Indonesian desa (village) and kota (city). Desakota models point to a blurred boundary

BOX II.1

COVID-19 outbreak, reverse migration and rural development

The COVID-19 pandemic has brought opportunities to reconsider our socioeconomic systems and make them more resilient and flexible. People in many parts of the world have realized that the rural area not only is the conventional source of essential goods and services, such as food and energy and the source of fresh air and relaxation, but also provides a safer living and more convenient work environment for urban dwellers. Some countries in both the developing and developed world have reported that urban dwellers chose to return to their villages and small towns of origin—so-called reverse migration—when facing lockdowns or mandated closures of factories and stores as well as loss of income sources. The true magnitude of such migration patterns is not yet known.

The pandemic is accelerating the diffusion of digital tools used in the office and at home and pulls people away from large city centres. Fear of spread of the virus in areas with high population density, coupled with isolation measures to ensure social distancing, is leading to remote working practices, remote learning and e-services. All of this has attracted more people into rural areas. With changing habits and greater willingness to accept digital tools, the public and private sectors now have higher incentives to increase investments in digital infrastructure, and the increased connectivity can further unlock opportunities for work and integration between rural areas and their neighbours. In the of case reverse migration, policymakers should focus on improving rural infrastructure to decongest overcrowded cities that prevail in many parts of the world.

Thus, over the longer term, the pandemic can change the locations where goods and services are produced and consumed, including remote work and mobility between rural and neighbouring areas. Socioeconomic infrastructure can be improved to accommodate the increasing demand for work and life support services. At the same time, global value chains of production and services, which are currently going through dramatic changes, could open up new opportunities in some rural areas, particularly areas with improved infrastructure. The pandemic has the potential to create a new pathway for sustainable development in the rural area and beyond, and a more geographically balanced settlement of population within a nation.

Source: UN DESA.

between rural and urban areas, in which farm and non-farm activities co-exist within the predominantly rural landscape. Place-based urbanization—often called in situ urbanization—is also of growing importance in sub-Saharan Africa and other parts of Asia. This type of place-based transition from a rural area into an urban one has received much less attention (Brown, 2018). It is different from traditional urbanization, in which the rural surplus labour and farming populations are transferred to secondary and tertiary industries in cities.[5] The advancement of in situ rural urbanization lies not only in promoting rural development, reducing the cost of labour migration and advancing the social and economic development, but also in realizing the transformation of economic and social structure and a more geographically balanced settlement of people within a nation by reducing population expansion pressure and improving the sustainability of the urbanization of development (Asada, 2020; Guo and Zou, 2015).

For example, urbanization in China since the 1970s has been led by in situ urbanization in its south-eastern coastal regions, where the central Government and, later, local governments, had played the critical role in facilitating the place-based urbanization. At this early stage of urbanization, the regions successfully developed higher valued-added labour-intensive manufacturing, such as sewing and food, which attracted workers from neighbouring villages (box II.3). Because of the very success of the process

5 It should be noted that in situ urbanization is relative to the geographic area and time span to be examined. It can be considered as classical urbanization if the rural area is absorbed at a later stage by a large metropolitan area. It is an in situ urbanization if the viewpoint is more microscopic within a relatively short time span, focusing on the socioeconomic development of the rural area. In situ urbanization examines structural and socioeconomic transformation from more regional perspectives.

BOX II.2

The rise and fall of rural communities in Japan

Since the end of World War II, Japan has transformed underdeveloped rural areas into modern communities with high per capita income and better infrastructure and health status. Before the mid-twentieth century, rural areas suffered high population growth, structural underemployment, stagnating agricultural productivity, and lack of financial resources, all factors now common to their counterparts in many developing countries. The underdeveloped regions in Japan overcame these obstacles by increasing agricultural productivity, which enabled them to supply sufficient food for the whole population and send young workers to large cities, thereby contributing to the high national economic growth experienced in the 1960s and 1970s.

A series of land reform measures were introduced in 1946 to convert the landless peasants into landowners. Once landowners, farmers had an incentive to invest in the land by applying fertilizers, purchasing agricultural equipment and improving irrigation. The Government and the agricultural cooperatives (established in 1948) played a pivotal role in improving the well-being of rural residents and building transportation and other infrastructures, such as the distribution system for agricultural inputs and outputs.

The reform measures also included the provision of a rice price subsidy to farmers. The producer price was set much higher than prevailed on the international market with the difference paid by the Japanese consumer through high import tariff rates. Agricultural productivity in Japan increased tremendously as a result. While a farmer with 1 hectare of rice paddy spent 251 days a year working on the land in 1951, this was reduced to only 30 days in 2000. The average rural household now consists of part-time farmers who have a full-time job in the non-agricultural sector. In 2000, the average farm household earned about $80,000 per year, or 23 per cent more than a non-farm household (figure II.2.1). As the manufacturing and, later, service sectors expanded, many young people opted to live in the rural areas but work outside their hometowns. Agricultural production thus became a part-time job for many rural households and non-agricultural income dominated in their overall earnings.

The rice price subsidy increased production levels and productivity, and thus narrowed wage gaps between agriculture and other sectors. But high prices eventually led to reduced demand in the 1970s, with a large stock of unsold rice stored in warehouses. In response, the Government introduced a policy to reduce the area of rice fields per household in order to lower the excess supply. This led some farmers to sell their farmlands, which sometimes were converted to public or housing development projects.

continued >>

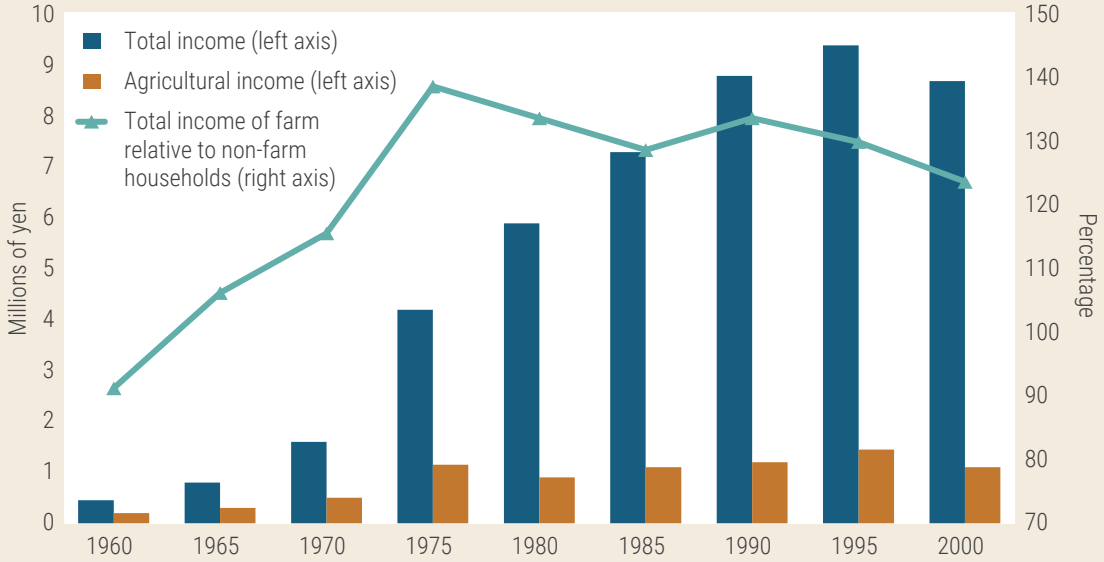
at the early stage, the importance of in situ urbanization has declined recently and now, the traditional urbanization that involves significant flows of migration has become dominant in the country. In Sri Lanka, in situ urbanization of rural areas has not been an explicit policy goal, but rather reflected the long-term development since the colonial period and people's preferences towards a rural-based lifestyle (box II.4). Some researchers further proposed the "settlement transition," involving the urbanization of the rural area without massive rural-urban migration (see Dick and Rimmer, 1998). In the early 2000s, a new form of urbanization was recognized in large rural areas of Bangladesh, India and Pakistan, where the population growth in some places has resulted in densities that equal or exceed the population densities in Los Angeles, New York or Toronto. The high population density is the force that transforms rural regions with urban characteristics but, unlike the case in south-eastern regions in China, migrants have found jobs in the low-skilled, low-wage urban informal sector, not contributing much to higher value added activities.

Not all urbanization experiences have led to the desired outcome and created the typical problems associated with urbanization. One such example is "urbanization without growth" in the sub-Saharan Africa region (Fay and Opal, 1999; Glaeser, Resseger and Tobio, 2009; Jedwab and Vollrath, 2015). In these

BOX II.2 continued

Figure II.2.1

Average total income and income for agricultural activities of farm households in Japan, 1960–2000



Source: Yamashita (2014).

Today, many rural areas located on the outskirts of large cities have become parts of a metropolitan region, producing non-rice agricultural products (such as flowers, fruits and vegetables); serving as a residential location; and hosting manufacturing and service activities. Other rural areas, however, are facing different socioeconomic challenges, such as the abandonment of cultivated farmland; declining commercial activities; rapid population ageing; and increasing fiscal deficits. This means that Japan now needs to devise a new rural development strategy to revitalize the role of rural areas in the national economic transformation process.

Source: UN DESA.

cases, population shifts to cities accelerated without sufficient expansion of employment opportunities. Karonga is the fifth largest city in Malawi and located in the northern region of the country. The city has grown from a former trading post in the colonial period under the United Kingdom to a subregional service centre. Its population increased to 61,609 in 2018 from about 11,000 in 1966, growing at 3.3 per cent per year on average. Despite its growth in population, Karonga does not have a local government, which could have planned and managed the growth of the city. The city experienced numerous large and small disasters, including earthquakes and strong winds, as well as environmental hazards, such as poor sanitation and seasonal floods (Manda and Wanda, 2017). The absence of a local government in the city has been an obstacle to the emergence of modern institutions and formal urban development, which could help reduce the risks associated with the environment and disasters.

Table II.1 schematically summarizes the urbanization experiences in these regions and countries. The urbanization experiences in some sub-Saharan African countries and the settlement transition in South Asia have transformed the previous rural areas into areas with higher population density, but socioeconomic transformation has not caught up with population growth, leaving the increased demand for decent jobs and public services often unmet (third column). A com-

BOX II.3

Government-led in situ urbanization of rural China

The in situ urbanization in China has contributed to the emergence and development of some 20,000 small towns since the late 1970s and provided more than 100 million people with employment in the non-agricultural sectors. It was a deliberate policy choice by the Government. The in situ urbanization has been particularly prominent in the south-eastern coastal region of China. The process has involved the creation of new city centres together with the reclassification of areas from rural to urban, along with physical changes of rural settlements and infrastructure through the development of township and village enterprises (TVEs) (Zhu, 2017). Table II.3.1 shows that the reclassification of rural areas to urban constituted about 67 per cent of the total population growth between 1982 and 1990, while the natural increase in cities and towns and rural-urban migration accounted for less than 5 and 28 per cent, respectively. The dominant role of in situ urbanization in population growth continued during the 1990s. Only in the 2000s did the rural-urban migration become the dominant factor in explaining the rapid increase of people living in urban areas.

In 1978, TVEs employed about 28.3 million people, but the number increased to 130.5 million by 1997. By the end of the twentieth century, the total value of TVE output accounted for about 30 per cent of China's gross domestic product and the TVE contribution to exports accounted for about one third. The emergence and expansion of TVEs has been the major driver of in situ urbanization by bringing structural and infrastructural changes to the rural areas—for example, by the creation of industrial parks and development zones, and by contributing to higher population density through better infrastructure and public facilities.

The true impact of in situ urbanization in China is likely to be underestimated, largely because public statistics only reflect those areas that have been officially reclassified as urban. There are three factors that have particularly contributed to the emergence and development of in situ urbanization in China (Zhu et al., 2013):

Table II.3.1

Population growth in cities and towns, 1982–2010

Components of population growth	Period between 1982 and 1990 censuses		Period between 1990 and 2000 censuses		Period between 2000 and 2010 censuses	
	Urban population growth (thousands)	Percentage of the total growth	Urban population growth (thousands)	Percentage of the total growth	Urban population growth (thousands)	Percentage of the total growth
Natural increase in cities and towns	19,320.6	4.9	28,497.0	17.0	28,283.6	13.3
Rural-urban migration	108,442.8	27.7	51,732.2	30.8	122,326.4	57.4
Reclassification of areas previously definied as rural	263,799.0	67.4	87,624.2	52.2	62,509.1	29.3
Total	391,562.4	100.0	167,853.4	100.0	213,119.1	100.0

Source: Zhu (2017), table 1.

continued >>

mon characteristic of the recent experiences in urbanization and in situ urbanization in developing countries is the absence of significant movements of people from rural to urban areas (fourth column). In Desakota, the initial stage of urbanization is characterized by rural-rural migration but, at the later stage in which some previously rural areas are reclassified as urban, the migration is considered to be rural to urban. They have involved migratory movements between rural areas, caused either "naturally" or by policy. Finally, all the urbanization experiences examined here ended up with an increase in population density, except Sri Lanka (fifth column). In Sri Lanka, many rural dwellers commute to cities for work by using extensive yet inexpen-

BOX II.3 continued

1. ***Population density and infrastructure***. In the late 1970s, the population density in the coastal region reached 400 persons per $km^{2,}$ the common criterion for the definition as an urban territory. Relatively inexpensive means of transport, such as motorcycles, buses and trucks were available, with rapidly improving and expanding road networks (Rodrigue, 2020). In-ground and wireless communication systems were also fast becoming available in many parts of the region. All these developments have reduced the necessity for rural dwellers to be close to the cities in order to gain the economies of agglomeration;
2. ***Internal and external socioeconomic conditions***. The lack of investment is the major obstacle to urbanization in rural areas. Prior to the economic reforms of the 1970s, people in the coastal region invested in housing and created family-based workshops jointly owned by several households, often financed by remittances received from overseas. In cooperation with the commercial networks of overseas Chinese (people of Chinese birth or descent who live outside the territories of China), people engaged in labour-intensive production, such as sewing, construction materials, and food processing, which required limited upfront capital and an unskilled workforce. These family workshops were the forerunners of TVEs, the incubators for the in situ urbanization in the coastal region. In October 1986, the Government enacted a new measure that welcomed foreign investment, which ignited a large inflow of capital into the region from overseas Chinese. Foreign capital improved not only access to the international markets, but also production methods and facilities;
3. ***Policies and institutions***. China's household registration system, known as ***hukou***, which restricted rural-urban migration, as well as the national urban development strategy, which limited the growth of large and medium-sized cities, indirectly promoted the in situ urbanization of the rural areas. The land tenure and social security systems in China also created disincentives for rural residents to move to urban centres and thus indirectly encouraged in situ urbanization. For example, once a resident leaves a village permanently, the rights to use farmland and entitlements (dividend payments) from village collective enterprises may be lost. In addition, greater decentralized decision-making for economic development in the 1980s empowered local governments to create TVEs and "urban centres" in the rural areas.

Towards the end of the 1990s, a consensus emerged that large cities needed to accelerate their urbanization by better coordinating with surrounding smaller cities and towns. The removal of hurdles to rural-urban migration restricted by the hukou system also encouraged local governments to expand regional urban centres, particularly provincial capitals.

Shifting the importance to the creation of large cities is an inevitable consequence of the success of in situ urbanization, as the previous rural areas have become officially recognized as cities and the shares of their population and economic activities have increased. But the recent developments do not imply a lesser relevance of in situ urbanization in the coastal provinces of China. In situ rural-urban transformation is ongoing, and the relatively dispersed spatial pattern of city locations will continue to affect the future models of urbanization at the provincial level.

Source: UN DESA.

sive publicly owned bus transportation. The free universal health care and education up to the tertiary level, together with increased per capita income, have made it possible for the country to minimize the rural-urban gaps and rural-to-urban migration.

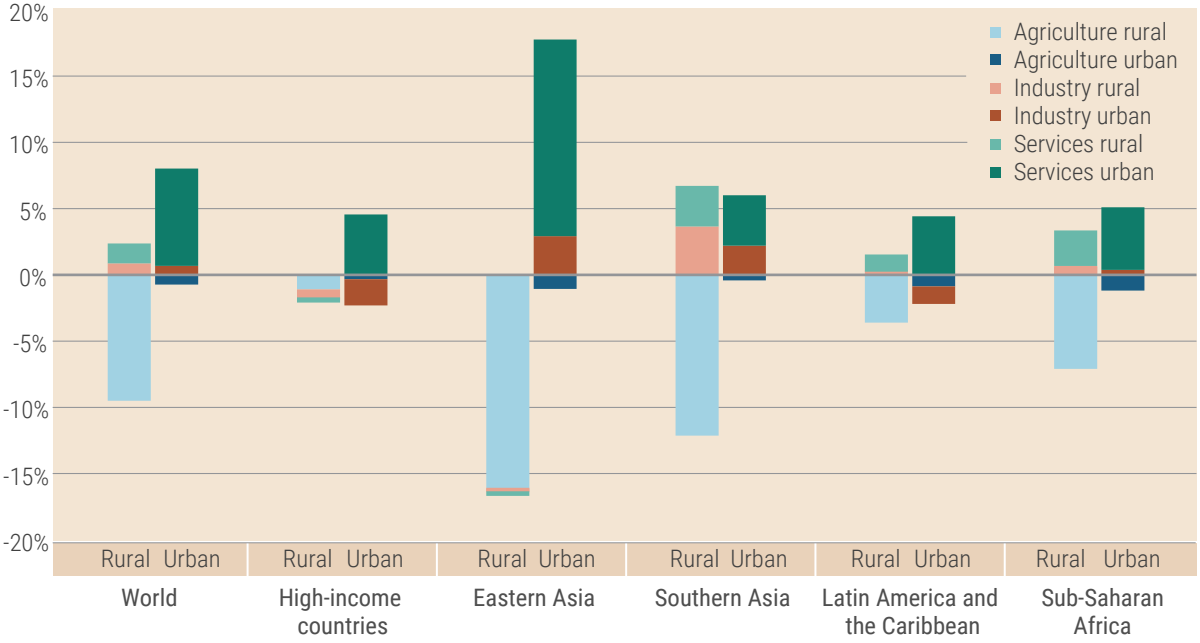
In a few regions, employment data at the national level show what may be interpreted as in situ (rural) growth of non-agricultural jobs. In Southern Asia and to a lesser extent in sub-Saharan Africa, where the agricultural sector dominates rural economies, the rural sector has experienced an increase in the employment share of industry and services in total employment (figure II.4). This increase absorbed some of the job losses in agriculture, preventing what would have been a corresponding migration of rural population to urban areas to seek employment opportunities.

Table II.1
Types of urbanization

Pattern	Example of country/region	Structural transformation	Rural-to-urban migration	Increase in rural population density
Classical urbanization	Europe, Japan	●	●	●
Urbanization without growth	Some sub-Saharan countries	□	●	●
Policy-driven in situ urbanization	South-eastern coastal region in China	●	□	●
Settlement transition	Bangladesh, India and Pakistan	◆	□	●
Desakota	Indonesia	●	◆	●
Rural-first in situ urbanization	Sri Lanka	●	□	□

Source: UN DESA.
Note: ● applicable, □ not applicable, ◆ not always applicable.

Figure II.4
Percentage point change in the share of total employment by sector and region between 2005 and 2019



Source: UN DESA, based on data from ILOSTAT.

BOX II.4

Rural-first in situ urbanization in Sri Lanka

Sri Lanka joined the group of upper-middle-income countries in 2019 without experiencing significant rural-urban migration. According to the World Bank (2015a), the country has achieved spatial equity between rural and urban areas in the provision of basic public services and living standards. The urban population share in Sri Lanka increased from 15.3 per cent in 1950 to 18.7 per cent in 2020, while in South Asia as a whole (including Sri Lanka), the same percentages were 16 and 37 per cent respectively (United Nations, 2019b).[a] Regional differences in Sri Lanka are minimal except in the Western Province, the location of the capital city, which exhibits some urban characteristics such as higher per-capita income, greater share of non-agricultural activities, and lower number of schools and hospitals per capita (see table II.4.1).

Table II.4.1
Socioeconomic indicators by province, Sri Lanka

Province	Number of schools per 100,000 population	Number of schools per 10 km^2	Number of hospitals per 100,000 population	Number of hospitals per 100 km^2	Per capita GDP (1,000Rs)	Share of non-agricultural sectors (per cent of total output)
Western	23.2	3.7	1.1	1.7	810	97.9
Central	59.0	2.7	3.9	1.8	487	89.7
Southern	44.8	2.0	2.5	1.1	482	86.6
Northern	92.7	1.1	6.4	0.8	467	87.5
Eastern	71.6	1.1	4.4	0.7	439	87.8
North-Western	52.5	1.6	2.6	0.8	534	89.9
North-Central	64.3	0.8	4.0	0.5	543	89.4
Uva	70.9	1.1	5.1	0.8	543	87.1
Sabaragamuwa	58.5	2.3	3.2	1.2	465	92.4
Country	**50.0**	**1.6**	**3.0**	**0.9**	**585**	**92.5**

Sources: UN DESA, based on Central Bank of Sri Lanka (2018) and Asada (2020).

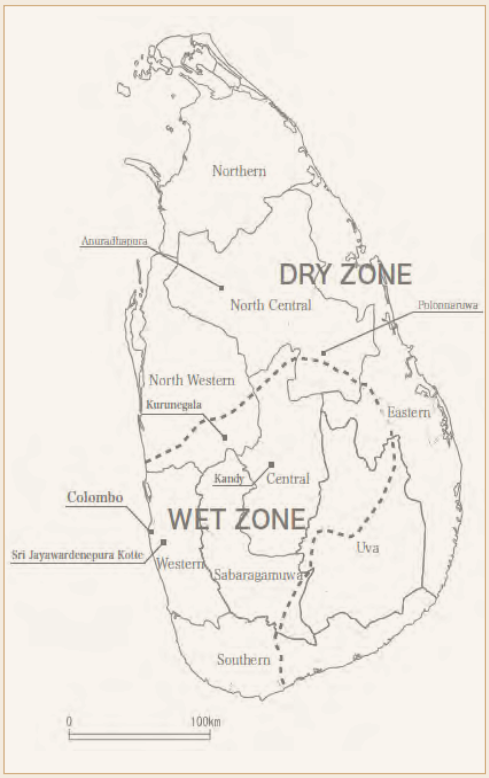
Rural areas in Sri Lanka enjoy many social benefits and a relatively high quality of life, in addition to rising per capita income. Although different political parties have ruled the country since the post-colonial period, they have consistently emphasized the development of rural societies, what Asada (2020) calls the "rural first principle"—guaranteeing universal free education and health care and offering affordable public transportation.[b] Schools and hospitals are located equally among provinces and districts although there are some disparities in terms of quality of service and facilities. Access to educational and medical facilities is enabled by reliable, subsidized public transport networks. In the 1970s, the country also instituted a poverty-alleviation programme and a low-interest-rate loan scheme for small businesses, which continue to this day.

Sri Lanka currently enjoys the highest level of health status and educational attainment and the lowest poverty rate among South Asian countries—all of which has reduced the need for rural residents to migrate to the cities. Public transport in Sri Lanka has also played a key role in achieving a geographically balanced growth. The rural bus network is expansive, and fares are kept low, which has facilitated rural-urban mobility as well as the overall welfare of people living in local areas.

continued >>

BOX II.4 continued

Map of Sri Lanka



The currently changing economic conditions, however, are making it challenging for the country to maintain some of the social programmes based on the rural-first principle. The economy of Sri Lanka has stagnated in recent years and is heavily dependent on remittances from overseas, amounting to about 10 per cent of gross domestic product. The Metro Colombo Urban Development Project, which started in 2012, with support from the World Bank, may contribute to further urbanization of the capital city in the long run and shift the rural-urban balance more to the latter.

The Sri Lankan experience offers several lessons for other developing countries facing urbanization challenges. For example, maintaining universal welfare programmes is key to achieving balanced rural-urban development. The provision of universal free education and health care is a bedrock principle of the Sri Lanka development experience. The country's expansive road networks and affordable public transport have also been critical in ensuring the access of all to schools and health facilities, regardless of where they live. The country's impressive progress in achieving spatial equity between rural and urban areas has thus reduced the incentives for rural residents to migrate to the cities.

Source: UN DESA.

a The urbanization in Sri Lanka in 1881 is estimated to be around 10 per cent (Central Bank of Sri Lanka, 2018). Weeraratne (2016) notes that the Government of Sri Lanka reclassified 89 previous urban areas into rural settlements.

b Asada (2020) argues that the rural first principle is rooted in the prosperity of the country during the pre-colonial period based on rich agricultural practices and the Buddhist culture that emphasizes a sustainable relation between humans and nature and between production and consumption.

Rural transformation and what holds it back

For economic transformation to take off in rural areas, at least two crucial steps have to happen. The first is the improvement in agricultural productivity. The second is the spillover of agricultural productivity growth to the expansion of local non-farm activities in rural areas, rather than the release of all factors of production—labour, capital and knowledge—to the cities, leaving the rural areas deprived of these factors. It would result in more diversified, more productive production patterns and livelihoods in rural areas, generating more resources for better coverage and access to services and infrastructure. This could in turn create conditions for rapid growth of rural areas to become mid-sized cities and small rural cities and ultimately leading to convergence of income levels across region. Besides supporting growth, diversification into a wider range of economic activities also improves long-term economic resilience of rural residents, which is critical to sustaining the elimination of poverty and hunger.

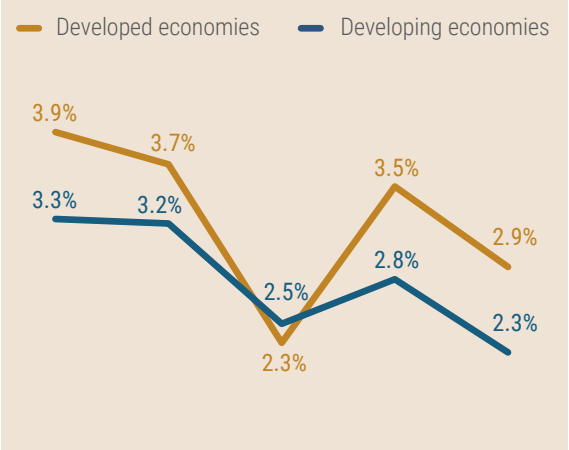
The policy focus in rural development has typically been on improving agricultural productivity, and there has been relatively less focus on how to ensure it would translate into reallocation of resources into

other sectors locally in rural areas. Moreover, for many developing economies, neither step is happening at the pace or to the extent that is fully compatible with sustained growth and generation of decent work in rural areas. It is estimated that global agricultural productivity growth has been below the rate that is needed to sustain the projected increase in need of food, feed, fibre and biofuel for the coming decades (Steensland and Thompson, 2020). A review of historical experiences—including the aforementioned successful ones in the United Kingdom and East Asia—clearly shows agricultural productivity improvement typically results in expansion of industrial and service sectors in cities rather than rural areas, for reasons that will be explained later in this chapter. A decisive change in the direction of national development planning—one that places more emphasis on rural areas and their linkages with urban areas, while ensuring equitable distribution of developmental gains within and between different areas—would need to happen to accelerate and actualize rural transformation.

Factors behind inadequate agricultural productivity growth

A major characteristic of the global agriculture landscape is the great variance of agricultural productivity levels and growth across countries.[6] Developing economies generally have significantly lower levels of agricultural productivity and have seen lower agricultural productivity growth in the past decades (figure II.5). In the majority of the 15 years during 2003–2017, the median agricultural growth rate among developing economies fell below—and in some years far below—that of developed economies.[7] As a result, there has been little catching up of low-agricultural-productivity countries with those at the productivity frontier (figure II.6).

Figure II.5
Agricultural labour productivity growth by country group, 2003–2017
Percentage



Source: UN DESA calculation, based on Dieppe (2020).

Note: Median value among countries is used for each country group. Value shown for each period is the simple average of the median values of the years in the period.

Regionally, the Middle East and North Africa have seen the highest median agricultural productivity growth during 2003–2017, followed by high-income economies in Europe and Central Asia and North America, as well as East Asian economies. On the other end are Latin America and the Caribbean and sub-Saharan Africa, which have seen considerably lower agricultural productivity growth.

Globally, in the 15 years from 2003 to 2017, more than 147 million agricultural workers—close to one fifth of global agricultural workforce—were working in developing countries that did not see sufficient agricultural labour productivity growth that would allow any meaningful catch-up with the agricultural labour productivity levels in the developed countries.[8] Furthermore, it is projected that countries that are home to at least 501 million agricultural workers will not be able to double their agricultural labour productivity during the SDG period (2015–2030) (figure II.7). Without acceler-

6 Throughout this section, the terms "agricultural productivity" and "agricultural labour productivity" are being used interchangeably. It is calculated as the total agricultural value added divided by the number of people employed in agriculture.

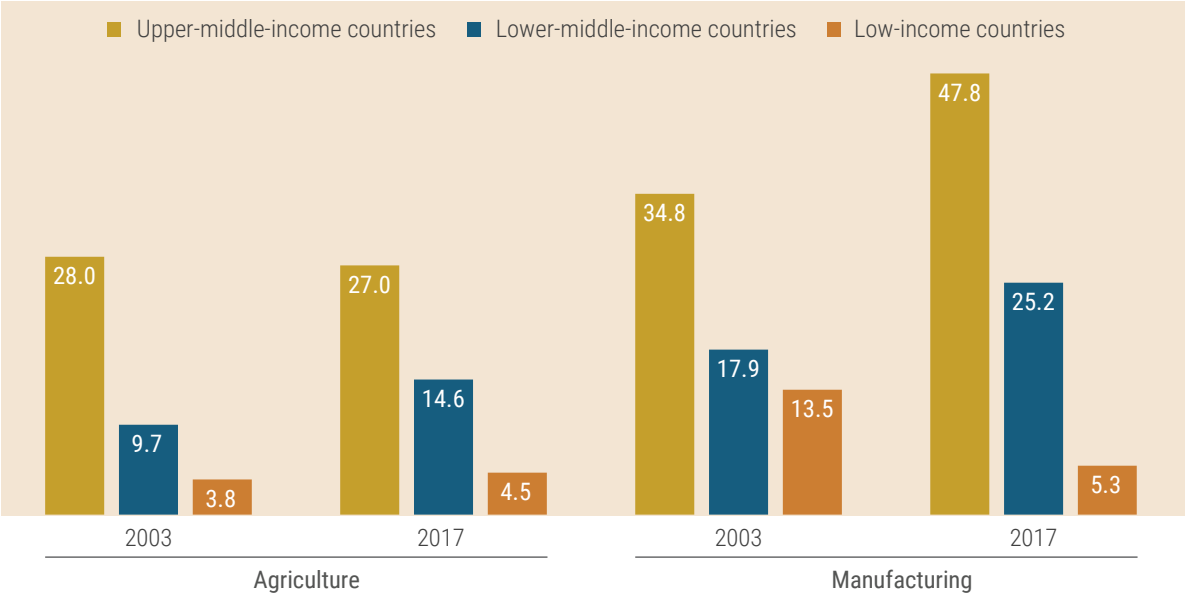
7 In the period following the global financial crisis period, low-income countries suffered the most among the developing countries from a productivity slowdown in their agriculture sector, which has coincided with a broad-based decline in agricultural commodity prices since 2011 (Dieppe, 2020).

8 UN DESA calculation, based on data from Dieppe (2020). These are developing countries where each of their average agricultural labour productivity growth rate during 2003–2017 was below that of the average growth rate in developed countries.

Figure II.6

Labour productivity in purchasing power parity, relative to high-income countries, 2003 and 2017

High-income countries' median=100



Source: UN DESA calculation, based on Dieppe (2020).

Note: Median value is shown for each income group.

ation in agricultural labour productivity growth, SDG 2.3 (doubling the agricultural productivity and incomes of small-scale food producers) could be out of reach for these countries, particularly given that small farms are typically outperformed by larger ones in terms of labour productivity (Gollin, 2018).[9]

One way to understand the slow agricultural productivity growth—defined here as changes in output per agricultural worker—is to decompose it into its two key elements: deepening of physical capital and accumulation of knowledge and technology.

9 It should be noted that there is also an alternative view that small farms could be more productive than their larger counterparts. For example, Binswanger-Mkhize, McCalla and Patel (2009) argue small family farms are more productive because of greater incentives felt by family labour to work hard. Also, small farms could be more productive in highly variable weather conditions, as they demand close management and supervision that is more viable in small farms. The paper also notes, however, that plantation crops (such as sugar, oil palm, tea, bananas) and horticultural crops grown for export (that need to be processed quickly and satisfy exacting quality standards) can experience economies of scale—meaning large farms would be more productive. Also, the rise of precision agricultural technologies in recent years means that close management and supervision is increasingly feasible for large farms, even with low levels of labour relative to land size.

Inadequate and uneven investment in agriculture

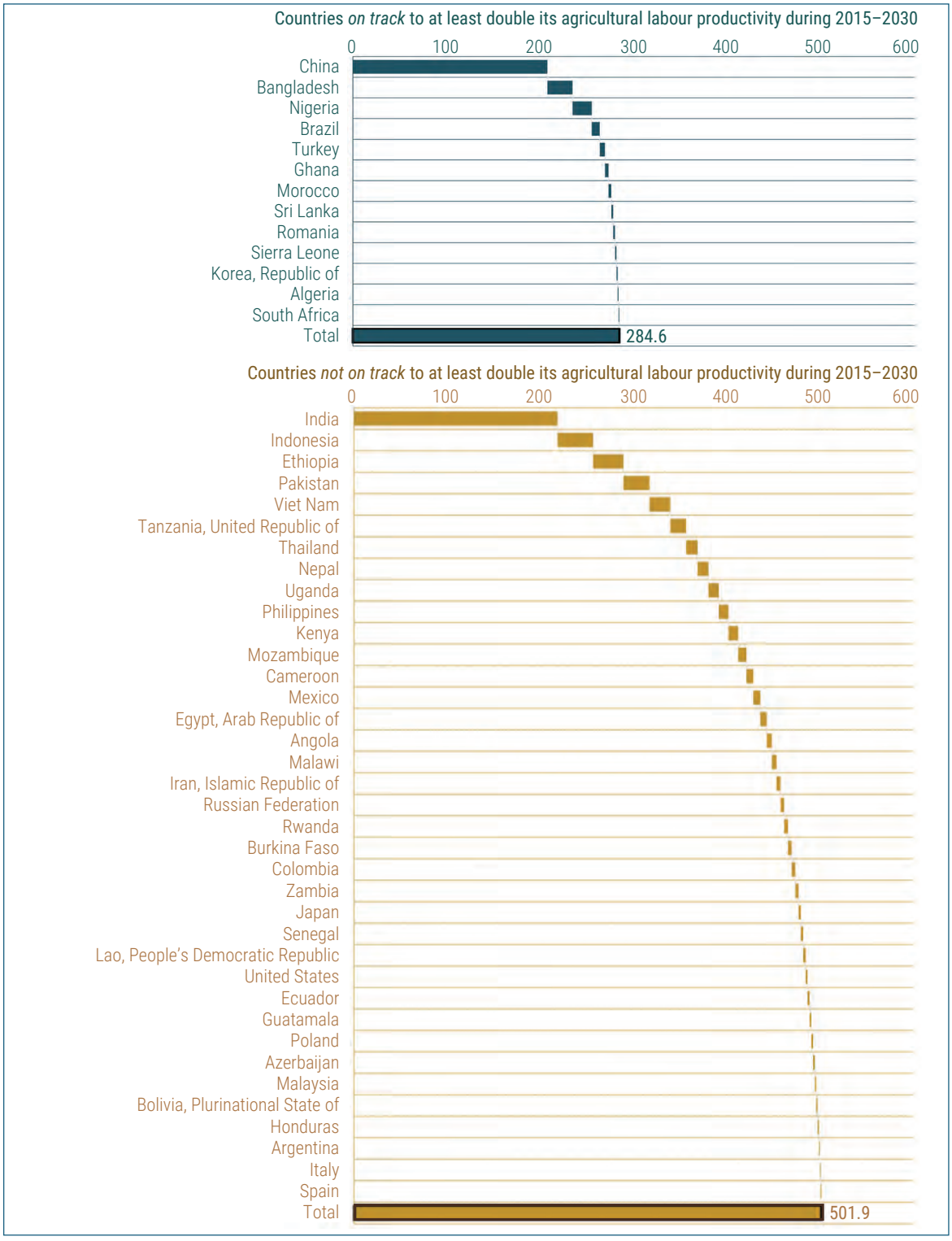
There has been chronic underinvestment in the agricultural sector across countries, which can be seen to go hand in hand with lower agricultural labour productivity growth (figure II.8). The median level of agricultural capital stock per agricultural workers in low-income countries remained a meagre 3 per cent of that in high-income countries in 2017 (figure II.9). Middle-income countries did not fare well either, with lower-middle-income countries and upper-middle-income countries reporting median values of about 25 per cent and 50 per cent of that in high-income countries, respectively. In Africa, where the median agricultural capital stock per agricultural worker is the lowest among all regions, the dismal agricultural investment is reflected in the almost non-existent improvement in the scale of irrigation and the use of fertilizer inputs and agricultural machinery per hectare of land, which drags productivity growth (Binswanger-Mkhize, McCalla and Patel, 2009).

Despite having significantly lower capital stock per worker in the agricultural sector (figure II.9), low-

Figure II.7

Doubling of agricultural labour productivity during the SDG period (2015–2030)

Millions of agricultural workers

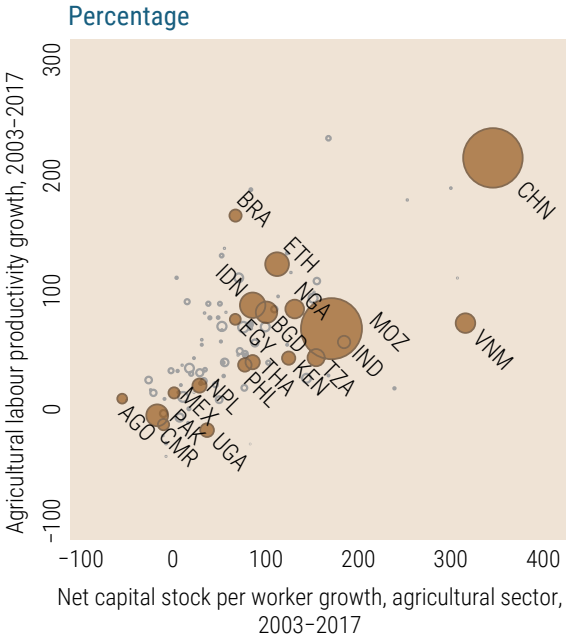


Source: UN DESA estimation.

Note: Each bar denotes the number of agricultural workers in the country as of 2017. The chart only shows countries that are among the world's top 50 in terms of agricultural labour force. The projection of whether a country is on track to at least double its agricultural labour productivity during 2015–2030 assumes that its average annual agricultural labour productivity growth rate in the SDG period will remain equal to its annual growth rate during 2001–2015. Agricultural labour productivity is calculated as the total agricultural value added divided by the number of people employed in agriculture.

Figure II.8

Positive correlation between agricultural investment growth and labour productivity growth, 2003–2017



Source: UN DESA calculation, based on data from FAOSTAT(2020) and Dieppe (2020).

Note: The circle size of each country is proportional to the size of its agricultural employment. The top 20 countries in terms of agricultural employment are labelled. Net agricultural capital stock is calculated by cumulating historical series on physical investment flows and deducting the part of assets that are consumed in every year.

income and lower-middle-income countries have seen very low share of investment going into agriculture (figure II.10). As of 2019, the median share of agriculture in gross fixed capital formation among low-income countries and lower-middle-income countries are 7.5 per cent and 6.9 per cent, respectively. In particular, the median value of the share of agriculture in gross fixed capital formation has declined in the past two decades in low-income countries—the countries most in need of an increase.

Unfavourable return is likely a main factor behind the tepid agricultural investment, which is in turn a result of a combination of factors. These include volatile agricultural prices that have been on a decade-long downward trend; insufficient access to productivity-enhancing agricultural technologies and knowledge; inadequate infrastructure; insecure access to land;[10] and increasingly debilitating effects of climate change and environmental degradation on agricultural outputs. Weak agricultural investment is also a function of inadequate access to financing, which is a prevalent challenge for smallholder farmers—especially female farmers—that predominate many developing countries. Many of these factors will be discussed further in the remainder of the report. For the more developed middle-income countries, the stagnant accumulation of agricultural capital stock could also partly be a result of their failure to orient to livestock and horticulture, which have surpassed cereals to become their major agriculture industries (Mellor, 2017). This in turn reflects the underappreciation of agriculture by urban-oriented governments.

Decade-long trend of decline in agricultural prices coupled with volatility

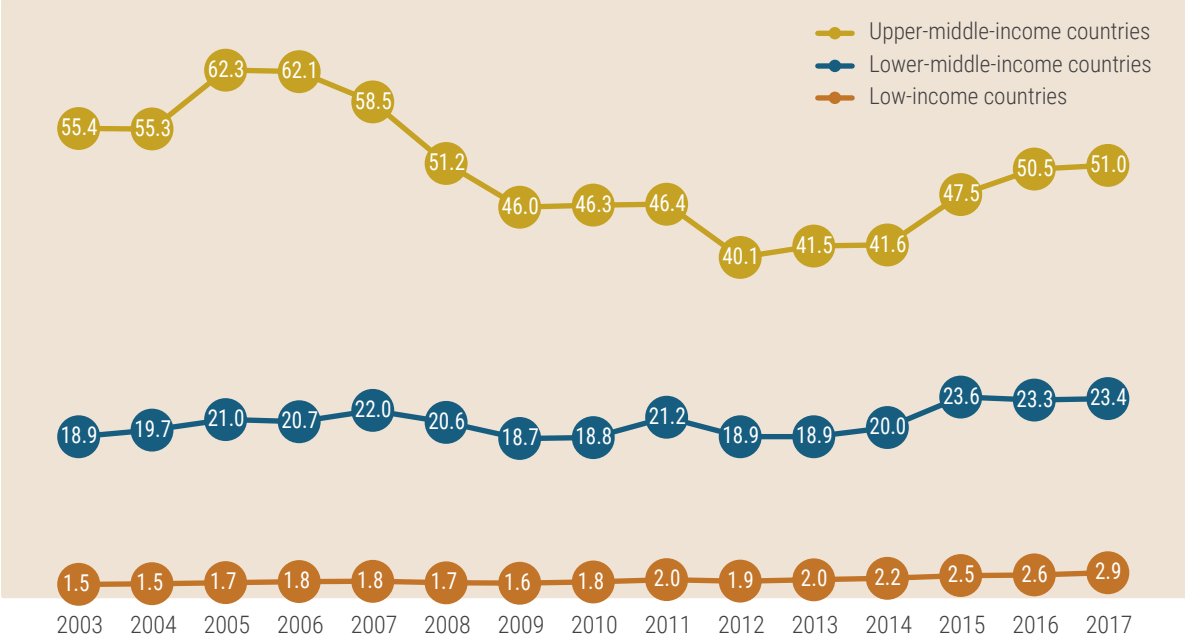
Subdued investment in agricultural assets reflects the steady fall of agricultural prices for much of the past decade. At the global level, a strong correlation between agricultural investment and agricultural commodity prices provides some prima facie evidence of the linkage (figure II.11). More sophisticated empirical evidence shows that an increase in agricultural prices has a long-term, persistent effect on agricultural labour productivity through both capital deepening and increase in total factor productivity, the latter of which includes accumulation of knowledge and technology (Dieppe, 2020). In the case of emerging markets and developing economies, it has been shown that a 10 per cent increase in agricultural prices tends to be followed by an increase of labour productivity among agricultural exporters by 2.0–2.5 per cent after 10 years. Higher agricultural prices could translate into higher agricultural productivity, as the increased revenue for farmers could be invested into newer technologies and equipment. The signals of higher prices also incentivize governments to invest in complementary infrastructure.

10 There is in-depth treatment of the issue of land access and land reform in chapter III.

Figure II.9

Net capital stock per worker in agriculture sector, relative to high-income countries, 2003–2017

High-income countries' median=100



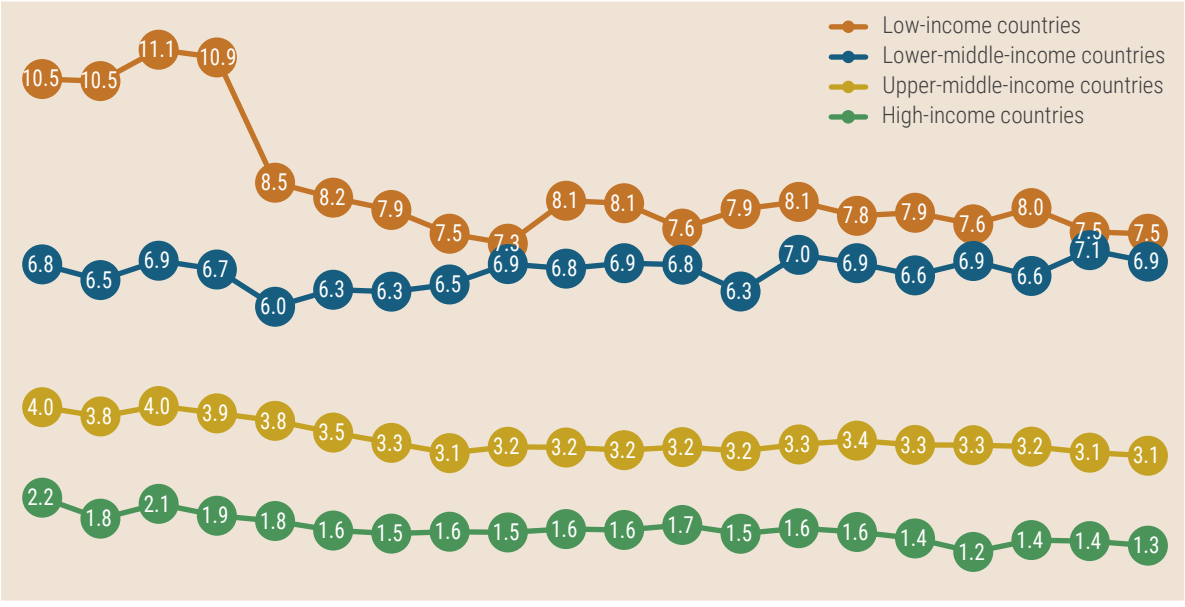
Source: UN DESA calculation, based on data from FAOSTAT (2020) and Dieppe (2020).

Note: Median value among countries is used for each income group. Net capital stock is calculated by cumulating historical series on physical investment flows and deducting the part of assets that are consumed in every year.

Figure II.10

Share of agriculture in gross fixed capital formation, 2000–2019

Percentage

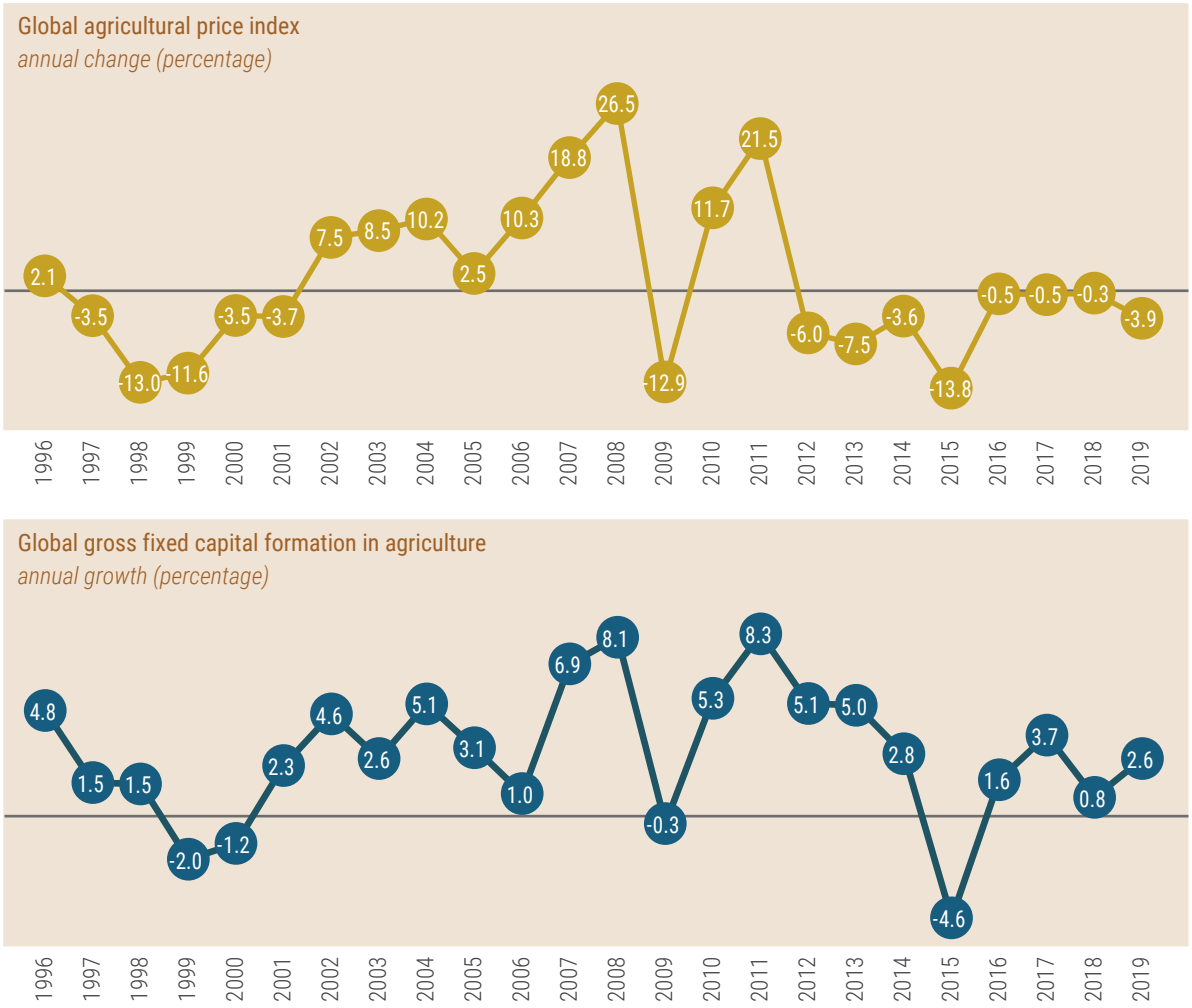


Source: UN DESA calculation, based on data from FAOSTAT (2020).

Note: Median value among countries is used for each income group. Forestry and fishing are included in agriculture.

Figure II.11

Strong correlation between global agricultural prices and investment, 1996–2019



Source: UN DESA elaboration, based on data from FAOSTAT (2020) and World Bank Commodity Prices data.
Note: The Pearson's correlation coefficient of the two variables is 0.76 and is statistically significant at 0.01 per cent level.

In this view, the overall downward trend of agricultural prices in the past decade has spelled trouble for agricultural investment. The World Bank Agricultural Price Index has fallen from its peak in February 2011 by 30 per cent, further denting the prospects for agricultural investment.

Traditionally, volatility of agricultural prices—partly driven by the financialization of commodities and the associated speculation—is a deterrent to investment in the agricultural sector, as it injects uncertainty to the return. However, given that agricultural price volatility has been on a general downward trend in the past decade (and at levels far below that around the global financial crisis and its immediate aftermath), it is likely a secondary factor behind the declining agricultural investment growth in recent years. Going forward, the trend of agricultural price volatility could once again reverse, as disruptions to the agricultural system caused by COVID-19 have created some upside volatility risks. Even if the uptick in agricultural prices since the pandemic is sustained, volatility would likely cloud the decisions of the public and private sectors

on longer-term investments in improving agricultural productivity and better food safety standards (Timmer, 1995 and 2009).

Underfunded agricultural research and insufficient access to technology

Underinvestment in agricultural capital stock has been accompanied by underfunded agricultural research across developing economies, which is a main cause behind the slow accumulation of knowledge about agricultural practices and technologies. Low- and middle-income countries typically spend less than 1 per cent of agricultural GDP—and in many cases less than half of 1 per cent—on research, which is substantially lower than expenditure in high-income countries (Mellor, 2017). For example, in recent years, public and private sectors in the United States of America spent approximately 6 per cent of agricultural GDP on agricultural research; on a per-researcher basis, high-income countries' agricultural research spending is twice that of low- and middle-income countries.

Besides the subpar innovation effort, accumulation of agricultural knowledge has also been hindered by inadequate and uneven access to information and technology. In developing countries, extension services—predominantly carried out by the public sector—are typically of low quality, due to poor fiscal and political support and to extension workers' insufficient accountability and knowledge of emerging technologies (World Bank, 2007). Another factor behind the inefficiency of public extension systems is that extension and research are usually situated in different administrative units, and without proper integration between the two (Mellor, 2017). This has led to poor performance on both the extension side and research side.

Disruption to the agricultural global value chain

Global trade facilitates the procurement of inputs to agricultural activities, such as machinery, fertilizers and pesticides (Farrokhi and Pellegrina, 2020). And fall of trade costs in agricultural inputs has shown to have a notable impact on improving agricultural productivity. In some more successful cases, countries' participation in the agricultural global value chain (GVC) and associated changes in the institutional organization of value chains also led to major inflows of domestic and foreign investment (Reardon et al., 2009). In this view, the expansion of the agricultural GVC witnessed in the past two decades has likely played a positive role in improving agricultural productivity. The magnitude of its overall productivity impact relative to other drivers, however, is unclear. Cross-country data from the recent two decades shows no noticeable correlation between agricultural productivity growth and agricultural GVC participation,[11] suggesting the latter is secondary to other factors in explaining the former.[12] This empirical observation is also consistent with the fact highlighted by the World Bank (2020f) that domestic value chains are generally more dominant than global value chains in the agricultural sector, unlike in the manufacturing sector.

Nevertheless, recent disruptions to international trade caused by COVID-19 do generate concerns over their negative impact on agricultural productivity, particularly given their global scope. Restriction on transportation—such as full or partial shutdown of ports that limit freight capacity on commercial flights and maritime shipping—and other COVID-19-induced disruptions to the global supply chain could have adverse effects on agricultural productivity, as they significantly constrain farmers' access to critical agricultural inputs and markets (Stephens et al., 2020). The length and extent of such impact would depend on how quickly international trade can recover, which for now is difficult to project.[13]

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11 The global value chain (GVC) participation measure reflects the share of a country's exports that flow through at least two borders. It is computed as the share of GVC exports in total international exports.

12 There are countries, such as Kenya, the United Republic of Tanzania and Viet Nam, that experienced rising agricultural productivity together with stronger participation in the agricultural GVC. But there are two things to note here: (i) they are among the exceptions; (ii) it is unclear if there is a causal effect, and more research has to be done to ascertain the dynamics.

13 See United Nations (2021) for a discussion on the impacts of COVID-19 on global trade.

Other factors behind subdued agricultural productivity growth

A significant factor behind the subdued agricultural productivity growth is gender inequality in rural areas, perpetuated by gender norms that limit the economic possibilities for women. This has significant implications, given the importance of women's labour participation in agriculture-dependent countries: they are the primary agricultural workers in many of these countries. There is a gender gap in education in many developing countries, resulting in a gendered agricultural productivity divide. For example, in sub-Saharan Africa, the improvement in closing the education gap has slowed down after the Global Financial Crisis, which is subsequently reflected in lower productivity of female agricultural works and entrepreneurs (World Bank, 2019; O'Sullivan et al., 2014). Other dimensions of gender inequality—such as access to productive resources, including land, technology, financial services and social capital—are also hampering agricultural productivity growth. A literature review by the Food and Agricultural Organization (FAO) (2011) found that closing these gender gaps could yield an improvement in women-owned land by an average of 20.0–30.0 per cent, which could translate into an improvement in total agricultural output in developing countries by 2.5–4.0 per cent.

Adding to the list of long-standing factors behind low agricultural productivity is climate change, which has been increasingly disrupting agricultural activities.[14] Around the world, the agricultural sector is becoming more constrained by temperature rise and extreme weather events that could completely ruin a whole year of farmers' efforts, devastating the sector's productivity (IPCC, 2014; Steinbach, 2019). Other human-induced changes, such as deforestation, agricultural intensification, soil compaction, surface sealing, soil acidification, pollution, and many others also adversely affect agricultural sustainability and productivity, including through undermining the crucial role of soil biodiversity in ecosystem functioning and ecosystem service delivery (FAO et al., 2020).

Adapting measures for advancing agricultural productivity to the institutional environment

Agriculture is highly context specific. As illustrated by table 1.3 in chapter 1 of this publication, there are numerous agriculture models that differentiate from each other in terms of technology, scale, ownership pattern and other institutional factors. For governments to effectively push to step up agricultural investment, research and adoption of agricultural technology, and to ensure accurate agricultural price signals that incentivize investment and production, they must account for the different market structures and institutions.

Small-scale farmers operating in a traditional institutional setting tend to have inadequate access to affordable financing that allows them to invest, as conventional bank loans are either outright inaccessible or accessible at very high interest rates with stringent collateral requirements (Hilmi and Nærstad, 2017). Therefore, countries with traditional institutions where small-scale farmers predominate the agricultural landscape cannot rely on these farmers alone to step up investment. Examples in Ethiopia, Mozambique and Nicaragua show that unifying small-scale farmers into community cooperatives allows them to better mobilize necessary financial resources to support investment. If being run efficiently and transparently, these cooperatives allow members to gain quick access not only to capital, but also to knowledge and technical solutions to the challenges they face in production. Also, governments must reverse the declining trend of public investment in agriculture, especially in developing countries where private investment is lacking.[15]

Besides increasing research funding, an efficient approach to strengthening agricultural research must also ensure an optimal balance of different actors in agricultural innovation. Compared to countries at the more advanced industrialization stages, those at the

14 On the other hand, unsustainable agricultural and land management practices contribute to climate change, land degradation and loss of biodiversity. See chapter IV for detailed discussions.

15 It was reported that, during 2001–2015, Governments allocated a low (typically below 2 per cent) and declining share of their central government expenditure to agriculture. See FAO Food and Agriculture Statistics.

earlier stages of industrialization would likely have to rely more on the public sector to play a dominant role in R&D, given that the latter have lower levels of market maturity and more limited research capabilities in their private firms. The latter countries are also likely to be more dependent on adopting foreign technologies for making advances in agricultural development, given the high cost and risks associated with innovation. This highlights the importance of having a flexible global intellectual property regime that facilitates rather than hinders cross-border diffusion of essential agricultural technologies, while allowing innovators to be sufficiently compensated for their R&D investment. Reliance on foreign technologies, however, must not mean neglecting domestic innovation efforts, which is necessary for boosting countries' absorptive capacity, and without which adoption of foreign technologies would be unsuccessful (United Nations, 2018b).

The issue of competition and market structure in the agricultural sector requires a close look by policymakers as it plays a significant role in price formation. Uncompetitive intermediary markets create the possibility that traders who engage in large-scale aggregation, storage and transportation could pay below-competitive prices to farmers. Empirical evidence from Kenya on high concentrations of intermediary market power and its adverse welfare and efficiency effects provides some affirmation of the speculated exertion of market power by agricultural traders in Africa (Bergquist and Dinerstein, 2020). The adverse effects are likely to be amplified in countries where smallholder farmers predominate, as they have little bargaining power vis-à-vis the traders, further disincentivizing investment in the production processes. Improving competition at the intermediary markets is therefore important. Better competition policies that mitigate collusion and other anticompetitive behaviours are needed, even though they might be less effective in countries where competition authorities have constrained enforcement capacity. Technologies that enable more direct matching between farmers and consumers also hold promise (this is discussed in the section on technology).

From agricultural productivity growth to the expansion of rural, non-farm economy

For agricultural productivity to play a significant role in reducing poverty, it must lead to not only higher incomes for agricultural-sector workers, but also a vibrant non-farm economy. While the mention of agricultural work in developing countries might conjure up images of countless subsistence farmers labouring in the field, agricultural production in a significant number of low- and middle-income countries is in fact dominated by small-scale, commercial, and typically non-poor farmers (Mellor, 2017). For example, in Ethiopia, such farmers own 77 per cent of the country's farmed land. In fact, in many countries, poverty is more prevalent among rural non-farm households that are either landless or have insufficient land to escape poverty from farming. It then follows that improvement in agricultural productivity alone does not necessarily lead to broad-based and immediate poverty reduction, since the lion's share of benefits would likely be captured by these small-scale, commercial farmers who live above the poverty line.

There are indications that the poverty-reducing benefits of higher agricultural productivity could be significantly enhanced through helping the expansion of non-farm activities in rural areas. As farmers' productivity grows and their incomes increase, demand for food processing, marketing and logistics, and food services also grows (Christiaensen, Rutledge and Taylor, 2020). The productivity gains also benefit producers in the rural non-farm economy—which are often households that diversify their earnings—because they can source their products locally and benefit from not paying the high costs of transporting goods from other locations. These extra earnings release household labour from agricultural activities, rather than inciting an increase in agricultural productivity or intensification. In other words, gains from non-farm income start a virtuous cycle in the non-farm economy (Davis, Di Giuseppe and Zezza, 2017).

Non-farm economic activities have been gaining importance in poverty reduction. In as recent as 2016,

35–50 per cent of rural income in developing countries came from productive activities in the rural, non-farm economy (World Bank, 2016). For many of the very poor and landless populations in rural areas, sustainable income gains at the household level are generally associated with extra income earned from engaging in non-farm activities. Jobs created by this growing non-farm rural activity are more accessible for rural workers, particularly women who are less likely to migrate. Keeping a vibrant non-farm economy in rural areas is therefore crucial for lifting, and keeping, many rural residents out of poverty.

Evidence has shown that the rural non-farm economy can contribute to poverty reduction in a range of different country and sectoral settings (Lanjouw and Lanjouw, 2001). Even participation in less-productive rural non-farm sectors that are at the lower end of value chains can help reduce poverty, as it smooths and boosts income over the year for rural residents that see less work during the slack season of agriculture. By providing an additional layer of buffer against poverty, the diversification of employment into the non-farm sector could also support agricultural income by expanding the possibility of investment in high-risk, high-return agricultural technologies.

Expansion of non-farm sectors in rural areas is also necessary for countries that have a so-called youth bulge—that is, a large share of the population comprised of children and young adults. Youth bulge necessitates the need for generating a large number of jobs. Urban jobs have attracted many of these young workers, but the rural non-farm economy could also provide considerable employment potential for a young labour force. There is a prevailing view that because youth are better educated and less attracted to agricultural work, they are well-positioned to establish rural non-farm businesses (Mueller, Rosenbach and Thurlow, 2019). Empirical evidence based on country studies in Africa have provided some support to that view, but the conclusion is far from final. A more definitive conclusion from these studies is that even when youth are more likely to engage in non-farm work, they tend to work in informal, low-productivity jobs or run less successful non-farm businesses. This result stresses that non-farm sector expansion must be measured not only by quantity but also by quality in order for it to be an effective contributing factor to the generation of decent work.

It should be noted that additional jobs generated by non-farm sectors also provide opportunities for a growing number of older persons who are often either left behind in rural areas—particularly in sub-Saharan Africa, but also in Eastern Europe and other regions—or who return from cities upon retirement from urban jobs.

It must also be noted that the translation of higher agricultural productivity into an expansion of the local non-agricultural sector is not automatic. The successful development of agrifood systems is part of Asia's structural transformation story. In Africa, on the other hand, most of the expansion of non-farm entrepreneurship has been in activities that do not require significant start-up costs or that give higher expected returns. The potential of these activities to generate sufficient additional investment to ignite rural development and faster structural transformation is therefore limited. Encouraging smallholder farmers to drastically increase their non-farm incomes to levels similar to other regions remains an important policy challenge.

Barriers to the development of rural, non-farm economy

Productivity improvements in the agricultural sector in a rural area often resulted in expansion of non-agricultural sectors in the cities, but did not necessarily lead to expansion of non-farm sectors in the same area.[16] Even in the case where there is an eventual integration of farm labour into the non-farm economy, in both rural and urban areas, evidence has shown that the process takes a long time (Timmer, 2017).

A key and well-documented reason that industrial activities have concentrated in cities rather than in rural areas is economies of agglomeration. Agglomeration provides (i) better opportunities to match work-

16 See Hornbeck and Keskin (2015) for a careful empirical analysis on the Ogallala counties in the United States of America that shows sizeable and persistent agricultural gains did not lead to long-run relative expansion of non-agricultural sectors in the same counties.

ers and employers; (ii) more global and dynamic peer learning and flow of ideas; (iii) more efficient sharing of infrastructures, business services, and intermediate suppliers; and (iv) ease in specializing. These are factors that rural areas, because of their low population density, cannot fully replicate. Rural firms also tend to be less connected with, and less equipped to operate in, the global manufacturing and service value chains, for various reasons: they may be far from major ports, and smaller firm sizes put them at a disadvantage when it comes to dealing with different national regulatory regimes. These firms also appear less attractive to the younger labour force, as a negative perception of working in the manufacturing industry in rural areas prevails (Hemstreet, 2017). More recently, some frontier technologies have created the possibility of at least partially replicating some of the benefits that agglomeration provides without the same extent of geographic clustering of factors of production (LaFleur et al., 2020). Moreover, better transportation infrastructure with affordable and relatively well-functioning public transport has significantly reduced daily commuting times between a city and its surrounding villages, lessening the need for people to concentrate in cities.

A less-explored factor that could hinder the spillover of agricultural-sector expansion to non-agricultural sectors is the unintended adverse effect of the former on the development of the latter, through at least two cost channels (Hornbeck and Keskin, 2015). First, increased agricultural land values could lead to increased land cost for non-agricultural sectors. Second, certain agricultural practices—such as increased use of agricultural chemicals and fertilizers—may disrupt living conditions for the local population (see chapter IV for more discussion on this issue) and increase labour costs, as wages have to go up to compensate for such disamenities.

In the end, without the appropriate type of human capital, complementary hard and soft infrastructures, including financing, long-term planning and coordinated actions from different government agencies and the private sector, there is little prospect for non-farm activities, such as manufacturing and high value-adding services, to thrive in rural areas. Evaluation by the World Bank (2016) has found that countries' efforts to create enabling conditions for rural enterprise activity are critical to poor households' participation in and benefit from the rural non-farm economy. The evaluation highlights (i) enhancing rural transport infrastructure; (ii) linking education and skills development to agribusiness and associated value chain activities; and (iii) strengthening financial inclusion as strategic initiatives that have proven to support the rural non-farm economy in different country contexts. These initiatives would be important not only for facilitating the reallocation of resources to the rural non-farm sectors, but also, and equally important, to promote rapid productivity growth within these sectors. Otherwise, as Diao, McMillian and Rodrik (2019) pointed out, structural change without significant and sustained productivity growth in the modern sectors would be "necessarily self-limiting".

Inclusive rural financing central to rural transformation

Inclusive rural financing would be crucial for both improving agricultural productivity and developing a rural, non-farm economy. Rural finance expands options for households and firms to adopt more advanced technologies, to invest in education and capacity-building, and to scale up their productive activities, thereby improving productivity in both rural farm and non-farm sectors (IFAD, 2016). Financial intermediation also allows better cash flow and risk management that are important for effective operation in agricultural and non-agricultural businesses.

Around the world, the rural population continues to enjoy far less access to finance than their urban counterparts (Demirgüç-Kunt et al., 2018). As of 2017, in only 15 per cent of countries is the share of rural adults with their own financial account (either at a financial institution or through a mobile money provider) on par with the overall national level. Even in cases where access to finance is available, rural residents typically face higher interest rates, challenges in receiving credit ratings, and a lack of profitable projects—all of which disincentivize them from borrowing.

Although rural residents generally face more limited access to finance than their urban counterparts, governments in both developed and developing countries should be on alert to the rising risk posed by rural debt while they seek to boost rural finance as part of their efforts to achieve rural transformation. Significant income volatility—partly driven by volatile agricultural commodity prices and changes in weather patterns—and inadequate access to insurance and other risk management instruments made rural households susceptible to indebtedness, which in turn presents an obstacle to the investment in human and physical capital that enables rural transformation.

An examination of the rural finance situation in a selected set of countries around the world reveals signs of elevated or high rural debt in different development settings. India, a lower-middle-income country, for example, has a long history of rural debt problems. Between 1993 and 2013, the percentage of farm households in debt increased by more than 12 percentage points (Kandikuppa, 2018). The average farm household in 2013 had more than 630 per cent higher debt-to-asset ratio than one in 1992. In China, an upper-middle-income country, it was reported in 2019 that rural commercial banks—whose asset quality is already the worst among lenders in the country—could be facing an even higher level of bad loans amid a slowing economy (Yang and Garrido, 2019). Whereas the average ratio of bad debt of all commercial banks in China was on a downward trend, the average non-performing loan ratio of rural commercial banks that serve mostly farmers and small local businesses was creeping up. In addition, countries including Argentina, Australia, Brazil, Republic of Korea, South Africa, Thailand, and the United States are also confronted by increases in rural debt that demand close attention of the policymakers, highlighting the global nature of the challenge. Going forward, reliable and comparable rural debt data on a large range of countries is needed to more systematically assess the severity of rural debt risk around the world.

Using technology to generate rural growth and employment, and connect rural and urban economies

The fate of agriculture has historically been linked to the path of technology. New innovations in farming methods, irrigation, fertilizers, seeds, machinery and countless others have each unlocked new levels of productivity. New types of technologies, rooted in digital systems and connectivity, are now being applied to agriculture, promising to further boost productivity and incomes for small and large farmers alike. The fast pace of digitization and interconnectivity, the proliferation of mobile phones, and advances in data collection and analysis, among others, are allowing digital technologies to be adopted for use in rural and agriculture activities with great speed. Drones, software analytics, mobile payment solutions, crowdfunding platforms, and countless other examples may be at an early stage of adoption in many countries, but they are rapidly expanding in scope and impact (table II.2).

Together, these technologies are opening new paths for countries to transform their rural economies by helping farmers sell their products to an increasingly urban consumer; by making production, processing, and distribution more efficient; and by strengthening connections between the farm and non-farm sectors. This transformation means more employment opportunities, higher incomes from agriculture and from non-farm employment, lower rural household poverty, and more prosperous rural communities (Barrett, Christian and Shiferaw, 2017). This section highlights five ways in which digital technologies are helping the rural sector:

I. Boosting agricultural productivity;
II. Helping sell products, reduce waste and improve food safety;
III. Easing access to finance and insurance;
IV. Helping many to find non-farm employment opportunities; and
V. Helping local governments.

Table II.2
Examples of technologies and their impact on rural activities

Technology	Key features	Advantages	Challenges	Evidence of impact
Ag tech • Drones • Robots • Sensors • 3D printing	• Encompasses a range of technologies that are relatively new and small-scale • Focus on water management, crop yields, weather prediction, and new machinery • Venture capital firms interested in investing in these innovations • More sophisticated in advanced countries compared to the less developed economies	• Helps improve farmer knowledge and labor productivity • Minimize inputs • Helps farmer productivity and ensures more food sustainably • Alert problems to crop diseases • More benefits to larger farmers (due to high cost)	• Difficulty in scaling up multiple micro-experiments • Hard to ensure relevant technology is adopted • Very poor farmers may not have access • Geography differences prevent "one size fits all"	• Can support both farm and non-farm development • RCT studies show early impact • Precision agriculture can increase yields by 15 to 20 per cent • However, jury still out on longer term impact on productivity
Ag tech • data analytics • artificial intelligence	• Support both small- and large- scale farmers • New and interesting technologies and applications	• Lowers transaction costs • Moves products faster through the supply chain • Helps farmer decision-making	• Difficult to adapt to needs of developing country farmers • High cost	• Can support agriculture and non-farm development • RCT analysis shows early wins in South Asia and sub-Saharan Africa
Fintech • mobile banking • remittances services	• Dynamic and usable model • In emerging markets, fintech can help create a stronger interface between governments, businesses and consumers to increase financial inclusion • With mobile phone and sophisticated algorithms, can foster financial intermediation	• Provides tailored financial services to poorer farmers at low cost • Allows access to credit and financial information • Reduces informational asymmetries • Can reach small farmers, although not poorest farmers	• Regulatory challenges and central bank policy response • Merging tech with finance difficult • Ensuring consumer protection • Training consumers in using app effectively	• Can facilitate access to funds through virtual digital payments • Can lower transaction costs for government services • A large body of empirical evidence shows dramatic increases in farmer credit and incomes
Fintech • Crowd funding platforms	• One of latest development in technology and finance space	• Innovative funding model	• Scalability challenges	• Helps nascent firms but too early to assess impact
E-commerce • Platforms linking producers to consumers • commodities • trading	• Allow greater consumer flexibility • Business to business; business to consumer; consumer to consumer; consumer to business	• Matches buyers and sellers • Allows small and large farmers to connect with urban consumers • Reduces transactions costs • Helps internet intermediaries facilitate transactions between third parties	• Generates sufficient and targeted traffic • Maintains food quality and safety standards • Complexity due to platform intermediaries spanning a wide range of digital business activities	• Can support farm and non-farm development • E-commerce has helped farmers bypass intermediaries, increase incomes and reduce wastage • Quantitative and qualitative evidence is abundant from many micro studies

Source: UN DESA, based on Zafar (2020).

Digital tools to boost farmer productivity

New technologies are transforming and modernizing every part of the agrifood value chain, boosting farmer productivity and incomes while making the whole ecosystem more efficient and more sustainable. Digitization is helping farmers get information and assistance to optimize the management of resources (Đurić, 2020). Platforms now exist to make agricultural knowledge and extension practices accessible to farmers around the world. They also help deliver market information, locally relevant weather and pest information, and video-based farming advice on demand. New digital platforms are also providing farmers with access to modern farming equipment without the need for significant investment or the creation of a sharing cooperative. An example is Hellotractor, which enables African farmers who own tractors to rent them to others that do not have the equipment (Cheng et al., 2020).

The impact of these technologies has been impressive. Practices recommended through digital extension are adopted at rates similar to those adopted through the course of traditional in-person extension practices and at a significantly lower cost. In sub-Saharan Africa and India, providing agricultural information through mobile technologies can improve the chances of farmers adopting recommended agricultural inputs by 22 per cent (Fabregas, Kremer and Schilbach, 2019).

For more commercial settings and more capital-intensive producers, digital data started to become important in the late 1990s, when farm equipment manufacturers in the United States began adding GPS sensors to their machinery. Since then, providers of agricultural equipment as well as seed and fertilizer inputs have used a multitude of sensors to measure nearly every aspect of farming. Input providers are using this data to offer data-rich customized services to farmers, improving yields and profits. These services are now being offered around the world.

In less developed economies, the use of many so-called agtech solutions remains on a relatively small scale, since the economic feasibility of technology adoption depends in part on the scale of the operation (Zafar, 2020). However, given the foundation set over the past decade, the next decade may witness greater adoption of innovative practices and technology, enabled by the digitization of the agricultural industrial complex and potentially accelerated by the impact of COVID-19 (William Blair, 2020). Nonetheless, without measures to address the gap in accessing and using agtech, distribution of the values created in the agriculture supply chain would be uneven. It could also have adverse implications for the market structure of the agricultural sector, where one already sees significant concentration of market power in the processing and distribution segments of the supply chain.

HIGHLIGHT

Precision agro-advisory services powered by artificial intelligence

A collaborative effort between Microsoft and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has developed a sowing app based on artificial intelligence that enables smallholder subsistence farmers to receive precision agro-advisory services, prompted by weather conditions and other parameters. In 2017, the service was used by 3,000 farmers during the rainy season for several crops, including groundnut, maize, rice and cotton. The increase in yields ranged from 10 to 30 per cent across crops.

Source: FAO (2020a).

Help match rural food producers with urban consumers, reduce waste and enhance quality control

E-commerce is helping many countries revitalize their rural businesses by facilitating smaller firms' integration into local, national and global supply chains. E-commerce connects producers in urban, peri-urban and rural areas with consumers, and helps reduce inventory. For instance, Pinduoduo, one of the largest e-commerce platforms in China, helps farmers sell

products online. As of the end of 2019, more than 10,000 rural industries have been involved in the supply chain, together with farmers. Another example is the Virtual Farmers' Market in Zambia, an app-based e-commerce platform for farmers and buyers to advertise and trade crops (WFP, 2020). The size of the market is small in dollar terms, but since 2017 it has reached more than 1,000 Zambian family farmers.

To overcome any reluctance by farmers to use e-commerce platforms, India's largest brick-and-mortar retailer, Reliance Retail, is using its over 6,000-plus smaller retail stores in more than 5,000 cities and towns as the last mile connection point for its e-commerce platform. This expands access into the rural non-farm sector and to consumers without internet access or who have never shopped online. It is also expected to create a large increase in rural non-farm employment.

Emerging digital technologies can also help to make value chains more traceable and coordinated, helping to further reduce waste and inefficiencies. Better commercialization helps to reduce the loss of food from post-harvest loss and poor distribution systems, estimated to be about one third of all food grown in the world each year. The problem is of such magnitude that resolving the equitable distribution of food would go most of the way to meeting the SDG targets for ending hunger and achieving food security (see chapter IV, box IV.3).

Digital technologies and e-certification systems have been used to detect food contamination and other quality issues, allowing early and effective responses. The IBM Food Trust is a notable example of the application of digital technologies in this area. In a pilot programme, the blockchain-enabled food traceability network has shortened the time for a retailer to trace an item from seven days to 2.2 seconds (Walmart, 2018).

The speed of adoption of these technologies is being accelerated by the stresses created by the COVID-19 pandemic. In Africa, for instance, COVID-19 has driven a perceptible shift in logistics, agriculture, and mobile-based financing (Zafar, 2020; Basta, 2020). Since the COVID-19 lockdown, Nigerian logistics company Kobo doubled its business of matching shippers and truck operators for long-haul trips. In Kenya, small companies such as Copia created a system to source goods and a network of rural distribution points that allows it to offer delivery services to rural households for as low as $1. Companies also offer delivery services to roadside stallholders and directly to consumers, taking advantage of mobile orders. The phone financing operator M-KOPA has increased revenue by 50 per cent, following greater demand from vendors for mobile transactions.

HIGHLIGHT

Digital platform for monitoring agricultural value chain

E- Farmers' Hub is a digital platform created by the Basel-based Syngenta Foundation to help farmers and entrepreneurs in developing countries keep track of agricultural inputs and outputs. Farmers use a mobile app to upload transactional data onto the platform, replacing paper-based documentation of transactions. It allows access to data in real time, location tracking and assessment of overall performance of the agricultural value chain. As of 2018, the project covered 45 Farmers' Hubs and benefited around 30,000 farming households, linking them to buyers, including medium to large traders, processors and export companies. These Hubs are owned by rural entrepreneurs, agribusiness suppliers or farmers' cooperatives, with fees for the services generating a regular income flow. At the same time, buyers benefit from product aggregation and reliable supply.

Source: Syngenta Foundation for Sustainable Agriculture (2020).

Ease access to funds through fintech innovations

Digital financial services (DFS) and fintech offer lower marginal costs and greater transparency, helping to overcome supply-side barriers such as high operating costs and limited competition. DFS is also better positioned to overcome demand-side barriers, including low incomes for the poor, lack of ID, and geographical

barriers (Zafar, 2020). The catalyst for rapid expansion of financial services has been the increase in mobile phone usage and mobile banking in many countries, including many in sub-Saharan Africa. Targeted digital financial literacy training has also had significant impact. In India, Grameen Foundation is providing digital financial literacy training for rural women, enabling them to act as agents for both public and private sector financial service providers. Over 200 skilled agents have empowered almost 270,000 low-income individuals—mostly women—with access to digital financial services, and have already facilitated transactions worth more than 21 million Indian rupees. This has also reduced the gender gap in access to credit considerably (ibid.).

In Africa, the pace of innovation in fintech has been accelerated by rapid and widespread adoption of digital transactions. A similar revolution happened in the continent when mobile technologies were introduced that allowed countries without legacy fixed connectivity networks to leapfrog over more developed countries. As a result, at least 50 per cent of the population in Botswana, Kenya, Uganda, the United Republic of Tanzania and Zimbabwe are using mobile banking (*The Economist*, 2015).

Financing by venture capital is also supporting other fintech as well as agtech initiatives. From 2018 to 2020, the total venture capital inflow into Indian fintech start-ups has more than doubled to 117 per cent, whereas the fintech adoption rate for India has surged to 87 per cent in 2019 from 52 per cent in 2018 (Moneycontrol, 2020). More than 1,000 fintech start-ups globally have entered the agtech sector and the numbers are growing. Since 2010, Ant Financial has a business lending subsidiary which has provided financing to 180,000 rural small and medium-sized enterprises through an Internet-based loan programme that gives poor rural merchants access to Alibaba's platforms and to capital.

HIGHLIGHT

Examples of digital financial services to rural communities

- Farm Drive, a start-up in Kenya, connects smallholder farmers to loans and financial management tools through their mobile phones and apps.
- In Kenya, Agri-wallet is a disruptive fintech that provides supply chain finance to ensure that all actors in the value chain—farmers, buyers and suppliers—can access the resources they need to grow and scale. The Kenyan company M-Shwari uses customers' phone and mobile money records to assess creditworthiness.
- In India, Grameen Foundation is supporting local rural women by training them on digital financial literacy and enabling them to act as agents for both public and private sector financial service providers. Over 200 skilled agents have empowered almost 270,000 low-income individuals—mostly women—with access to digital financial services and have already facilitated transactions worth more than 21 million Indian rupees. This has also reduced the gender gap in access to credit considerably.
- Credible India is an innovative firm that focuses on agricultural entrepreneurs by identifying financing gaps and designing AI-driven crop monitoring and local market demand forecasting tools.
- In the Philippines, a digital ecosystem is emerging with the rise of many fintech companies. Recently, PearlPay has signed a pilot programme agreement with BHF Rural Bank, Inc., based in Dagupan City, marking the first time a Philippine rural bank will utilize cloud-based technologies such as core banking solutions, agent banking solutions and white-label eWallet solutions.

Source: Zafar (2020).

Expand non-farm opportunities and employment

Digital technology has not just empowered individual farmers, but it also has immense potential to make the whole business ecosystem more efficient and sustainable. This is important for the non-farm sector, which includes agricultural value chain activities, such as agro-processing, transport, distribution, marketing and retail, but also tourism, manufacturing, construction and mining, plus self-employment activities (World

Bank, 2016). Technology also helps to expand services and create jobs in remote locations. In Kenya, for instance, an ambulance-hailing service called Flare reduces the response time of emergency services in remote locations where centralized ambulance dispatch services do not exist (Cheng et al., 2020).

Some frontier technologies can mitigate some of the disadvantages of operating in rural areas. For example, advances in information and communications technology (ICT) have made it easier to match workers and employers despite geographic distance. The digital sphere also makes it easier to share ideas and collaborate. Another example is 3D printing, which has the potential of bringing manufacturing activities to the rural areas. It is less capital-intensive and requires less upfront fixed investment, which means economies of scale would be a less salient factor in reducing per-unit manufacturing costs. Furthermore, there are signs that the use of 3D printing technologies is beginning to move beyond the creation of prototypes—their main use for decades.[17] Whether or not its commercial potential can be realized, especially in developing countries, would be conditional on further lowering of costs and development of relevant local expertise.

HIGHLIGHT

3D printing for manufacturing agricultural tools

Proximity Designs, a Yangon-based social enterprise, uses 3D printing to design and manufacture high-quality farming tools that are otherwise unavailable to low-income farmers. Enabled by 3D printing, the social enterprise is able to work closely with farmers to accelerate the process of prototyping. The switch away from metal machining—the traditional prototyping approach—makes creating farming tools that are fit for the purpose of rural households in Myanmar both faster and less costly. Also, 3D-printed parts help to concretize the discussions over the design of the tools, as 2D drawings cannot always fully reflect farmers' needs. This allows farmers to provide detailed and immediate feedback. Since it was founded in 2004, Proximity Designs has served over 102,000 rural households in Myanmar and generated over $276 million in revenue.

Source: Makerbot (2016).

Investing in local e-government for improved governance

ICTs can play an essential role in achieving an improved form of governance, especially when employed at the local level, as shown in the Local Online Services Index (LOSI) of the United Nations E-Government Survey 2020 (United Nations, 2020d).[18] With the appropriate use of ICTs in government services, the aspects of openness, transparency and accountability intensify, thereby helping to achieve sustainable development in general and SDG 16—just, peaceful and inclusive societies—in particular (ibid., p.105, para. 4). This then ultimately leads to the development of responsive policies, rewarding decision-making, lessening corruption and bribery, and strengthening growth in the economy, which ultimately results in local governments thriving from a high level of legitimacy and trust from their residents.

One of the main assets local governments hold over their regional and national counterparts is their proximity to their residents and thus their ability to more adequately address issues of a smaller and more personal nature. Locals feel "a sense of belonging and ownership" (ibid., p. 88, para. 2) towards their local governments. Consequently, concerns of trust and transparency by local residents are alleviated by their participation in local policy decisions. Furthermore, a local government's familiarity with its residents, its territory and its main activities also contributes to building and maintaining trust.

17 In the case of the United States, which leads the world in 3D-printing spending, more than two thirds of manufacturers were already using 3D printing in some way in 2016 (PwC and The Manufacturing Institute, 2016).

18 Local Online Services Index measures e-government development at the local level through the assessment of city web portals. It measures 80 indicators relating to four criteria: technology, content provision, services provision, and participation and engagement.

Use of ICTs in local governments provides more detailed and accurate information, both internally and publicly; makes interacting with residents more efficient and less burdensome; and makes operations more eco-friendly. The use of artificial intelligence (AI) chatbots, for instance, allows for better service delivery and workforce management (ibid., p. xxviii). Big data and analytics help local governments devise policies that are better suited for the locality and use of public resources most effectively. Other emerging technologies, notably the Internet of Things and Augmented and Virtual Reality help governments address issues such as climate change, air pollution, traffic congestion, ageing population, unemployment, public insecurity, solid waste, migration and others (ibid., p. xxix).

Despite the mounting interest of local governments in using technologies, the 2020 LOSI found that the majority of cities assessed still offer a limited menu of online services. Moreover, the survey does not show evidence of impending plans to expand e-services nor improving participation amongst their populations at this time. The reasons include some combination of a lack of financial resources and of a vision for inclusive local e-government, as emphasized in the 2020 edition of the United Nations E-Government Survey.

Conclusion: how to harness the potential from rural transformation

Historical data shows that richer countries derive a greater share of their income from non-agricultural activities in rural areas. This fact explains why achieving higher incomes per capita requires countries to invest in high-value agriculture, in agricultural value chains, and in higher value added industry and service sectors. However, the path that each country must take as it transforms and develops is not obvious. The general observed relationship between income and economic structures is complex and the causal links are multidirectional. Sustainability and social challenges add to this complexity and call for tailor-made interventions. It is no accident, then that there are nearly as many experiences of rural and national development as there are countries.

The discussion above shows that escaping poverty is possible not only through migration to large urban centres where higher-paying jobs are available, but, more importantly, through engaging with the rural non-farm economy. In situ urbanization of the rural areas is a location-based structural transformation that helps not only to eradicate poverty, but also to alleviate urban development issues by reducing incentives for rural dwellers to migrate to the urban area. A decisive change in the direction of national development planning and in situ urbanization in rural areas would need to happen to accelerate and actualize rural and nationwide transformation. Two key processes central to the achievement of rural transformation are the improvement of agricultural productivity and the spillover of agricultural productivity growth to the expansion of local rural-based non-farm economy. For many countries, neither process gathers sufficient pace for generating sustained growth and decent work in rural areas.

Improving agricultural productivity means that food production must become more commercially viable and profitable for small, medium- and large-sized producers. Farms must be able to leverage better production, processing, and distribution methods that are integrated across the farm and non-farm sectors. Whether family, cooperative, or commercially oriented, all farms also benefit from advances in transport and information networks that help producers form stronger connections with increasingly urban consumers.

Looking back to the recent past (2003–2017), more than 147 million agricultural workers were in developing countries where the agricultural labour productivity did not experience any meaningful catching-up with that in the developed countries. And looking forward, countries that are home to at least 501 million agricultural workers are unlikely to reach SDG 2.3—to double the agricultural productivity and incomes of small-scale food producers by 2030—unless they see an acceleration in agricultural labour productivity growth from the levels seen since the turn of the century.

Chronic underinvestment in the agricultural sector and underfunded agricultural research across developing economies are key factors behind the subpar agricultural productivity growth. Tepid investment in agriculture reflects low expected return, which is in turn driven by a host of factors that are putting downward pressure on agricultural productivity. These include volatile agricultural prices that have been on a decade-long decline; insufficient and uneven access to agricultural knowledge and technology; inadequate infrastructure; insecure land access; the gender gap in access to productive resources; climate change; and environmental degradation. Coupled with these factors are the de-prioritization of the agricultural sector by urban-minded governments and the ongoing COVID-19-induced disruptions to the agricultural global value chain. Given that agriculture is highly context specific, measures to advance agricultural productivity must adapt to the institutional environment of each community, accounting for differences in market structure, industrialization level and other institutional factors.

It should be noted that improvement in agricultural productivity does not always lead to broad-based and immediate poverty reduction—due in part to the fact that, in some cases, the lion's share of the benefits are captured by small-scale, commercial farmers who live above the poverty line. In countries where poverty is more prevalent among landless rural households that mainly engage in non-farm activities, keeping a vibrant non-farm economy in rural areas is crucial for lifting, and keeping, many rural residents out of poverty. A viable rural non-farm economy also presents significant potential for generating jobs for the growing young labour force found in many developing countries.

Expansion of the rural non-farm economy is not an inevitable consequence of higher agricultural productivity. Rural firms suffer a number of disadvantages, including weaker economies of agglomeration and economies of scale, less connection with global manufacturing and service value chains, and lack of appeal to the younger labour force—all of which hinder the development of rural non-farm sectors. Moreover, by pushing up land cost and wages, expansion of the agricultural sector could have unintended adverse effect on other sectors.

Continuous improvement in human capital, infrastructure and governance is essential in enabling both the reallocation of resources to rural non-farm sectors and productivity growth in these sectors. Also, some frontier technologies hold promise for mitigating some of the disadvantages that rural firms face, which could pave the way for a more vibrant rural non-farm economy. Inclusive rural financing is crucial and pressing given the persistent rural-urban gap in access to finance, but governments must also keep a watchful eye on the rising risk posed by rural debt that can be observed across countries at different development levels.

Technologies can also help overcome some of the disadvantages that workers and businesses face in rural communities. Agglomeration in cities means the network effects work against rural communities and smaller cities; but with the spread of digital technologies, it may finally be possible to end the rural-urban divide. Greater connectivity can facilitate in situ urbanization by making remote work more accessible. New business ventures and start-ups based on digital and e-commerce technologies make it possible for goods and services to be sourced and provided directly in rural communities; these developments are also helping many to find non-farm employment opportunities. This is a big step forward in removing the economic underpinnings of the rural-urban divide.

New technologies may be at an early stage in many developing countries, but they are rapidly expanding in scope and influence. Many firms now offer farmers mobile payment solutions, crowdfunding platforms, and extension services that use remote sensors and drones, among others. E-commerce and telecommunications infrastructure is helping to connect rural producers with urban consumers, but also vice versa. These and many other initiatives are rich with possibility for government facilitation and participation.

Policy priorities

As shown above, the lives and livelihoods of populations must be improved, especially in rural areas, if we

are to achieve the SDGs by 2030. The analysis in this chapter offers some insights into the policies that are most useful in achieving the connected objectives of rural development and transformation that are necessary for national and global sustainable development. All policy actions should be immediate and sustained but some should target rapid outcomes (quick wins) while others can target longer-term objectives.

Immediate tasks to achieve quick wins

Policy priorities can begin by looking for immediate actions that improve the income and welfare of rural inhabitants from existing activities. This means looking for quick wins that increase agricultural productivity as well as promote economic activity related to the agrifood chain and non-food rural industry. This would rapidly increase incomes for farmers, workers and businesses in rural communities.

Governments can quickly implement policies that will help make incomes more predictable, thereby facilitating investments. Stable domestic agricultural prices can serve as reliable signals for informing production and investment decisions of farmers. The choice of price interventions and their impact will depend on the source of price volatility—whether it stems from local, national or international factors, for example—and must be informed by timely market information, including high-probability forecasts.

The use of price subsidies has to be carefully calibrated in terms of the duration and recipients, ensuring fiscal sustainability, accurate targeting of farmers in need, and minimal distortion to long-term production and investment decisions. Governments should also commit to mitigating the price distortion caused by anticompetitive behaviours of powerful firms in different segments of the agrifood supply chain to ensure market prices accurately reflect the fundamentals of supply and demand. There also needs to be better management of government grain reserves to maintain stable supply and food prices. Well-defined and binding commitments to international coordination of domestic policies, especially trade policies, help to reduce uncertainty in global agricultural prices (Pinstrup-Andersen, 2015).

Technology is a catalyst and accelerator for rural transformation given the right underlying infrastructure and supportive financial and regulatory environment. Immediate action can be taken to increase digital connectivity, including facilitating access to cellular-based services or investigating the viability of emerging satellite-based connectivity services that can reach even the most remote locations. Remote and rural areas even have a particular advantage in new forms of connectivity as they are not encumbered by legacy infrastructure. Governments can also take quick action to create an enabling environment to encourage entrepreneurship in rural areas that leverages digital platforms to provide goods and services.

Immediate tasks for longer-term outcomes

A long-term concern of policy is how to lead rural sectors towards a more productive and prosperous future that does not leave them behind in the wake of urban growth. Sustained actions and longer-term perspectives are needed to ensure that national development plans reflect the concept of transformative change in a way that is compatible with the ambitions and priorities set in the 2030 Agenda for Sustainable Development.

It is not enough to simply set the objectives. It is crucial that national strategies connect longer-term objectives with strategies to achieve rural transformation, including in situ urbanization, providing social and health services, and strengthening governance. Those plans should also aim to build a better workforce and expand a country's capital and knowledge base for this transition.

Immediate actions can also target longer-run objectives such as a rethinking of spatial development. In situ urbanization of rural areas offers an alternative way of narrowing socioeconomic gaps between rural and urban areas, without invoking significant rural-urban migration. Governments can also work to strengthen and expand the socioeconomic infrastructure in rural areas by building more and better schools and hospitals, by building roads and telecommunications infrastructure, and by expanding water, sanitation and electricity networks, among other investments.

Over the long run, such investments are central to generating additional private investments in businesses and to support a more productive and thriving rural population.

Policies must also support the growth of upstream and downstream providers in agrifood and other value chains as a way to lower input costs and facilitate the processing and marketing of products. For quicker results, governments can support a robust financial network to fund investments. In addition, efforts should be directed at addressing information asymmetry that rural producers typically suffer when it comes to regional and global markets, helping them understand the market opportunities, and required capabilities and actions to succeed in the value chains. It should be noted that the value-chain approach may improve productivity and boost revenues, but it has mixed success at reaching the poor. Policies can have a rapid effect if they are combined with community-based, poverty-oriented actions to deliver services for the poor, such as quality education and health (World Bank, 2016).

It bears repeating that governments should take immediate and sustained investment efforts in providing basic technologies such as electricity and sanitation. Billions of people are still relegated to using technologies of the pre-industrial era. They therefore lack access to the modern education and health systems necessary to accumulating a minimum level of human capital for adopting many digital technologies. Developing the right financing and public-private-partnership structures can accelerate investment in basic services to those most in need.

In any situation where employment relationships exist, proper labour market protection must not be neglected. Like their urban counterparts, rural workers must be given a voice and the right to form trade unions and conclude collective agreements. Governments must also invest in the human capabilities needed to enact change by investing in education that develops skills in the local population and by attracting talented workers from elsewhere. It is also important to create incentives to retain the skilled workforce in local governments and communities, ensuring career opportunities and quality-of-life gains, thereby avoiding the "hollowing out" of local government leaders and staff.

Finally, the overall vision must incorporate a new paradigm for rural development that gives greater importance to the needs of local communities and civil society—comparable to that given to the private sector, local governments, and sector institutions in key sectors such as health, education and agriculture. This shift in focus should be established to ensure all stakeholders are empowered to contribute to rural development (Binswanger-Mkhize, McCalla and Patel, 2009). If certain groups are disempowered, it creates openings for other groups to capture a disproportionate share of development gains, thereby preventing the achievement of inclusive and sustainable rural development.

Chapter III

UN Photo/Martine Perret

Poverty, inequality and rural development

Introduction

Extreme poverty is mainly a rural phenomenon. In fact, four of every five people living below the international poverty line reside in rural areas, according to the World Bank (Castañeda et al., 2018). However, there has been tremendous progress in reducing rural poverty over the last decades, partly as a result of successful policy strategies to promote the expansion of economic opportunities for the rural poor and to expand social protection in rural areas.

This progress has not been equitable across the board. The same economic forces that drive poverty reduction, including rural development and urbanization, can cause inequality to rise. In many countries, income inequality has risen over time in rural areas, often in line with increases at the national level. At the same time, inequalities in key markers of opportunity, such as health and education, remain stubbornly high in rural areas, leaving some rural groups behind. These high levels of inequality can greatly dampen gains from growth to people in poverty, even where inequalities are not rising.

Trends in rural poverty and rural inequality cannot be understood in isolation, however. National and regional contexts, policies and institutions matter, as do trade flows, migration and other linkages between rural and urban areas. An assessment of rural trends would therefore be incomplete without a comparison of progress in urban areas. As this chapter shows, the rural-urban divide in access to opportunity remains large, but it is shrinking in many countries.

Poverty is now on the rise as a result of the COVID-19 crisis. All evidence points to possible increases in inequality as well. The pandemic and subsequent lockdown measures have so far affected urban areas disproportionately, but still have had a substantial impact on rural residents. Travel and transport restrictions have disrupted the livelihoods of the rural poor, many of whom depend on mobility, seasonal and migrant work, and remittances. In some countries, there has been a massive return of migrants to rural areas, largely due to job loss. Now, during this decade of action and delivery for sustainable development (United Nations, General Assembly, 2019a), policies at both the national and rural levels will be vital, not only in driving equitable rural development and poverty reduction, but also in strengthening the resilience of rural residents to shocks, including pandemics.

This chapter focuses on the linkages between poverty and inequality in rural areas. It starts by acknowledging that rural conditions are geographically, socially and economically diverse, even within one country. The second and third sections provide an overview of trends in rural poverty, rural inequality and disparities between rural and urban areas across countries. The fourth section compares trends to illustrate that rural poverty and rural inequalities, although interlinked, follow different dynamics. The fifth section discusses policies that promote inclusive development in rural areas, drawing lessons from countries that have succeeded in reducing both rural poverty and rural inequality.

Rural areas are diverse

Location is a key determinant of opportunities and outcomes. Local conditions have a major impact on an individual's chances to live in good health, find decent employment, learn critical skills, and stay out of

poverty. These conditions differ geographically, even between different rural areas in a single country.

Distance to urban markets, flows of goods and services to and from cities, the quality of local infrastructure and public services, the natural resource base, and population density differ strongly between different rural areas. The quality of services and infrastructure, for example, tends to be worse in remote rural areas (Abate et al., 2020; Bird, McKay and Shinyekwa, 2010; Mitra, Dangwal and Thadani, 2008).

Large and persistent differences between rural areas within a single country—geographically, socially and economically—make it difficult to accurately assess rural challenges and opportunities within a single framework. The term "rural" captures a highly diverse group of areas under a common denominator—from the peri-urban, which is very urban in character, to the very remote (box III.1).[1] Therefore, establishing a simple dichotomy between urban and rural areas may be increasingly at odds with how people live.

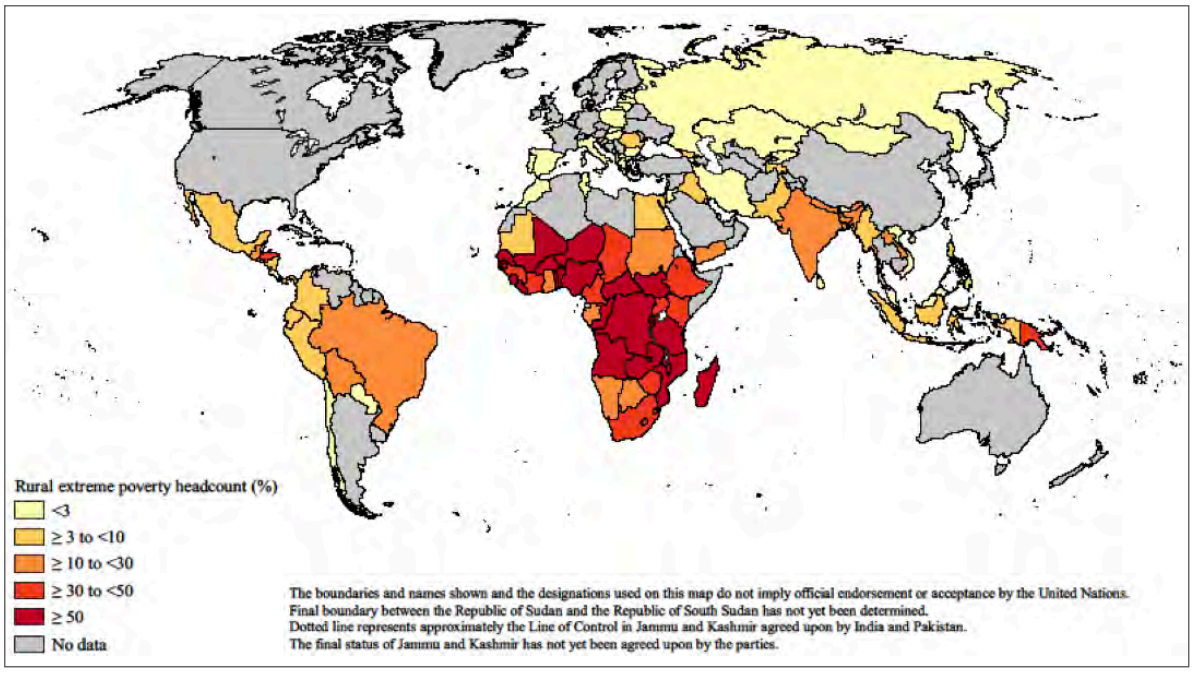
Rural poverty: main facts

Rural poverty is declining fast, but the poorest are being left behind

Poverty levels are generally higher in rural than in urban areas. In developing countries, 80 per cent of people in poverty live in rural areas. About 18 per cent of rural residents live in extreme poverty, as compared to 5.3 per cent of urban residents (Castañeda et al., 2018).[2] The highest rates of extreme rural poverty can be found in sub-Saharan Africa, where in numerous countries, more than half of rural residents are living in extreme poverty (figure III.1).

Figure III.1

Rural extreme poverty headcount[a] for available countries, most recent year



Source: World Bank Global Monitoring Database (GMD).
Note: GMD offers a snapshot of rural extreme poverty estimates for 110 countries based on the most recent survey year (ranging from 2006 to 2018).
a Extreme poverty headcount at $1.90-a-day (2011 PPP prices).

1 IFAD (2019) uses three rural gradations (rural, semi-rural and peri-urban) to proxy for commercialization potential and pairs it with an enhanced vegetation index to proxy for agricultural potential.

2 Based on data for 89 countries in developing regions. See Castañeda et al. (2018) for additional information.

BOX III.1

The challenge of defining rural and urban areas

Obtaining standardized global measures for rural extreme poverty and rural inequality is challenging. Estimates of income poverty and inequality disaggregated by rural and urban areas are not readily available for most countries (United Nations, General Assembly, 2020). Cross-country comparisons are further hampered by the fact that the official definitions of rural and urban differ by country (United Nations, 2018c).

In addition, the characteristics associated with urban and rural areas are becoming increasingly blurred. Areas officially defined as rural can be home to substantial urban growth. For example, Van Duijne (2019) finds evidence of hidden urbanization in villages surrounding rapidly growing secondary cities in Bihar, India. While most villagers make their primary living outside of agriculture, village leaders attempt to hold on to their rural status since this has implications on, inter alia, access to rural development funding. Along the same lines, in West Bengal, part of the population currently classified as living in rural villages along the Dhulian–Malda corridor are in fact living a mostly non-agricultural life in a contiguous, built-up area of over 250,000 people without any form of urban governance (Van Duijne and Nijman, 2019). More broadly, the transformation of agrifood systems and economic diversification in rural areas has intensified the economic linkages between these areas and cities, heightening the need for a more fluid spatial definition (IFAD, 2019).

How "urban" is defined may even differ between different data sources within a given country, challenging any attempt to combine information from multiple sources. Moreover, what exactly constitutes an urban area is highly context dependent and, as the urbanization process unfolds, also likely to change over time. It is therefore challenging to adopt uniform criteria that distinguish rural from urban areas. For example, setting a minimum threshold of 3,000 inhabitants as a designation for "urban" may not be meaningful in a populous country where rural settlements have many inhabitants, while lacking most of the typical characteristics that would be expected of urban areas. As it stands, national statistical offices remain best placed to determine a suitable definition for their respective countries.

By way of example, in preparing the United Nations *World Urbanization Prospects*, urban areas are not defined solely based on fixed administrative boundaries, as they may miss important issues, such as suburban areas just beyond these boundaries or large agricultural zones within them. When available, two alternative concepts are applied, namely the urban agglomeration and the metropolitan area. The former refers to a contiguous territory with an urban level of population density, while the latter expands on this by also including surrounding areas with lower settlement density under direct influence of the city.

Ambiguities in the definition of urban areas challenge the use of administrative data. Accurate analyses of the spatial disparities between rural and urban areas call for the use of alternative data sources, such as satellite imagery of land cover or night-time light intensity.

Source: UN DESA.

The situation of the rural poor is made worse by deficiencies in access to public services, infrastructure and social protection. The COVID-19 pandemic has compounded their already vulnerable position by reducing incomes, limiting mobility and reducing food security. Historically, as incomes fall, people living in poverty fall back on the consumption of staples and cut back on meat, dairy, and fruits and vegetables, affecting food security and nutrition (FAO, 2020b). However, early evidence suggests that those pushed into poverty by COVID-19 differ from the current global poor, with many of those newly forced into poverty more likely to live in urban areas and work outside of agriculture (World Bank, 2020b).

Despite persistent rural disadvantages, the data available indicate that poverty is declining faster in rural than in urban areas. Figure III.2 compares changes in rural and urban poverty in 19 countries with data available. All but one of the countries fall above the diagonal line, indicating faster progress in rural areas. Among

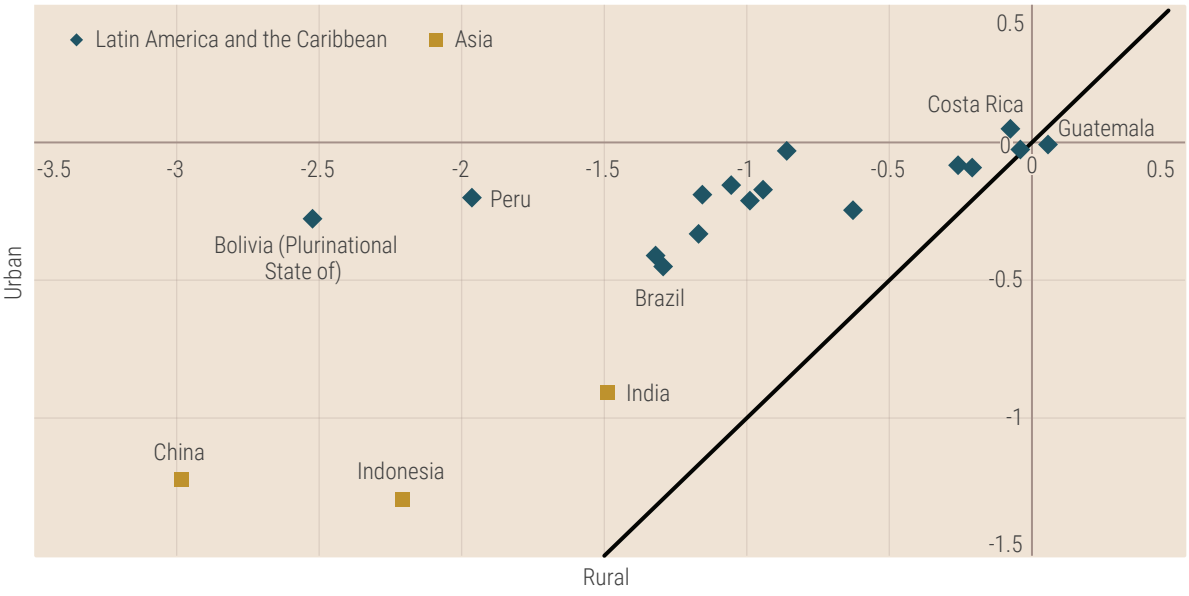
the countries shown, Bolivia (Plurinational State of), Brazil, China, India, Indonesia and Peru have made the most progress in reducing extreme poverty rates in rural areas. The drivers of these rapid poverty declines differ by country (box III.2 compares the experiences of Brazil and China). The exception to this pattern of fast rural poverty decline is Guatemala, where rural extreme poverty has increased slightly since 2000, as smallholder farms have seen productivity decline or stagnate (Sanchez, Scott and Lopez, 2015). Among the countries in the dry corridor of Central America, Guatemala is the one that has experienced the longest and most severe droughts in recent years (OCHA, 2020). Increased droughts and other disasters related to climate change are affecting the growth cycle of its key subsistence crops. While comparable estimates of rural poverty are not available for other countries (box III.3), the available evidence suggests that faster rural than urban poverty reduction is a common pattern (Kharas et al., 2020; Asian Development Bank, 2014).

Despite important declines in rural poverty, reaching the very poorest remains challenging. Over the past 30 years, developing regions have made little progress in raising the "poverty floor"—a measure of the level of consumption of the very poorest (Ravallion, 2016a). In other words, the poorest have been left behind. Based on estimates of multidimensional poverty, which considers overlapping deprivations in education, health and living standards, poverty is not only higher in rural than in urban areas but also more intense (UNDP and OPHI, 2020; Alkire et al., 2014). In other words, reaching the very poorest largely means reaching the rural poorest.

These most extreme forms of poverty are often chronic: they affect people for substantial periods of time or even their entire lives, and their disadvantage is often passed on to the next generation. People living in rural areas, particularly remote rural areas, account for a substantial proportion of the chronically poor. Tackling chronic poverty is challenging for several rea-

Figure III.2

Average annual percentage point change in extreme poverty headcount[a] in rural and urban areas in selected countries, 1990s to 2010s



Source: UN DESA calculations, based on data from LAC Equity Lab: Poverty–Poverty Rate and PovcalNet.
Notes: Data is from 19 countries (16 from Latin America and the Caribbean and 3 from Asia), representing 47 per cent of the 2020 world population. The diagonal dashed line represents points where the change in rural and urban areas is identical.

a Extreme poverty headcount at $1.90 a day (2011 PPP prices).

BOX III.2

The drivers of rural poverty reduction in China and Brazil

China and Brazil have seen rapid reductions of extreme poverty in rural areas. Extreme poverty (living on less than $1.90 a day) dropped from 79 per cent in 1990 to less than 1 per cent in 2018 in rural China[a] and from 27 per cent in 2001 to 9 per cent in 2015 in Brazil.[b]

Both countries experienced rapid economic growth and shared a strong political commitment to eradicate poverty. They also recognized the role of agriculture in poverty reduction. China incentivized production through the Household Responsibility System, and linked small-scale agricultural producers to the non-farm economy through agribusiness and cooperatives and other non-agricultural enterprises at the village and township level. Brazil viewed farming as a major force to drive growth in the rural economy and ensure food security and nutrition for all. Both countries stressed coordination between sectors, and developed institutional mechanisms to improve the reach of policies on poverty reduction and hunger eradication.

However, the main drivers of poverty reduction differ significantly between the two countries. While agricultural growth drove poverty reduction in China, rural pensions were essential for reducing poverty in Brazil. In China, primary sector growth in the rural economy, particularly coastal areas, has contributed more to poverty reduction than urban economic growth. Low levels of inequality in key physical and human assets ensured that people living in poverty were able to benefit from growth (Ravallion, 2011). The relatively equal distribution of farmland after the pro-market economic reforms of the 1980s was particularly important in ensuring pro-poor growth in China.

In Brazil, social pensions and cash transfer programmes (both conditional and unconditional) have played an important role in poverty reduction since the late 1990s. The rural pension, in particular, has been essential, reducing extreme poverty among the rural population by about 37 per cent in 2008 (Barbosa, 2011). The substantial reduction in inflation rates from 1994 onwards contributed to reducing poverty as well.

Hence, while rural economic growth and a relatively equal distribution of assets were the main drivers of poverty reductions in rural China, Brazil resorted to a combination of pro-poor social policies and macroeconomic policies. However, over the past decade, China has also expanded social protection in rural areas, through programmes such as the *dibao* rural minimum income guarantee scheme introduced in 2007 and a rural pension pilot programme that started in 2009 and was accelerated beginning in 2012.

Source: UN DESA.

a Data from PovcalNet.

b Data from LAC Equity Lab: Poverty—Poverty Rate.

sons. First, people who live in long-term poverty lack assets, and those available to them provide meagre returns. They tend to live in marginal areas—those more prone to natural disasters such as droughts and floods—and do not have the resources needed to cope with shocks. Second, due to their identity or because of where they live, many face barriers in accessing land, housing, decent work and credit; they are often discriminated against, overlooked by institutions and lack political voice. Third, deep, chronic poverty is often hidden. The very poor are often landless, live in underserved areas, are employed in the informal sector or lack official forms of identification. They are often missed in household surveys and may have difficulty accessing public services. The poorest may also live in households that are classified as non-poor, due to intrahousehold dynamics and inequality, which often affects rural women and children.

Rural inequalities

Lower income inequality in rural areas

While poverty is higher in rural than in urban areas, income inequality is often lower in the former. This is the case in 44 of the 56 countries with rural and urban income inequality estimates available (based on

BOX III.3

Harmonized information on rural poverty is scarce

Poverty estimates are based on nationally representative household survey data (either income or consumption).[a] National household surveys are not available in all countries or are not collected with sufficient regularity. Where they are available, they are rarely representative beyond the first administrative level (e.g., regions or States within a country) and, therefore, poverty levels cannot be easily estimated for smaller areas or clearly associated with rural heterogeneity in agroclimatic characteristics and livelihoods.

In order to estimate extreme poverty for a country at the international poverty line in a given year, the survey data must be combined with data on purchasing power parity exchange rates and inflation. In order to project estimated poverty rates for non-survey years, consumption or income data is extrapolated based on real economic growth rates.

Since prices can change rapidly, intertemporal price deflators are required to compare real standards of living over time. In addition, prices do not only vary between countries, but also within them. To compare standards of living within a country, adjustments must be made for geographic differences in prices. Without these price adjustments, a national level poverty line would overestimate poverty in areas with lower prices (such as rural areas) and underestimate it in areas with higher prices (such as urban areas).

Compiling the necessary variables from household surveys and making them comparable across countries with data available is a major undertaking. Different countries use different methods and questionnaire designs to estimate household income and consumption. Additionally, questionnaires are frequently changed over time. This heterogeneity limits the comparability of poverty and inequality estimates between countries, and sometimes even within countries over time.

Given these data requirements, time series data of extreme poverty estimates that are disaggregated geographically (e.g., by rural and urban area) are not readily available or comparable across countries.

Source: UN DESA.

a See Ferreira et al. (2016) for a more in depth-discussion of the complexities involved in estimating the global poverty count.

the Gini coefficient).[3] Cities are engines of growth, accounting for 80 per cent of global gross domestic product (UN-Habitat, 2016). Agglomeration economies promote productivity, innovation and social mobility in cities, and therefore attract people of diverse skill levels and occupations. Hence, incomes in the top percentiles of the national distribution are mostly earned in cities.

There are exceptions, however, with higher rural than urban income inequality in countries that span all regions. The largest difference is found in Bolivia (Plurinational State of), where the Gini coefficient of rural income inequality was 10 points higher than the urban Gini coefficient in 2018. High rural inequality is linked to the localized benefits and distributional consequences of hydrocarbon extraction—specifically gas in the department of Tarija (Humphreys Bebbington and Bebbington, 2010). However, inequality has declined substantially in both rural and urban areas of the country, dropping by 10 and 16 points between 2005 and 2018, respectively. Evidence suggests that labour income growth for lower-income groups was the main driver for this reduction in inequality (Vargas and Garriga, 2015).

Rural-urban inequality following national trends

Despite differences in levels, income inequality trends are similar in urban and rural areas. For 79 per cent of countries with data available, inequality as measured by the Gini coefficient either increased or decreased both in rural and urban areas, along the lines of a shared national trend (table III.1). Figure III.3 illustrates

3 Based on the latest available year of data on income inequality measured using the Gini coefficient. See Annex table III.A.1 for details.

this shared trend graphically, based on the example of four countries from different regions.

Regions, rural and urban areas, and different sectors of the economy are linked—including through trade and migration—and share common institutions and national development patterns. The roll-out of social protection programmes or the implementation of national education plans, for instance, generally help reduce inequality in both urban and rural areas. Rural development, including poverty and inequality trends, are affected by national and regional economic, social and political contexts, including linkages between urban and rural areas.

Rural-urban linkages

The extent of these linkages depends on the proximity and connectivity of rural areas to urban centres, the levels of migration and remittances, and the distribution of resources and public services, among others. Rural economies depend on urban demand for their products and services. They also rely on transport networks and local or regional markets to sell outputs

Table III.1

Number and percentage of countries experiencing an increase or decrease in the rural and urban Gini coefficients, 1990s to 2010s

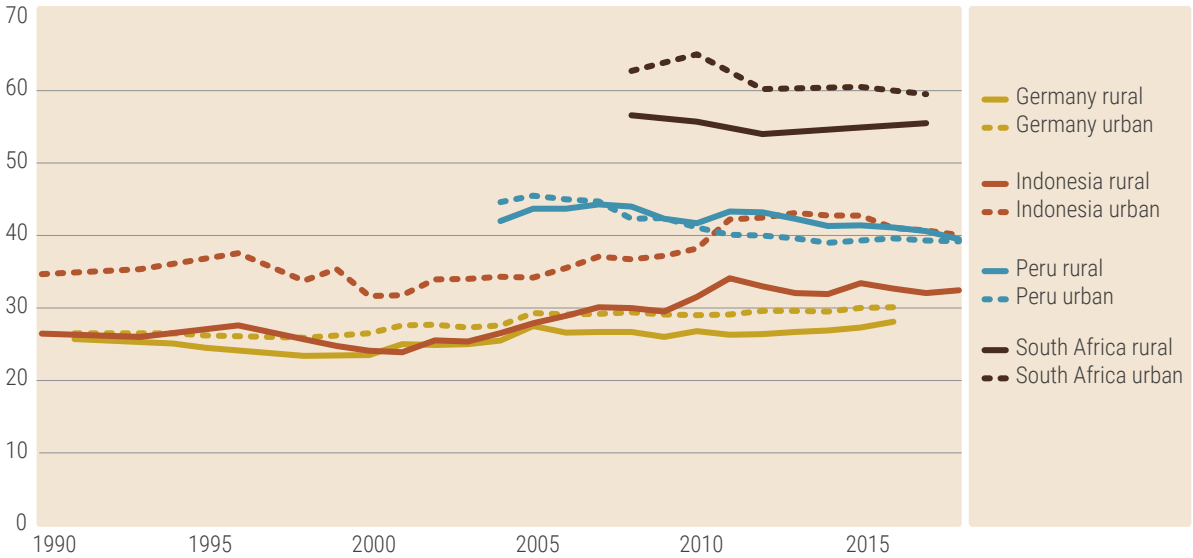
		Urban			
		Increase		Decrease	
		Number	Percentage	Number	Percentage
Rural	Increase	16	29	4	7
	Decrease	8	14	28	50

Source: UN DESA calculations, based on data from LAC Equity Lab: Income inequality—Urban/rural inequality (SEDLAC tabulations), Luxembourg Income Study's Data Access Research Tool, PovcalNet, the National Statistical Office of Thailand, the National Statistical Office of Mongolia, the National Statistics Office of Mongolia and World Bank (2020), and UNU-WIDER's World Income Inequality Database.

Note: Data is from 56 countries (6 from Africa, 17 from the Americas, 11 from Asia and 22 from Europe), representing 63 per cent of the 2020 world population.

Figure III.3

Trends in the rural and urban Gini coefficients for four selected countries, 1990s to 2010s



Source: UN DESA, based on data from LAC Equity Lab's tabulations of SEDLAC (Peru), Luxembourg Income Study's Data Access Research Tool (Germany and South Africa) and PovcalNet (Indonesia).

from rural production. In other words, urban development can spill over and generate economic activity in neighbouring rural areas.

The creation and expansion of small towns, for instance, plays a crucial role in the diversification of rural non-farm incomes, labour mobility, and the building up of agrifood systems. Linkages to towns strengthen connections of rural economies to different segments of the agricultural value chain—including storage, processing and packaging—and stimulate a greater variety of employment opportunities for rural communities. This diversification of economic activities and jobs can be an important source of livelihood for those rural poor who are unable to move out of poverty through agriculture alone.

Poor access to education, health care and other services in rural areas stands as a barrier to human capital accumulation, hampering the ability of the rural poor to participate fully in economic growth. Expanded economic activities and employment in non-agricultural sectors—including those generated as a result of growth in neighbouring towns—can provide alternative livelihood options and potentially higher wages than in agriculture, but are likely to demand new or higher-level skills. Even within the agricultural sector, farming is becoming more technology intensive, and more advanced, productive farming methods will increasingly require higher levels of education and technical skills (Ravallion, 2016b). Over time, these disparities can leave the poorest residents in rural areas behind—especially poor women—as the country progresses.

Migration is a key diversification strategy for rural households. It benefits rural areas through remittances and knowledge and through skills transfers, helping reduce poverty. It may even push rural wages upward. Remittances are invested in the farm and non-farm sectors, partially making up for poorly functioning rural credit markets. This can create new employment opportunities in the sending rural areas and can fund investment in mechanization and innovation, improving productivity. Studies in developing countries highlight the central role of remittances in boosting investments in sustainable agriculture and climate change adaptation among recipient households (FAO et al., 2018). Remittances also provide insurance against shocks, including natural disasters and health epidemics. At the same time, rural economies can be negatively impacted if they lose a significant share of their young, educated and/or skilled workers through outmigration.

Converging access to basic services and opportunities between rural and urban areas

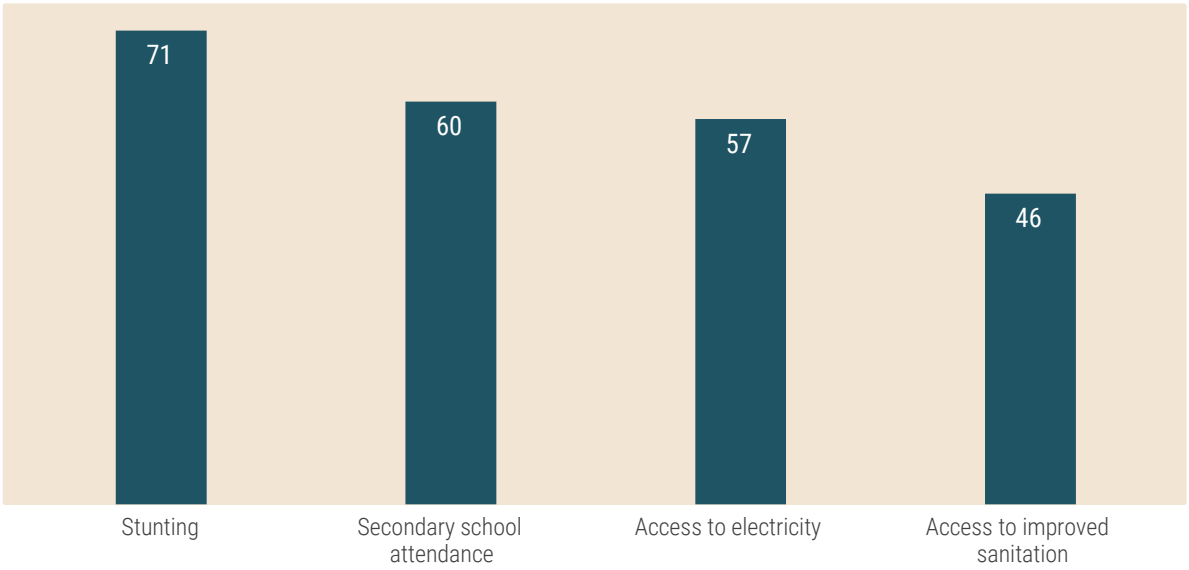
Inequalities between urban and rural areas can be significant. Generally, living in an urban area gives one access to more job opportunities, better education, higher-quality health services, safer drinking water and more advanced infrastructure. Extreme poverty is largely a rural phenomenon, despite faster improvements in rural areas.

However, rural-urban gaps in basic health, education and other dimensions of well-being are declining in many developing countries with data available. On average, progress in secondary school attendance, the reduction of stunting, and improvements in access to electricity has been faster in rural than in urban areas since the 1990s in more than half of all countries with data available (figure III.4). The exception is in access to improved sanitation, where rural-urban gaps have decreased in slightly less than half of all countries with data available. Nevertheless, even if the progress observed in these dimensions of well-being continues, rural areas will still lag far behind urban areas by 2030 (United Nations, 2020e).

At the same time, technological innovation is generating new forms of inequality. Access to information and communications technologies (ICTs), for instance, can make an important contribution to poverty reduction by providing rural residents with the skills, knowledge and information they need to develop their livelihoods. The rural-urban digital divide is still vast: most of the 3.8 billion people who are offline live in rural areas. Globally, rural residents were 40 per cent less likely to use mobile internet than urban residents in 2018. In sub-Sharan Africa, they were 58 per cent less likely to do so (ITU and UNESCO, 2019).

Figure III.4

Percentage of countries with declining urban-rural gaps in basic indicators of well-being, 1990s to 2010s



Source: UN DESA calculations, based on data obtained from Multiple Indicator Cluster Surveys (MICS) and Demographic and Health Surveys (DHS).
Note: See Annex table III.A.2 for list of countries, data and calculation methodology.

While the use of ICTs has increased in schools worldwide, mobile learning opportunities are particularly lacking. In response to the COVID-19 pandemic, governments around the world have instituted school closures and remote learning policies. However, an estimated 463 million students worldwide have been cut off from education and cannot be reached by digital and broadcast remote learning programmes (UNICEF, 2020). Over 70 per cent of these students live in rural areas, causing rural students to fall further behind their urban peers. Moreover, these school closures have a cascade of consequences that may expand rural-urban disparities, such as reduced food and nutrition security or reduced school enrolment for adolescent women and girls.

High inequality of opportunity in rural areas

Differences within rural areas are often as stark as those between rural and urban areas. The *World Social Report 2020* (United Nations, 2020e) showed that major progress in fulfilling basic needs, such as improved child health and completion of primary education, has helped to reduce gaps between rural and urban areas. Within rural areas, however, gaps in these basic markers of opportunity are persistent for specific groups.

Table III.2 shows disparities in child stunting and secondary school attendance within rural areas by characteristics of the household head (educational level, wealth quintile) in a large sample of developing countries. Children in richer and in highly educated rural households are twice as likely to attend secondary school and significantly less likely to suffer from stunting. Households in rural areas with a well-educated household head are almost as well off as the average household in an urban area. The same is true for rural households in the two wealthiest quintiles. Households with either an uneducated head or from the bottom two wealth quintiles, on the other hand, are far worse off. Moreover, these differences are not narrowing. On average, stunting gaps have not changed since the 1990s and progress in secondary school attendance is faster among children from more educated and richer

Table III.2

Trends in stunting[a] and secondary school attendance[b] by rural household head completed education level, rural wealth quintiles and urban average, 1990s to 2010s

Percentage

	Stunting					
	Rural					Urban
	Education level of household head			Household wealth[c]		
	No education	Primary	Secondary and higher	Poorest quintiles	Richest quintiles	Average
1990s	45	40	31	42	30	27
2010s	37	30	24	33	20	20
Average change[d]	-0.5	-0.7	-0.4	-0.6	-0.6	-0.5

	Secondary school attendance					
	Rural					Urban
	Education level of household head			Household wealth[a]		
	No education	Primary	Secondary and higher	Poorest quintiles	Richest quintiles	Average
1990s	15	27	43	22	40	47
2010s	23	40	56	37	60	61
Average change[d]	0.6	1.0	1.0	1.1	1.4	1.1

Source: UN DESA calculations, based on data obtained from Multiple Indicator Cluster Surveys (MICS) and Demographic and Health Surveys (DHS).

Note: Stunting data is based on 44 countries for the rural education level of the household head, 50 countries for rural wealth quintiles and 51 countries for the urban average. Secondary school attendance data is based on 36 countries for the education level of the household head, 44 countries for wealth quintiles and 45 countries for the urban average.

a Stunting measures the proportion of children below minus two standard deviations from the median height-for-age of the World Health Organization Child Growth Standards.

b Secondary school attendance measures the proportion of children in the secondary school age range attending secondary school at the time of the survey.

c Poorest quintiles are a combination of "poorest" and "poorer," while richest quintiles are a combination of "richer" and "richest".

d Average annual percentage point change.

households, leaving those who are already struggling to catch up still further behind.

Unequal opportunities also manifest across other groups. Indigenous peoples and many ethnic minority groups suffer from worse health and educational outcomes across countries and are much more likely to live in poverty than the ethnic majority—the outcomes of a shared history of marginalization and discrimination (Hall and Patrinos, 2012; United Nations, 2018a; United Nations 2020e). While these groups are at disadvantage in both rural and urban areas, the available evidence points to greater ethnic gaps in wealth and opportunity in rural areas (United Nations, 2016; World Bank, 2020a). In Belize, for instance, the percentage of mestizo children completing lower secondary school is two thirds that of Creole children in rural areas, as compared with nearly 90 per cent in urban areas (United Nations, 2016). In the former Yugoslav Republic of Macedonia, the percentage of Albanian children completing this level of schooling is less than 75 per cent that of Macedonian children in rural areas, but close to 90 per cent in urban areas (ibid.).

For indigenous peoples, spatial disadvantage has been perpetuated by the State through the dispossession of land, deforestation, housing policy, zoning rules and laws regarding land use. In addition to threatening indigenous peoples' way of life and identity, geographic concentration in rural and remote areas with poor infrastructure and few opportunities for non-agricultural employment leads to the observed lower levels of education, poorer health, higher rates of unemployment and informality, and lower returns on productive activities among these groups (Hall and Patrinos, 2012; United Nations, 2016; World Bank, 2020a). Indeed, indigenous peoples living in rural areas are more than twice as likely to live in extreme poverty (22.4 per cent) than their non-indigenous rural counterparts (10.6 per cent) (ILO, 2020). Globally, 55 per cent of employed indigenous peoples work in agriculture, compared to only 27 per cent of the non-indigenous population, and they work much more often in informal employment (ibid.).

In addition, indigenous and ethnic minority cultures and languages have historically been suppressed and undermined, in large part through colonization. Few countries today actively suppress indigenous cultures or those of ethnic minorities, but the failure in many to take cultural differences into consideration means that disparities between indigenous and ethnic minorities and non-indigenous and ethnic majorities persist. For instance, as much as 40 per cent of the world's population does not have access to education in a language they speak or understand, limiting their prospects for the future (UNESCO, 2016).

The overlay of gender with rural residence confers additional disadvantages to rural women, who face more obstacles in accessing education than rural men or urban women; lower levels of ownership and control of assets; and less access to paid employment and public services. Traditional values and norms—which often prevent women from taking some or all types of jobs—together with lower levels of public service provision in rural areas, deny rural women the opportunity to participate fully in society as independent socioeconomic agents.

When active, women in agriculture operate smaller farms and are much less likely to use inputs such as credit, fertilizer, improved seeds and mechanical equipment than rural men (FAO, 2011). As a result, rural women in agriculture produce less than men, with the gap in productivity being caused by differences in input use. Closing the gender gap in access to inputs could increase yields on women-owned farms by 20–30 per cent (ibid.). Due to a greater overall workload—which includes low-productivity activities like fetching firewood or water and unpaid care and domestic work—rural women also face greater time poverty than men.

Out of the world's 1.2 billion young people aged 15 to 24, nearly 1 billion reside in developing countries (IFAD, 2019). Rural youth make up about half of all youth in developing countries and the growth of this group is concentrated in the world's poorest developing countries. This large base of young people offers tremendous opportunity in the form of a demographic dividend. However, young people in rural areas also face specific challenges: They are much more likely to be unemployed than adults and face difficulties in accessing land, finance and education. Rural youth need a vastly different skillset from their parents. For example, markets have expanded into new areas, and the digital revolution is making access to information increasingly important. Young people need to know how to manage these new networks and utilize new modes of communication. Only when young people in rural areas are enabled to successfully navigate the rapidly changing reality—from changing dietary habits and the rise of automation to climate change—will they be able to prosper, to access and seize opportunities, and to contribute to sustainable development in rural areas.

The disadvantages of living in rural areas—including inadequate access to infrastructure, efficient transportation, public services and health care—are particularly challenging for older persons. They are more likely than younger persons to work, or have worked, in the agricultural and informal sectors, and many lack savings, health insurance and pension coverage for their old age (United Nations, 2011; UNECE, 2017).

Urbanization holds prospects and challenges for these disadvantaged groups. Not only do cities promote greater social and economic mobility and better access to opportunities and markets, but they

are less constrained by traditional values and provide a more anonymous space that enables members of these groups to escape discrimination and exclusion. At the same time, ethnic groups tend to cluster residentially in cities, with negative consequences when such segregation amounts to a geographic concentration of poverty (United Nations, 2018a). In addition, the urban advantage, in terms of fulfilling basic needs and providing better opportunity, is shrinking in many countries.

Reducing poverty and inequality in rural areas: complementary goals?

Many countries have succeeded in reducing rural poverty over the past decades, including through rural development strategies. However, few of these strategies aim explicitly at reducing inequality. An important question thus arises as to whether reductions in rural poverty have gone hand in hand with reductions in rural inequality.

Rural poverty and rural inequality: different dynamics

Reductions in rural poverty do not always occur in tandem with reductions in inequality. Figure III.5 illustrates trends in rural poverty and rural inequality, as well as national inequality, based on the examples of six countries. In Bolivia (Plurinational State of), Brazil and Ecuador, rural poverty decreased along with rural inequality from the 2000s to 2010s. However, over a similar period in China, India and Indonesia, rural inequality increased or maintained around the same level while rural poverty fell. In all six countries, changes in rural inequality roughly followed the same trend as that of national inequality.

Additional data on rural-urban gaps support the finding that rural income inequality can rise despite progress in reducing other dimensions of disadvantage. Table III.3 shows trends (annual changes) in the Gini coefficient of rural income inequality, rural poverty, where available, and rural-urban gaps in health, education and other indicators of well-being. Some countries have made progress across the board: in four of the five Latin American countries shown as well as Mongolia, rural poverty and inequalities (in rural areas and between urban and rural areas) have mostly declined between the 1990s and the late 2010s. By contrast, in Bangladesh, India, Indonesia and Viet Nam, rural Gini coefficients have increased, while rural-urban gaps in well-being have declined. These four countries serve as examples of how rural income inequality can rise despite relative improvements in other social indicators.

Rural poverty and inequality trends: different drivers

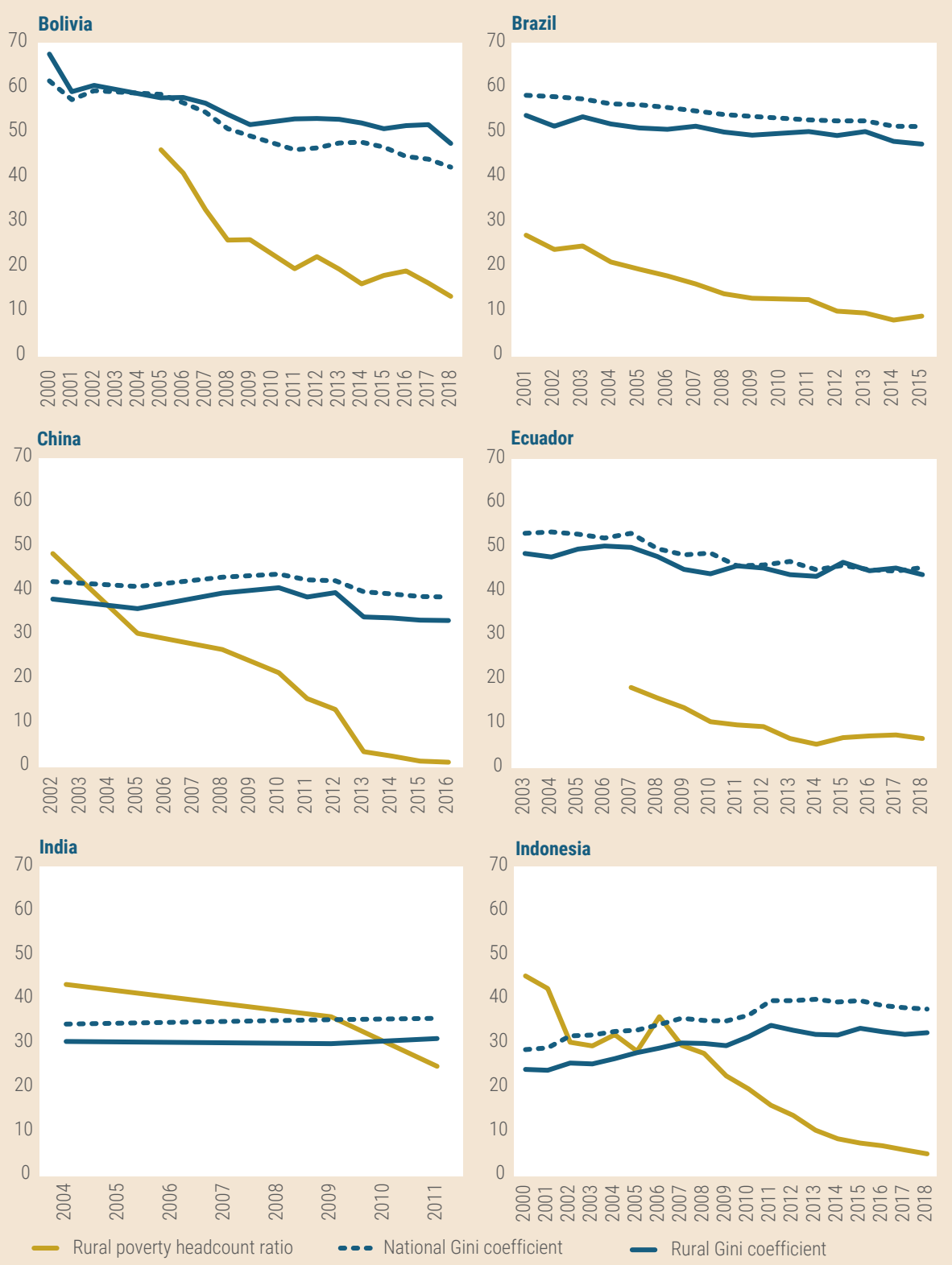
Over the course of development, the same economic forces that drive poverty reduction can cause inequality to rise. Especially in phases of rapid growth, a rising tide can bring many out of poverty while concurrently widening inequality, as certain regions or segments of the population become frontrunners or reap higher returns to their investments than the rest (see box III.4 for an example from rural India). Kuznets (1955) posited that primarily rural and agricultural societies see growth accelerate during the initial phases of development through rapid urbanization and an economic transition to non-agricultural activities.[4] Those at the frontlines of this structural transformation stand to reap substantial gains through higher wages. As countries develop further, increased wealth should enable the introduction of broad-based education and social protection, leading to a reduction of inequalities.

Regional and time trends suggest that declines in inequality are not a systematic outcome of growth and development, however (United Nations, 2020e). Trends in the distribution of income within countries, in particular, are shaped by national policies and institutions as well as global forces. In the rural context, agricultural development, a key driver of rural poverty reduction, can exacerbate rural inequality as segments of the rural population differ in their participation in the sector's growth. This can arise from disparities in access to resources among population groups or districts. For instance, if land is unequally distributed,

4 See chapter II for a broader discussion on structural transformation.

Figure III.5

Trends in national and rural Gini coefficients and rural poverty headcount in selected countries, 2000s to 2010s



Source: UN DESA. Poverty calculations based on data from LAC Equity Lab: Poverty—Poverty Rate and PovcalNet. Gini coefficient calculations based on data from LAC Equity Lab: Income inequality—Urban/rural inequality (SEDLAC tabulations) and PovcalNet.

Table III.3

Trends in the rural Gini coefficients, rural poverty headcount, and urban-rural disparities, 1990s to 2010s

Annual change

	Rural		Rural-urban gap			
	Inequality	Poverty	Stunting	Secondary attendance	Sanitation	Electricity
Bolivia	▼	▼	▲	–	▼	▼
Colombia	▼	▼	▼	▼	▼	▼
Dominican Republic	▼	▼	▼	▼	▲	▼
Gambia	▼	–	▼	▲	▲	▲
Guatemala	▼	▲	▼	–	–	▼
Mongolia	▼	–	▼	▼	▼	▼
Peru	▼	▼	▼	▼	▼	▼
Serbia	▼	–	▼	▼	▼	▲
Thailand	▼	–	▼	▲	▼	▼
Bangladesh	▲	–	▼	–	▼	▼
Côte d'Ivoire	▲	–	▼	–	▲	▲
Ethiopia	▲	–	▲	▼	▲	▲
India	▲	▼	▼	–	–	▼
Indonesia	▲	▼	–	–	▼	▼
Malawi	▲	–	▼	▲	▲	▲
Uganda	▲	–	▼	▼	▲	▲
Viet Nam	▲	–	–	▼	▼	▼

Source: UN DESA. Poverty calculations based on data from LAC Equity Lab: Poverty—Poverty Rate and PovcalNet. Gini coefficient calculations based on data from LAC Equity Lab: Income Inequality—Urban/Rural Income Inequality (SEDLAC tabulations), Luxembourg Income Study's Data Access Research Tool, PovcalNet, the National Statistical Offices of Mongolia and Thailand, and UNU-WIDER's World Income Inequality Database. Urban-rural calculations based on data obtained from Multiple Indicator Cluster Surveys (MICS) and Demographic and Health Surveys (DHS).

Note: See Annex table III.A.3 for figures, and Annex table III.A.2 for calculation methodology of rural-urban gaps.

▼ Decrease ▲ Increase – No data

gains accrue disproportionately to those with larger land endowments (Ravallion, 2016b; Griffin, Khan and Ickowitz, 2002).

Widening inequality during growth can manifest between regions within a country, as experienced in China from 1990 to 2016. Significant reductions in rural poverty during the period were accompanied by not only a rise in the rural Gini coefficient from 30.6 to 33.2, but also growing developmental gaps between the richer, more urban coastal provinces and the poorer, more rural inner provinces (Chen and Cowell, 2017). As millions in rural areas escaped poverty, urban residents were pulling ahead as a result of faster rates of income growth in cities.

Inequality trends may also vary depending on the sector and nature of economic growth. Urbanization and a diversification away from agriculture in developing countries, for instance, can concentrate economic returns in urban areas and wealthier households. In a study of countries in Asia, Imai and Malaeb (2018) find that agricultural growth tends to reduce inequality both within rural areas and between rural and urban areas,

BOX III.4

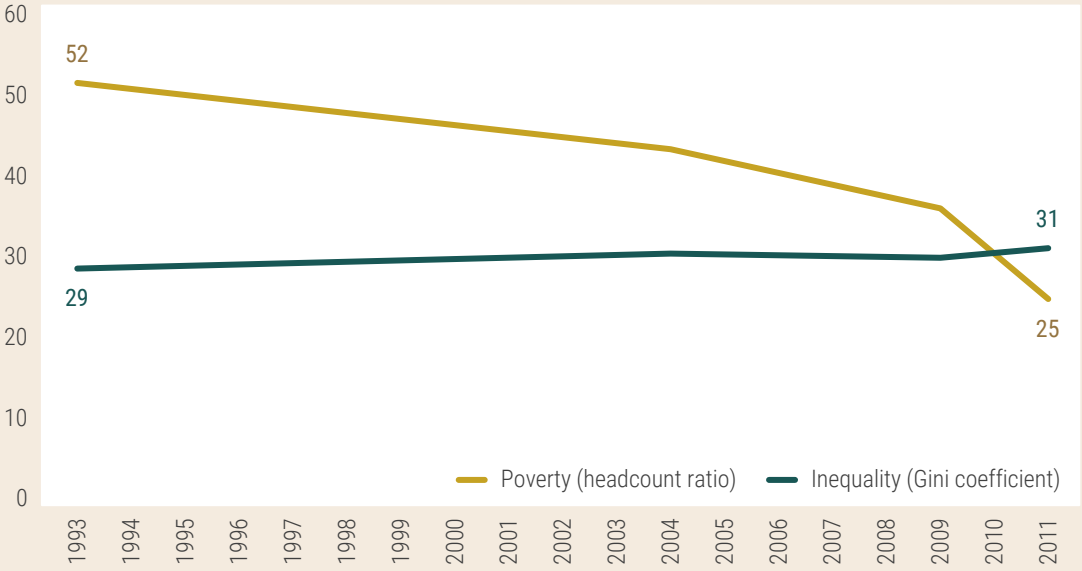
Poverty and inequality in rural India

Rural India, home to 65 per cent of the country's total population, has seen a steady decline in the percentage of people living in extreme poverty over the last two decades (figure III.4.1). The Gini coefficient of rural income inequality, on the other hand, has increased over the same period. The structure of the rural economy has changed substantially, as annual growth in rural non-farm employment has outstripped that of farm-based employment. The rural non-farm sector now accounts for 40 per cent of all rural employment, increasing non-farm income opportunities and economic mobility. Yet, agriculture remains the main sector of employment, and India's rural workforce remains mostly involved in agriculture.

Himanshu et al. (2013) document how these developments have impacted rural India through a case study in the village of Palanpur, Uttar Pradesh, which is mostly comprised of small-scale farmers. While the bulk of economic activity takes place in agriculture, a growing share of villagers rely on non-agricultural wage employment outside the village. These non-farm activities have benefited disadvantaged Jatab caste members in the village the most: while roughly 90 per cent of them were classified as "very poor" or "poor" in the early 1980s, the number had decreased to about 60 per cent by 2009.[a]

Figure III.4.1

Trends in extreme poverty and inequality in rural India, 1993–2011



Source: PovcalNet.

However, income inequality as measured by the Gini coefficient increased from 30.7 in 1983 to 42.7 in 2009 in the village. Caste-based income inequality plays a limited role in this increase. Instead, over two thirds of overall income inequality in 2009 can be attributed to the distribution of non-agricultural incomes. In other words, the increase in non-farm incomes reduced poverty and increased mobility, slowly breaking down long-standing barriers to mobility among the poorest segments of rural society in India, but it also brought greater income inequality to the village.

Source: UN DESA.

a Households are divided into five quintiles based on per capita income: very poor, poor, secure, prosperous, rich. See Himanshu et al. (2013) for more detail.

while non-agricultural growth is inequality increasing, as it tends to benefit urban households and less-poor rural households more. Poorer rural households often lack the capital, skills or market access needed to take advantage of increased economic opportunities in non-agricultural sectors, including in manufacturing and services. Consequently, expansion in these sectors can lead to widening income gaps between wealthier and poorer households within rural areas. On the other hand, agricultural expansion is typically centred in rural areas, and opportunities are more readily accessible to rural households, notwithstanding disparities in land distribution. Rural agricultural growth, when based on small-scale farming in particular, is strongly beneficial to rural households living in poverty (Rodríguez-Pose and Hardy, 2015).

Rising income inequality in the midst of rural poverty reductions may not necessarily be a cause for concern, so long as the rise is temporary and stems from economic development. Over the longer term, however, persistent and growing inequality can be detrimental for growth and poverty reduction: the more unequal a society, the less poverty decreases as economies and incomes grow.[5]

In rural areas with high inequality, people in poverty—already disadvantaged in terms of access to income, wealth, land and other resources—benefit less from subsequent growth. Even in periods of agricultural expansion, those with fewer resources will gain less from general agricultural productivity improvements. Consequently, this growth will have a reduced impact on rural poverty reduction. This is particularly true in settings that suffer from unequal land distribution patterns, or where the ability to purchase fertilizers and other farming inputs, for instance, varies heavily among different population groups.

Left unaddressed, challenges faced by the rural poor in trying to escape poverty and fulfilling their potential ultimately lead to constraints on rural economic growth, on the aggregate.

5 For a discussion on the impacts of inequality, see United Nations (2020e).

Inequalities and rural areas: what policies are most effective?

Until the COVID-19 crisis hit, rural poverty had been declining in most countries with data available. While the pace of poverty reduction has slowed down in recent years, poverty gaps between rural and urban areas have generally declined. That is, progress in reducing poverty has been faster in rural than in urban areas. At the same time, rural income inequality has at times increased, in parallel with urban inequality.

Most rural development strategies are designed to reduce rural poverty, while few aim explicitly at reducing inequality (Ravallion, 2016b). Yet, more equitable and inclusive rural development does not occur naturally or in isolation from wider national trends. It requires promoting access to quality education, health and other services as well as opportunities for decent work, especially for the rural poor. Such development also calls for building resilience to shocks, addressing the degradation of natural resources and reducing inequality of opportunity both within rural areas and between rural and urban areas. It therefore must include both localized rural policies and action at the national level. The right mix of economic and social policies, both rural and national, can spur economic development while reducing poverty and inequality in rural areas.

This section draws lessons from countries that have succeeded in reducing both rural poverty and rural inequality, based on concrete examples. Specifically, it examines those national and rural strategies that have (i) helped address the distribution of resources and assets within rural areas and between rural and urban areas, with a particular focus on land distribution; (ii) promoted equal opportunity; (iii) helped increase the resilience of the poorest; and (iv) promoted the rights of the most disadvantaged and have given them a voice.

Upgrading basic infrastructure

Historically, a key element in the successful reduction of poverty in rural areas has been substantial investment in basic infrastructure and public services. Sustained investments in roads, electrification, improved sanitation, safe drinking water, education, health care and the bridging of the digital divide in rural areas will be required to eradicate extreme poverty and reduce rural-urban disparities. Such investment must also address inequalities in access to public infrastructure and services within rural areas to ensure no one particular area or group of people is left behind.

Basic infrastructure lies at the heart of rural-urban linkages that connect rural villages to towns and cities. Access to all-season roads, for example, increases household welfare, especially when it brings access to new job markets and social services, and enhances food security. Improving access to transport for rural populations is thus key to promoting rural development and poverty reduction, increasing uptake of public services, advancing the inclusion of disadvantaged groups and improving employment opportunities. Access to roads is particularly critical for smallholder farmers in order to reduce their distance to markets and transport costs, and to promote agricultural growth. Markets may cease to function in remote rural areas under certain circumstances—for instance, during the wet season if roads become more difficult to use, if not impassable.

Public investments in highways have been vital for Ghana, for example, to build up logistical and urban-rural connections for the agricultural market (Wiggins and Leturque, 2011). Notably, Ghana's transport network today is well-regarded among sub-Saharan African countries. The connections made possible by this network have helped to link smallholder farmers to the wider national market, and even export markets in neighbouring countries. Similarly, in Peru, the Decentralized Rural Transport Project improved the coverage and quality of rural roads, and is estimated to have reduced travel time to schools by 25 per cent, contributing to an increase in school enrolment among children aged 12 to 18 (World Bank, 2020e). As expanded road networks halved the average travel time from a rural district to a city, connections opened up between rural and urban regions around the country, allowing for greater market access and reduced transaction costs for agricultural produce (Flachsbarth, Lay and Garrido, 2017; World Bank, 2017b).

Mikou et al. (2019) estimate that, in most developing countries, less than 60 per cent of rural residents live within two kilometres of all-season roads; in sub-Saharan Africa less than 50 per cent do. While investment is thus sorely needed, building and maintaining a universal paved road network in rural areas by 2030 will be unaffordable for most countries. In the short-term, rural areas will have to be integrated using alternative methods, such as constructing gravel rather than paved roads (i.e., feeder roads) or using drones to deliver medical and school supplies.

Access to electricity is also necessary for people to escape persistent poverty (Shepherd et al., 2019). In addition to raising the efficiency of agricultural production, increased electrification has been associated with positive educational impacts (Franco et al., 2017; Kulkarni and Barnes, 2017). Franco et al. (2017) find that household electrification in rural Peru has significantly increased reading time at home for children aged 6–18, and secondary school enrolment rates. The ability to study for longer periods at home increases the likelihood of students staying in school, and of parents encouraging children to focus on schooling as opposed to engaging in labour activities.

Households' needs for energy to fulfil both productive and domestic demands requires that electricity be available, affordable and reliable. The grid should be expanded into remote rural areas. People living in poverty should be supported financially to access modern energy services. While regional and local systems provide a limited amount of power, they can still be an appropriate solution for isolated households, businesses and public services. This calls for a decentralized approach to promoting uptake and regulating electricity, as well as to providing subsidies for the poorest households.

Beyond electricity, universal access to ICTs stands to radically change rural life, bolster poverty reduction efforts, and contribute to closing the rural-urban gap. Digital job networks improve the functioning of the rural labour market; telehealth enables remote con-

sultations; digital banking provides rural people with real time access to credit; online teaching materials ensure everybody has access to the same, high-quality content; access to market information empowers rural smallholder farmers; and more.

The world has made great progress in building the backbone infrastructure to enable connectivity in rural and remote areas. However, these areas are likely to remain largely unconnected without appropriate last-mile connectivity solutions—made more difficult by the challenges of rugged terrain, lack of investment, and high last-mile infrastructure installation costs. In order to promote connectivity in rural areas, Governments can ease regulatory requirements for alternative business models such as community networks; create a more enabling environment for investment in underserved areas through incentives such as tax breaks; and create a universal service fund to expand rural access financed through some form of mandatory contribution from telecommunications service providers (ITU, 2020).

Improving access to quality public services

Sustained investments in public services are also central to promoting equal opportunity for rural populations. A key factor for effective public services is quality. The focus of investments therefore should not only be expanding coverage, but also improving the quality of existing public services in rural areas. Many countries have rapidly expanded access to primary education beyond their funding and institutional capacity, resulting in a drop in educational outcomes (Shepherd et al., 2019). Recent research suggests that interventions that improve school quality are more cost effective than interventions that solely increase attendance (Angrist et al., 2020).

Improving the quality of education in rural areas calls first for upgrading supply-side capabilities, namely by hiring more teachers, particularly in remote areas, and providing more school materials, such as computers and textbooks. Second, it often requires offering additional payment to teachers willing to work in rural areas and increasing efforts to recruit teachers locally. These measures should most often be complemented with efforts to incentivize participation, such as monitoring teachers' attendance or offering conditional cash transfers to encourage people in rural areas to send their children to school. Third, decentralizing the management of education has often helped meet the needs of local communities better, namely by providing bilingual education in places where local minorities speak a different language. A systematic review of the evidence suggests that a combination of policies improves the effect of interventions on the quality of education (Masino and Niño-Zarazúa, 2016).

The Gambia introduced a special allowance in 2006 to attract teachers to hardship locations, which are defined as schools located more than 3 kilometres from a main road. The hardship allowance is equivalent to 30 to 40 per cent of salary, depending on the region (Mulkeen, 2009). As early as 2007, one quarter of teachers in the regions where the incentive was offered had requested transfer to hardship posts (ibid.). In the Republic of Korea, teachers are offered additional stipends, smaller class sizes, greater promotion opportunities and the opportunity to choose their next school after teaching in a difficult area (Kang and Hong, 2008). As a result, students living in rural areas have greater access to better educated and more experienced teachers (Luschei, Chudgar and Rew, 2013).

Moreover, teacher workload is determined primarily by class size, which varies across rural areas in many developing countries. In order to make schools cost efficient when class size is very small, Governments have encouraged teachers to undertake multigrade teaching methods (Adedeji and Olaniyan, 2011). However, not many teachers are properly trained in this type of teaching, which negatively affects the performance of the pupils. Teachers should either receive instruction on multigrade teaching during their formal training or follow additional courses in order to apply the teaching technique effectively. Moreover, governments can put in place policies to encourage flexibility in rural schools' timetables. This allows school programmes to align with the labour requirement of rural parents and for their children to attend school while also being able to render assistance at home during the planting and harvesting seasons (ibid.).

Another approach to improving the quality of rural education is to recruit teachers locally. Locally recruited teachers are more likely to be socially and culturally familiar with the daily context faced by their students (UNESCO, 2015). Less social distance between teachers and students has been argued to have a positive impact on student learning (Rawal and Kingdon, 2010). More generally, teachers posted in rural areas should receive specific training designed to teach more effectively in those areas. This includes an understanding of the language or dialect spoken and specific local behaviours in rural communities.

Box III.5 illustrates how one country, Mongolia, has expanded access to education, as well as electricity and ICTs, among its rural population.

Regarding health care, investments are needed to boost various aspects of rural health systems, including the availability and accessibility of pharmacies and essential medicines, the number and quality of health facilities, and rural health information systems. Strengthened institutional capacities for coordination between national (central) and rural (local) levels of the health system are vital to ensuring that rural health needs, especially those of disadvantaged groups, are adequately reflected in policymaking, monitoring and evaluation.

One of the main health care challenges is ensuring that people living in rural areas have access to trained health professionals (WHO, 2010; Scheil-Adlung, 2015). Skilled and motivated health workers are a prerequisite to delivering effective health services and improving health outcomes in rural areas. Scheil-Adlung (2015) estimates that global health-worker shortages are more than twice as high in rural than in urban areas. As a result of these shortages, more than 50 per cent of the rural population lacks effective access to health care, compared to 24 per cent of the urban population.

Improving rural access to health workers may involve strategies such as a more equitable geographical allocation of staff from a national health system, and the recruitment of students from underserved areas who return to work in their communities after their training. At the same time, as physicians are often in short supply, nurses could be trained to independently perform tasks or procedures traditionally carried out by doctors. Health workers in rural areas should also be provided with decent working conditions, including adequate wages and incentives to work in rural areas, and professional development opportunities. The motivation of rural health workers can be maintained by enabling them to do their jobs effectively and securely through investments in equipment, supplies and (community) infrastructure.

More broadly, boosting community-based health services, particularly in primary care, can be an effective way to deliver health care in rural and remote settings under resource constraints (WHO and UNICEF, 2018). Community health workers provide the first level of care and help alleviate the demand for doctors and nurses for basic routine care and less urgent or less complicated cases. In addition to community health workers, rural residents themselves can be trained to provide basic care, such as administering simple treatments and utilizing portable equipment for conducting initial diagnoses, which reduces the need for costly visits to hospitals or clinics far away. Such community-based health efforts have been crucial in the response to COVID-19 in rural Africa, especially where public and fiscal resources are limited (Zhou, 2020).

Community-based health care is increasingly made possible by telemedicine and mobile health technologies, which facilitate medical consultations from distant locations, and provide software-based assistance (some of which may be used offline) and health education and training. Automated telephone monitoring and self-care support calls, for instance, have been found to improve self-management of chronic diseases in low- and middle-income countries (Scott and Mars, 2015). In Kenya, no significant clinical differences were found between the antiretroviral therapy care received by HIV/AIDS patients in clinics and that delivered in a community programme by fellow patients supported by training and pre-programmed mobile devices (Fulton et al., 2011).

Due to their close contact with domestic animals and wildlife, rural residents—especially those working in agriculture—are often central to the human-animal interface. Such interactions must be given great attention, due to the possibility and impact of zoonotic dis-

BOX III.5

Extending electricity, ICT and education access to Mongolia's rural communities

With a population of just 3.3 million situated in a vast land area, Mongolia is the least densely populated nation in the world. Many rural Mongolians live a traditional nomadic lifestyle, herding livestock at a subsistence level and shifting from location to location according to the seasons and pastural needs. Infrastructure and public service provision in rural Mongolia can be challenging and costly, but the Government has managed to tailor its solutions to the country's characteristics.

In 2000, when herders had almost no access to electricity, the Government started the national solar electrification programme, subsidizing portable solar home systems for rural households, and establishing sales and service centres throughout the country to provide critical services within reasonable proximity. The programme brought electricity access to more than two thirds of Mongolia's nomadic herders, and most herder households now have mobile phones, televisions and refrigerators powered through solar panels (World Bank, 2013; World Bank, 2015b).

The Government has also sought to promote information and communications technology (ICT) investment in rural areas. Public-private partnerships have boosted phone and internet coverage in rural areas, and annual rural ICT investment rose tenfold from 2005–2013 (World Bank, 2020d). Over the same period, phone call minutes originating from rural areas other than district centres rose dramatically from almost zero to 530,000 a year. Access to such communications has helped improve rural agricultural business practices, with herders now able to obtain better, more up-to-date information and connect directly with both local markets and those farther away.

Nomadic lifestyles can be disruptive for children's education. Children often have to live in district centres away from the family in order to attend school, or delay entry into formal schooling. Most rural children enrol in primary school without adequate preschool preparation, and many encounter learning difficulties along the way. Dropping out is largely a rural phenomenon in Mongolia, with a majority occurring at primary grades (World Bank, 2017a; Steiner-Khamsi and Gerelmaa, 2008).

Over time, there has been an increased public focus and funding for education in rural areas (Engel, Prizzon and Amgaabazar, 2014). The building of more boarding schools and dormitories—the latter of which are all funded by the Government—has expanded education access for rural children. In 2012, a home-based school preparation scheme started, where Parents are trained by local teachers, and follow a specially designed programme to teach their children at home, using learning materials from mobile toy and book libraries. Particular courses were also developed to help young children who have dropped out to learn at home, and to subsequently enrol in school again. The scheme's impacts include reduced school dropout rates, better learning results for children, and increased support of parents and local communities (World Bank, 2017a).

Between 2007 and 2013, the Rural Education and Development Project sought to make learning materials more widely available for rural students by setting up libraries in all rural primary schools and selected kindergartens, dormitories and non-formal education centres (World Bank, 2014). This was accompanied by training and the formation of a local professional development network for rural teachers and school directors. On average, classrooms benefiting from the project were estimated to have doubled their reading time per week (ibid.).

Source: UN DESA.

eases.[6] Investments in rural areas in disease outbreak detection, preparedness planning and response capacities can help save lives, particularly among the most vulnerable, while generating jobs for local economies.

Stimulating inclusive rural development

The benefits of promoting agricultural development are both direct, through increased incomes and food security, and indirect, through increased investment in health and education. Poverty reduction through agricultural growth is estimated to be two to three times as effective as through growth in other sectors, and mainly benefits the poorest in society (Christiaensen and Martin, 2018). In mostly agricultural economies, the broad aim should be to boost the agricultural productivity of smallholder farmers in order to increase their incomes. Moreover, it is critical to support the integration of rural areas into the wider economy. Rural-urban linkages can be fostered by reducing transaction costs, allowing smallholder farmers in the rural agricultural sector to benefit from urban demand and keeping food prices in check.

Addressing rural poverty also requires facilitating the reallocation of labour to rural non-farm activities and assisting farmers in further modernization and specialization. Enabling rural households to diversify their income is known to be an effective way out of poverty. There should be public support to facilitate the transition to a more diverse rural economy and equip people with the skills required to participate in non-farm activities through, for example, investments in education and vocational training. Rural small and medium-sized enterprises and agribusinesses should be cultivated to allow a rural middle class to develop and promote the creation of a vibrant non-farm economy. Natural resource management and tourism in rural areas can create further employment opportunities.

As economies develop, reducing poverty through agricultural growth requires a targeted approach, aimed mainly at supporting smallholder farmers in more marginal and less connected rural areas and at tackling concentrated pockets of poverty in specific rural areas and among particular groups, such as indigenous peoples, older persons or women. The primary aim of policy should be to connect the remaining rural poor to the opportunities provided by modern food markets. This includes assistance to smallholder farmers in meeting food standards, improving market access in marginal rural areas, and promoting rural wage employment in the non-farm economy. In countries where the agricultural labour force is ageing, agricultural innovation, new technologies, and the adaptation of agricultural policies to fit the changing demographics of the agricultural workforce are needed. Box III.6 illustrates how agricultural and non-farm livelihoods can be supported, with examples from Peru and Ghana.

Ensuring access to land and natural resources

As populations and economies grow, constraints on available land may arise. Policy choices will influence whether this increased competition for resources leads to innovation and inclusive development or to degradation, scarcity and inequalities of access and control over these resources.

A country's initial level of inequality in the distribution of land has an impact on the nature of agricultural growth. When smallholder farmers living in poverty have less access to land, they naturally stand to gain less from improvements in agricultural productivity, lowering its impact on poverty reduction. Additionally, smallholder farmers tend to have a higher demand for labour per hectare than large landowners. Hence, if more land goes to smallholder farmers, the agricultural sector's ability to absorb labour and, in turn, reduce poverty improves. In short, the more equal the initial distribution of agricultural land, the more agricultural growth can contribute to pro-poor growth.

Besides the distribution of land, for rural people living in poverty, secure access to land and its natural resources is vital for their empowerment, food security and ability to climb out of poverty. With secure access to land, people are more likely to make sustainable, long-term investments in their resource base since they will directly reap the benefits. This, in turn, strengthens

6 Particularly in view of the COVID-19 pandemic, wherein the coronavirus was transmitted to humans zoonotically.

BOX III.6

Enabling agricultural livelihoods in Peru's highlands and rural entrepreneurship in Ghana

The Sierra Rural Development scheme (ALIADOS) was carried out from 2008 to 2017, targeting low-income communities in Peru's rural highlands. ALIADOS supported farmers and local organizations in designing and running business plans and community-led subprojects that aimed to build productive networks, increase market access, and improve food security through boosting agriculture and livestock assets (World Bank, 2020c). Workshops were held to train farmers in skills and guide them in subproject implementation. Many beneficiaries also had their first interaction with financial services through participation in the scheme.

At the close of ALIADOS in 2017, three quarters of participants had increased their productive assets by over 65 per cent compared to 2008 (ibid.). The scheme had contributed to a revitalization of economic activity, job creation, and poverty reduction in the highlands, and rural net sales volumes rose by more than 35 per cent from 2013–2017, with the most significant gains in agricultural products. An important lasting impact is the building up of local networks and their capacities for resource management and collective action. ALIADOS activities placed decision-making roles in the hands of farmers' communities and organizations, thus promoting participation and empowerment of local communities. Many participants continued to collaborate even after ALIADOS ended.

Even as agriculture has become a major driver of Ghana's national and rural growth, the structure of the economy continues to evolve and diversify. To better involve lower-income rural residents in this process and address poverty, the Government introduced the Rural Enterprise Project (REP) in 1995 (Adjei, Adjei and Serbeh, 2020). The scheme targets vulnerable rural inhabitants, particularly women and youth, willing to engage in small-scale and micro-enterprises. Participants receive technological resources and skills transfer, including through training in sales, customer service and finance. Earnings derived from these enterprises not only benefit participants directly, but also function as an important safety net for households engaged in agriculture, cushioning the impact of unpredictable agricultural income in the face of weather and climate changes.

Participants have utilized the entrepreneurial skills and knowledge gained to organize into groups that are more creditworthy, and better able to jointly tap microcredit that is otherwise inaccessible to them as individuals (ibid.). These funding sources help to boost financial capacity and are typically put to use in their small-scale livelihood activities. Group formation also enables the joint marketing of products, and strengthens the social network and social capital of members. The manufacturing sector in participants' communities is gradually seeing a boost following REP technology transfers and managerial training initiatives (ibid.). Livelihood activities resulting from REP interventions also promote technology transfer to non-beneficiaries, contributing to industrialization progress in the rural economy.

Source: UN DESA.

their economic position and improves their household's ability to invest in health and education. Hence, land reform policies should aim to both improve the distribution of natural resources and guarantee secure tenure, regardless of whether tenure is based on individual or collective rights.

Globally, about half of all countries are engaged in land tenure reform, with over 1 billion farmers already having benefited (IFAD, 2016). Land reforms have been undertaken to address growing inequalities, biases against specific groups, and social conflict. Many countries now recognize a continuum of land property rights. The basis of all successful programmes has been major investment in the infrastructure of land registration. This includes cadastral surveys, digitized records and improved resolution of land conflicts. Land registration, in particular, has historically been based on paper documentation. Paper records can be lost, falsified, destroyed or otherwise manipulated. Governments should invest in the simplification of cumbersome processes, improve record keeping and fight corruption. Building a digital records system based on

blockchain technology, for example, would create an indisputable record of land ownership.

However, rural women often have limited rights over land and natural resources. In many parts of the world, they still face discrimination in relation to land rights due to a combination of traditional practices and discriminatory laws. As a result, women often hold rights through male relatives and risk losing access in cases of divorce or widowhood. Additionally, women's parcels are generally smaller and of lower quality than men's (FAO, 2010). Furthermore, land reform policies meant to improve its distribution can have a male bias (ibid.). With land only being registered in men's names, compensation payments are made mostly to them, or compensation for land use restrictions are based solely on men's activities.

It is vital to ensure rural women's equal access to land and natural resources and address discriminatory laws and practices that impede their rights in this regard. However, secure and equal access to land is necessary but insufficient by itself to foster the effective use of land by rural women. Rural women also need improved access to other resources, such as credit, technology, extension services and markets. Land reform policies should be complemented by efforts to improve these aspects as well.

Countries have sought to implement land reform in various ways—such as by enacting new legislation—but these measures do not always pan out fully in practice. In Ethiopia, a land-titling programme was initiated in 1998 to increase tenure security and strengthen women's land rights, including through recognizing their equal rights in the use, transfer and inheritance of land and property (Fox et al., 2018). Land certification subsequently came to require the names of, and be held jointly by, both husband and wife in the case of married couples. Although the formal legal system now accords greater protection to women, obstacles such as high female illiteracy rates, discriminatory application of laws, and inadequate enforcement mean that many women continue to be unable to exercise their land rights.

For indigenous peoples, land is often not seen as a commodity. It is instead a sacred part of their cultural identity. Most indigenous peoples have land tenure systems based on collective rights, regulated by customary laws and tradition. However, in many parts of the world, these rights are either only partially recognized or not recognized at all by national Governments (IFAD, 2020). A lack of recognition of their customs and conceptualization of territory leads to conflict, marginalization and, ultimately, poverty. To ensure a prosperous future for indigenous peoples, both culturally and economically, secure access to their ancestral land must be guaranteed.

Young people in rural areas have limited access to land. They face three main challenges (IFAD, 2019). First, due to rapid population growth, particularly in sub-Saharan Africa, rural areas are becoming more densely populated. As a result, land is scarcer and plots are becoming smaller and more fragmented. Second, people live longer, more productive lives. Parents are thus less likely to transfer their land to their children when they enter the labour force. Third, the rise of medium-scale commercial farms is further increasing competition for land. As a result of all three factors, young people are significantly less likely to own land than adults. In sub-Saharan Africa, for example, 1 in 3 adults is the sole owner of a plot of land, while this is true for fewer than 1 in 10 young people (ibid.). Rental markets are making up for this to an extent. There has been a steep increase in the number of rural households that are renting land, particularly households headed by young people. However, land markets alone are not sufficient to address all constraints faced by the rural youth in accessing land.

Expanding social protection in rural areas

There is ample evidence of the positive impact of social protection on poverty and inequality reduction as well as its ability to promote inclusion (United Nations, 2018a; IFAD, 2016). Access to regular and adequate social protection benefits protect households from shocks and minimize negative coping practices in the short term. In the longer term, social protection can help smooth consumption, build (human) capital and enable investments that improve rural people's resil-

ience to future crises. Cash transfers, for instance, help prevent poverty and support broader human development outcomes, such as improved nutrition, health and education outcomes, particularly if linked with other sectoral policies such as those in agriculture. With shrinking household sizes and a future where unpaid family care will be insufficient, incorporating long-term care within essential health care as part of social protection systems will become increasingly important.

Faced with disproportionate levels of poverty, seasonal and informal employment, unsafe working conditions, limited access to markets, lack of access to basic services, and exclusion based on gender, age, ethnicity and other factors, access to social protection is essential for those living in rural areas. Yet, social protection coverage in rural areas is generally lower than in urban areas. Globally, 56 per cent of the population in rural areas lack health coverage, for instance, compared to 22 per cent in urban areas (ILO, 2017).

Agricultural micro-insurance is a developing field that can help lower-income farmers reduce vulnerability—at a lower cost than traditional insurance—to weather risks and shocks, which are increasingly exacerbated by climate change and are a major cause of income and livelihood loss. This is particularly relevant for smallholders, who often lack irrigation and depend on unpredictable rainfall, and find it difficult to cope with crop losses. The Kilimo Salama micro-insurance initiative in Kenya, Rwanda, and the United Republic of Tanzania is a weather-indexed insurance that pays claims based on weather measurements such as rainfall. Compared to traditional insurance, where losses have to be verified after they have occurred, Kilimo Salama is simpler and less costly (both to operate and to purchase), while its administration and payment through mobile phones has allowed it to reach smallholders in remote areas with poor access to financial services (Sibiko, Veettil and Qaim, 2018). Take-up rates, however, are still relatively low overall, as with most forms of agricultural insurance, and there is room for improvement in terms of customizing contracts to individual needs, reducing premium costs, and simplifying process and communications.

For all of its advantages, few social protection programmes are explicitly tailored to rural people or the specific vulnerabilities and constraints they face. There are a number of legal, administrative and financial barriers that must be addressed in order to overcome the low coverage of social protection in rural areas.

Globally, workers in rural areas are twice as likely to be in informal employment (80 per cent) than workers in urban areas (44 per cent) (ILO, 2018). Workers in informal employment are insufficiently covered by social protection or not covered at all. In fact, lack of social protection coverage is often used to identify informal employment (United Nations, 2018a). Seasonal and casual work are largely excluded from social protection as well. Even when not explicitly left out, there can be thresholds related to working hours, duration of contracts and enterprise size that disproportionately affect rural workers, even those in formal employment. In addition to legal barriers to access, the frequency and timing of payments and slow accrual of rights further discourage rural workers in non-standard forms of employment from signing up to voluntary schemes.

Administrative hurdles can further undermine the reach of social protection programmes. On the supply side, strong administrative capacity is required to identify and register beneficiaries, monitor payments and contributions and control for potential errors. Weak administrative capacity in rural areas has limited the reach of social protection programmes. The remote nature of some rural areas further increases the cost of delivering social protection. Moreover, reserving time to register and queue for benefits can result in significant losses of income, particularly for workers in casual employment who have to miss work or for those who have to close a small business; especially when it takes a substantial amount of time to reach the nearest rural service point.

There have been innovative solutions aimed at expanding the reach of administrative services. Governments are increasingly paying benefits and cash transfers directly to mobile phone-based accounts, a method that reduces transaction and travel costs for those living in rural areas. In Mongolia, visiting government offices to claim benefits is difficult and impractical for remote households, particularly herders who cannot leave their flock unattended for long. In addition to long travel distances, different public

offices had to be visited in the past for different needs. Access improved when One Stop Shops were introduced in 2007, gathering services of multiple government ministries in single locations (ILO, 2015). These combined-service centres have since been set up in all provinces and most districts, with mobile vans bringing access to those living in the most remote areas.

In terms of financial barriers, the most significant obstacle for rural people that prevents participation in contributory schemes is a lack of contributory capacity. Seasonal workers, for example, may earn their primary incomes in a short period of time during the year. As a result, making regular monthly contributions to contributory social insurance will be more difficult during, and particularly at the end of, the off-season. Rather than spend their limited financial resources on something like pension contributions, many living in poverty in rural areas must prioritize more immediate needs. For non-contributory schemes, indirect financial costs—such as transportation costs or the costs of compliance with conditionality—may reduce the potential benefit of the programme to participants. Given the higher levels of poverty in rural areas, this may represent a hidden cost that many cannot bear.

To overcome these structural barriers to the adoption of social protection in rural areas, legal frameworks can be adjusted and expanded to include people living in rural areas, working towards a universal social protection floor accessible to all. Contribution schemes can be modified to account for employment types common in rural settings and offer more flexible payment options. Participation in contributory schemes can be improved by offering subsidies to those living in poverty. Finally, the hidden costs of participation in non-contributory programmes can be lowered by simplifying administrative procedures and ensuring that services are readily accessible.

Beyond programme-specific adjustments, it is vital to be aware of the structural nature of the barriers in rural areas. They are fundamentally linked to poverty, remoteness, the informality of employment and the economic structure of rural areas. An integrated rural policy framework on social protection that recognizes these structural barriers stands a better chance at overcoming them.

Leaving no one behind: promoting the rights of the disadvantaged

Discrimination remains a persistent driver of inequality. Distinctions on the basis of gender (box III.7), race, ethnicity, religion, age, disability or other characteristics often deny certain groups the full benefits of economic growth. Because of this systematic exclusion, the benefits of rural growth are likely to be unevenly distributed, potentially contributing to rising inequality. The 2030 Agenda for Sustainable Development calls for the elimination of discriminatory laws, policies and practices to ensure equality of opportunity and prevent the entrenchment of exclusion of disadvantaged groups.

Furthermore, socially excluded groups are more likely to live in poverty owing to a combination of political, sociocultural, economic and spatial factors (United Nations, 2016). These factors are often intertwined, leading some people to face overlapping forms of exclusion and an elevated risk of falling into a poverty trap. A rural, indigenous woman, for instance, faces a triple burden, making it that much more difficult to escape poverty. For growth to contribute to the eradication of rural poverty for the most disadvantaged groups, governments should utilize the necessary legal and policy instruments to ensure inclusion of these groups, while also removing obstacles to their political participation (United Nations, 2020e).

Conclusion

Poverty remains a largely rural challenge. The situation of the rural poor is made worse by deficiencies in access to public services, infrastructure and social protection. The COVID-19 pandemic has compounded the already vulnerable position of the rural poor by affecting livelihoods, limiting mobility and reducing food security. However, poverty is declining faster in rural than in urban areas.

BOX III.7

Promoting the inclusion of rural women

Structural barriers and discriminatory social norms continue to constrain women in rural households (United Nations, General Assembly, 2019b). Women in rural areas continue to lack equal access to land and natural resources, public services and infrastructure—all of which compromise their ability to build better economic futures for themselves and their households. Much of their labour remains invisible and unpaid. Disproportionately affected by poverty and exclusion, rural women continue to lag behind rural men and urban women in almost all development indicators.

Many countries have adopted gender-responsive agricultural and rural development policies for the economic empowerment of rural women (ibid.). These policies aim to support the livelihoods and well-being of rural women through capacity development, entrepreneurship, investments in productive assets and increased participation in the agricultural labour market. Some countries have targeted specific groups of rural women, including indigenous women. The two examples below, from Mexico and Uganda, illustrate some of the policy measures adopted by Governments (ibid.).

The Sowing Life (Sembrando Vida) programme in Mexico promotes the effective participation of women and men in rural development—particularly older persons living below the poverty line—and supports them in establishing agroforestry production systems that will help to achieve food self-sufficiency, improve incomes and restore forest cover of 1 million hectares. The programme was operational across 20 states in 884 municipalities, and served over 400,000 beneficiaries in 2020

Uganda's Women's Empowerment for Resilience and Adaptation Against Climate Change project aims to enable rural women to become agents of change. The project has resulted in the creation of over 1,600 women-led associations that have pooled more than $2.8 million. Women can borrow from this fund to invest in scalable solutions that address climate change. The initiative promotes solar energy for rural domestic lighting, fruit and fish drying, water irrigation technology for dry season agriculture, and agroprocessing activities to diversify and strengthen women's income-earning opportunities. The project has economically empowered over 250,000 women, many of whom now own and control the land they use.

Source: UN DESA.

Despite higher levels of poverty in rural areas, rural income inequality tends to be lower than urban income inequality. As regards disparities between urban and rural areas, progress in access to basic services has been faster in rural than in urban areas of developing countries with data available since the 1990s. Nevertheless, even if the progress observed continues at the same pace, rural areas will still lag far behind urban areas by 2030. Within rural areas, inequalities in basic services and opportunities remain high and are persistent for specific groups.

Reductions in rural poverty have not always led to reductions in rural inequalities or in inequalities between rural and urban areas. That is, regional and time trends suggest that declines in inequality are not a systematic outcome of growth and development. The same economic forces that drive poverty reduction can cause inequality within rural areas, and that between urban and rural areas, to rise.

Countries that have succeeded in reducing both rural poverty and rural inequalities have invested in infrastructure and public services. They have promoted inclusive agricultural growth, access to land, especially for women, and expanded social protection in rural areas. Sustained investments in roads, electrification, improved sanitation, safe drinking water, education, health care and the bridging of the digital divide in rural areas will be required to eradicate extreme poverty and reduce rural-urban disparities. Such investment must also address inequalities in access to public infrastructure and services within rural areas to ensure no one particular area or group of people is left behind.

Annex tables

Table III.A.1

Rural and urban income inequality (Gini coefficient) for selected countries, latest available year

Country	Year	Rural Gini	Urban Gini
Austria	2016	25.6	30.4
Bangladesh	2016	45.4	49.8
Belgium	2016	23.1	26.9
Bolivia (Plurinational State of)	2018	47.5	37.4
Brazil	2015	47.4	50.7
Canada	2017	28.3	31.5
Chile	2017	42.6	44.4
China	2016	33.2	36.1
Colombia	2018	43.5	49.2
Costa Rica	2018	46.1	47.1
Côte d'Ivoire	2015	52.8	58.9
Czech Republic	2016	24.5	25.4
Denmark	2016	24.2	25.4
Dominican Republic	2016	41.2	46.2
Ecuador	2018	43.8	44.3
El Salvador	2018	35.9	37.6
Estonia	2013	35.5	35.3
Ethiopia	2016	28.0	38.0
Finland	2016	23.4	26.6
France	2010	24.2	30.3
Gambia	2011	40.0	42.1
Georgia	2016	38.4	37.0
Germany	2016	28.1	30.1
Greece	2016	31.9	32.0
Guatemala	2014	43.6	47.0
Honduras	2018	49.9	46.7
Hungary	2015	23.9	27.1
Iceland	2010	22.9	24.6
India	2011	31.1	39.0
Indonesia	2018	32.4	40.1
Ireland	2010	28.1	30.0
Israel	2016	23.8	35.3
Italy	2016	31.0	34.5
Lithuania	2017	39.0	35.7
Luxembourg	2013	27.2	29.1
Malawi	2011	37.5	49.1
Maldives	2010	36.0	38.0
Mexico	2014	44.4	47.9
Mongolia	2018	29.2	34.0
Nicaragua	2014	40.8	45.7
Norway	2013	22.3	25.0

continued >>

Table III.A.1

Rural and urban income inequality (Gini coefficient) for selected countries, latest available year

Continued

Country	Year	Rural Gini	Urban Gini
Panama	2018	49.7	45.7
Paraguay	2018	48.5	42.9
Peru	2018	39.5	39.2
Poland	2016	30.6	27.6
Russian Federation	2017	29.2	31.0
Serbia	2016	36.1	30.3
Slovakia	2013	27.4	26.4
South Africa	2017	55.5	59.5
Spain	2016	31.1	34.5
Switzerland	2013	27.6	30.0
Thailand	2017	42.6	44.1
Turkey	2013	36.5	39.2
Uganda	2010	37.5	44.7
Uruguay	2018	33.0	39.8
Viet Nam	2018	40.7	37.2

Source: UN DESA calculations, based on data from LAC Equity Lab: Income inequality—Urban/rural inequality (SEDLAC tabulations), Luxembourg Income Study's Data Access Research Tool, PovcalNet, the National Statistical Office of Thailand, the National Statistical Office of Mongolia, National Statistics Office of Mongolia and World Bank (2020) and UNU-WIDER's World Income Inequality Database – version 6 May 2020.

Note: Data from 56 countries representing 63 per cent of the 2020 world population – 6 from Africa, 17 from the Americas, 11 from Asia and 22 from Europe.

Table III.A.2

Trends in urban-rural gaps in stunting, secondary school attendance, access to improved sanitation and access to electricity, 1990s to 2010s

Country	Urban-rural gap (annual percentage point change)			
	Stunting	Attendance	Sanitation	Electricity
Armenia	0.13	-1.12	3.11	-0.03
Bangladesh	-0.49	-	-1.80	-1.27
Belize	-0.65	-1.47	0.06	-0.65
Benin	0.14	-0.09	-0.09	0.12
Bolivia (Plurinational State of)	0.31	-	-0.51	-1.69
Bosnia and Herzegovina	-0.29	-1.08	-0.76	-
Burkina Faso	-0.17	-	6.03	0.69
Cambodia	0.10	-0.23	-0.09	-0.27
Cameroon	0.28	0.33	1.24	0.31
Central African Republic	0.21	1.48	2.76	0.77
Chad	-0.04	-	1.20	1.25
Colombia	-0.37	-1.27	-1.26	-0.42
Côte d'Ivoire	-0.09	-	1.80	0.17
Dominican Republic	-0.37	-0.31	0.72	-1.10
Democratic Republic of the Congo	0.46	0.43	0.85	-
Egypt	-0.71	-0.56	-0.74	-0.37
Eswatini	-0.17	0.67	-1.59	-0.82
Ethiopia	0.22	-1.24	2.68	0.57
Gambia	-0.26	0.40	0.17	1.07
Ghana	-0.57	-0.55	0.52	-2.11
Guatemala	-0.20	-	-	-1.62
Guinea	-0.01	0.41	1.15	0.64
Guyana	-	-0.71	-3.37	-
Haiti	-0.26	0.12	-0.09	-0.60
India	-0.17	-	-	-1.81
Indonesia	-	-	-0.76	-1.82
Iraq	-0.42	-0.32	-2.11	-0.48
Jordan	-0.58	-	-0.14	-0.36
Kazakhstan	-0.39	-0.07	-0.06	-0.01
Kenya	-0.13	0.52	2.19	0.78
Kyrgyz Republic	-	-0.26	-0.31	-0.05
Lao People's Democratic Republic	-0.25	-0.80	-2.11	-3.90
Lesotho	0.00	0.04	0.83	2.42
Madagascar	0.19	-	0.98	2.03
Malawi	-0.20	0.37	0.99	1.15
Mali	0.05	0.33	1.42	1.15
Mauritania	-0.24	0.35	0.04	1.14
Mongolia	-0.53	-1.03	-0.59	-0.86
Mozambique	-0.06	-	-	1.80
Namibia	0.39	-1.09	3.03	-0.64

continued >>

Table III.A.2

Trends in urban-rural gaps in stunting, secondary school attendance, access to improved sanitation and access to electricity, 1990s to 2010s

Continued

	Urban-rural gap (annual percentage point change)			
Country	Stunting	Attendance	Sanitation	Electricity
Nepal	-0.18	-0.64	0.44	-2.83
Nigeria	0.17	0.76	2.09	-0.49
Pakistan	-	-0.10	-1.89	-0.25
Peru	-0.36	-1.14	-2.06	-2.86
Philippines	-	-	0.50	-1.71
Rwanda	-0.04	-0.10	-0.60	1.50
Senegal	-0.26	0.38	2.98	-0.37
Serbia	-0.19	-0.20	-1.70	0.02
Sierra Leone	0.07	1.27	2.17	6.69
Suriname	-0.46	-0.21	-0.58	-0.75
Tanzania	-0.07	0.70	3.11	0.88
Thailand	-0.51	0.15	-0.07	-0.06
Togo	0.17	-0.08	-0.08	1.45
Uganda	-0.59	-0.51	1.91	0.11
Viet Nam	-	-0.92	-3.36	-0.23
Zambia	-0.48	0.34	1.83	0.82
Zimbabwe	0.02	-0.10	3.37	-0.27
AVERAGE	-0.15	-0.16	0.43	-0.06

Source: UN DESA calculations, based on data obtained from Multiple Indicator Cluster Surveys (MICS) and Demographic and Health Surveys (DHS).

Note: Urban-rural gap in this table refers to the percentage point difference between urban and rural areas for a particular dimension of well-being. The change in this gap from the first year (1990s round of surveys) to latest year (2010s round of surveys) of observation is divided over the number of years to obtain the annualized percentage point change. A negative figure denotes a shrinking of urban-rural disparities in well-being, while a positive figure denotes a widening of disparities. Average figures in the bottom row are unweighted.

Table III.A.3

Trends in rural Gini, rural poverty headcount, and urban-rural gaps in stunting, secondary school attendance, access to improved sanitation and access to electricity, 1990s to 2010s

Country	Rural Gini	Rural poverty	Urban-rural gap (annual percentage point change)			
			Stunting	Attendance	Sanitation	Electricity
Bangladesh	0.24	-	-0.49	-	-1.8	-1.27
Bolivia (Plurinational State of)	-0.78	-2.52	0.31	-	-0.51	-1.69
Colombia	-0.41	-1.32	-0.37	-1.27	-1.26	-0.42
Côte d'Ivoire	0.27	-	-0.09	-	1.8	0.17
Dominican Republic	-0.39	-0.63	-0.37	-0.31	0.72	-1.1
Ethiopia	0.05	-	0.22	-1.24	2.68	0.57
Gambia	-0.59	-	-0.26	0.4	0.17	1.07
Guatemala	-0.27	0.06	-0.2	-	-	-1.62
India	0.14	-1.49	-0.17	-	-	-1.81
Indonesia	0.21	-2.21	-	-	-0.76	-1.82
Malawi	0.7	-	-0.2	0.37	0.99	1.15
Mongolia	-0.31	-	-0.53	-1.03	-0.59	-0.86
Peru	-0.18	-1.96	-0.36	-1.14	-2.06	-2.86
Serbia	-0.07	-	-0.19	-0.2	-1.7	0.02
Thailand	-0.08	-	-0.51	0.15	-0.07	-0.06
Uganda	0.17	-	-0.59	-0.51	1.91	0.11
Viet Nam	0.29	-	-	-0.92	-3.36	-0.23

Source: UN DESA. Poverty calculations based on data from LAC Equity Lab: Poverty—Poverty Rate and PovcalNet. Gini coefficient calculations based on data from LAC Equity Lab: Income inequality—Urban/rural inequality (SEDLAC tabulations), Luxembourg Income Study's Data Access Research Tool, PovcalNet, the National Statistical Offices of Mongolia and Thailand and UNU-WIDER's World Income Inequality Database (version 6 May 2020). Urban-rural calculations based on data obtained from Multiple Indicator Cluster Surveys (MICS) and Demographic and Health Surveys (DHS).

Chapter IV

UN Photo/Eskinder Debebe

Rural development within planetary boundaries

Introduction

A sustainable rural transformation is needed in order to achieve the Sustainable Development Goals (SDGs) by 2030. The objective of such a transformation should be to improve the lives of rural people while preserving the environment. Meeting this objective will require a shift in the current patterns of rural development towards greater emphasis on balancing the goals of eradicating poverty, protecting and preserving natural, landscape and cultural resources, and ensuring the sustainable production of food.

While sustainable rural development involves the realization of all the SDGs, the focus of this chapter is particularly on five environment-related Goals: SDG 6 (water and sanitation), SDG 7 (energy for all), SDG 13 (climate change), SDG 14 (life below water) and SDG 15 (life on land).

The chapter has two main objectives: *first*, to examine the impact of the current patterns of rural development on land, water, air, and biodiversity in general, and how this is affecting the achievement of the SDGs, and, *second*, to suggest ways in which rural development can be made more environmentally sustainable and conducive to the achievement of the SDGs by 2030. Agriculture is generally the core sector in rural areas, particularly in developing countries, in terms of both value and employment. In developed countries, where the sector is smaller, its environmental footprint is often significant. A special focus is thus given to agriculture when assessing the environmental impact of the current patterns of rural development.

The planetary boundaries framework includes nine of the core Earth system processes, which, if exceeded, could generate irreversible environmental change, endangering human existence and ecosystems in general.[1] The impact of the current rural development patterns on planetary boundaries, particularly with regard to agricultural production, manifests itself through multiple interacting channels, such as land-use change, greenhouse gas emissions, excessive water use and pollution, and loss of biodiversity. The state of the nine planetary boundaries greatly affects the future of rural development and thus provides the context for the chapter.

Chapter IV is organized around three sections:

Section I focuses on the impacts of the current patterns of rural development on the environment and natural resources, particularly water, land and air, as well as the achievement of the SDGs by 2030. The world is not on track to realize the water- and land-related SDGs due to the growing depletion, degradation and pollution of these resources, as well as the loss of biodiversity, depletion of forests and wilderness, degradation of soil, and the despoliation of landscapes.

Section II discusses the strategies that countries can adopt to make rural development more environmentally sustainable and conducive to the achievement of the SDGs. A portfolio of strategic initiatives consisting of water- and land-use technologies, circular and conservation practices and institutional strengthening measures are proposed to promote sustainable rural development. The adoption of such initiatives would represent a shift in strategy away from a business-as-usual approach to strong commitment to sustainable rural development and the achievement of the SDGs. Scenario analysis in several areas also

1 The nine planetary boundaries are currently defined as (i) land-system change; (ii) freshwater use; (iii) biogeochemical flows (nitrogen and phosphorous cycles); (iv) biosphere integrity; (v) climate change; (vi) ocean acidification; (vii) stratospheric ozone depletion; (viii) atmospheric aerosol loading, and (ix) introduction of novel entities (Steffen et al., 2015b).

shows that it is possible to make development in rural areas more sustainable with the adoption of the right policies, management practices and technologies.

Section III presents the conclusions and key policy recommendations. The chapter calls, in particular, for more effective use and management of water and land resources because of their impact on the achievement of almost all SDGs. Rethinking agricultural practices—including through diversification and further expansion of non-farm activities, and the greening of settlements and infrastructure—will be central to achieving a sustainable and resilient rural development that includes food and water security, by 2030.

The environmental impact of current patterns of rural development

This section examines how existing rural development patterns are adversely affecting both water and land resources, including their depletion, degradation, and pollution. It also shows how these effects are making the achievement of some SDGs more daunting.

Impact of rural development on water resources

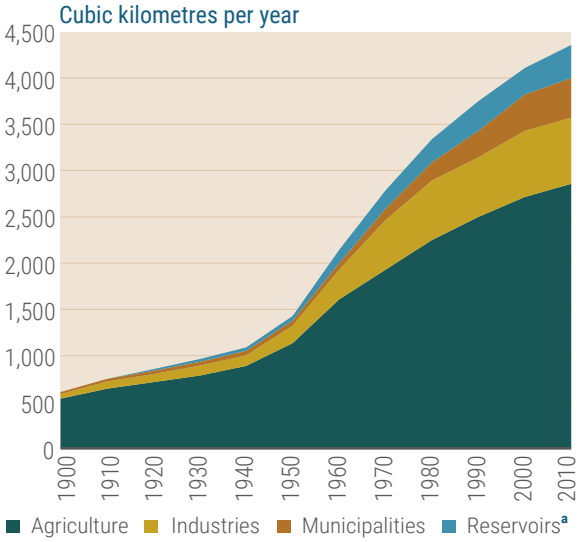
Some 97 per cent of the Earth's water is salt water, with only 3 per cent being freshwater. These limited freshwater resources are needed to meet multiple human needs, including for drinking water, irrigation, electricity generation, industrial processes, municipal purposes, fisheries, navigation and recreation. The extraction of both surface and groundwater is currently exceeding their renewal capacity and resulting in the depletion of those resources (Dasgupta, 2021). The state of the renewability of freshwater resources is thus an important indicator of water and food security.

Depletion and degradation of water resources

Over the last century, the resource-intensive water consumption patterns have resulted in nearly sixfold growth in the use of global freshwater resources, which is more than twice the rate of population increase during the same period (UNESCO WWAP, 2020). Five emerging economies, namely Brazil, the Russian Federation, India, China and South Africa, or the so-called BRICS countries, represent the largest share of global freshwater use (45 per cent), while the share of Organisation for Economic Co-operation and Development (OECD) countries has reached a plateau since the 1980s, representing about 20–25 per cent of global withdrawals (Steffen et al., 2015a). While the water withdrawal shares of industries and municipalities have increased over the last century, especially since the 1970s, agriculture remains by far the largest sector in terms of overall water consumption (figure IV.1).

Globally, approximately 70 per cent of all freshwater withdrawals is used by agriculture, but the share of this sector in total water use varies by country and income level (figure IV.2). The share of agriculture in total water withdrawals tends to decrease as the income of countries grow, and so the proportion of water withdrawals by individual sectors is closely linked to the patterns of traditional structural transformation, as discussed in chapter 2. In 2015, the average agricultural share of total water demand for low-, mid-

Figure IV.1
Global water withdrawals throughout the previous century, by sector



Source: UNESCO WWAP (2020).
a Evaporation from artificial lakes.

dle- and high-income countries was 73, 66 and 60 per cent, respectively. There are countries across South Asia, Africa and Latin America and the Caribbean that use more than 90 per cent of total water withdrawals for agriculture. South Asia has the highest share of agricultural water consumption mainly due to high use of irrigation in food production.

Irrigation has been an important factor in increasing yields per unit of land across many countries, and has thus contributed to higher agricultural productivity growth, poverty reduction and rural transformation, as discussed in Chapter 2. Irrigation has been particularly important across South and East Asia and the Middle-East. Pakistan, Bangladesh and South Korea all irrigate more than half of their agricultural land, while India's share is 35 per cent. The level of irrigation in sub-Saharan Africa has increased, yet the region continues to irrigate less land than South Asia and the Middle-East and North Africa. Intensive groundwater pumping for irrigation has also led to depletion of aquifers and contributed to environmental degradation, with significant economic impact on crop production (Ritchie and Roser, 2018).

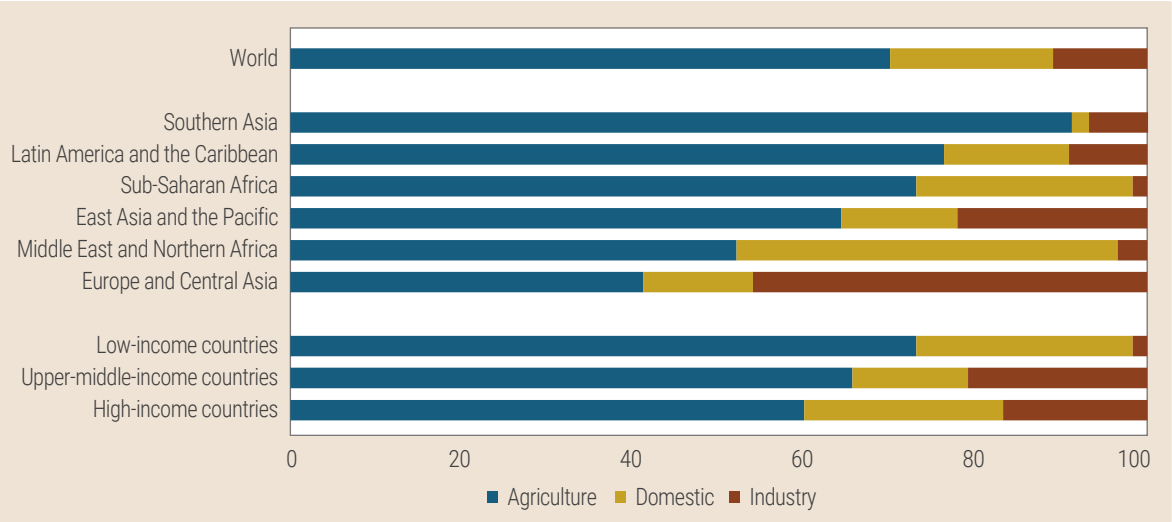
The amount of water depletion also depends on the efficiency of use, which is strongly influenced by the economic structure of a country and the share of water-intensive sectors. Water-use efficiency (SDG 6.4.1) is defined as the value added in United States dollars per volume of water withdrawals in cubic metres (m^3) by a given economic activity. Global water-use efficiency, according to the latest reporting, is \$18/m^3 (2017), with the lowest regional ratio at \$2/m^3 in Central and Southern Asia; about \$12/m^3 in sub-Saharan Africa; and \$11/m^3 in Northern Africa and Western Asia. Countries with highest water-use efficiency are mostly located in Northern and Western Europe, where some countries surpass \$100/m^3 (figure IV.3). These countries generally have a large service sector, often accounting for more than 60 per cent of gross domestic product (GDP).

Agriculture tends to have a much lower water-use efficiency relative to other productive sectors, so countries with a relatively large agricultural sector tend to score badly on this indicator. The water-use efficiency in the agricultural sector also varies among countries, although only a few, mostly located in Europe have this SDG indicator (SDG 6.4.1) exceeding \$10/m^3. One country that stands out is the Netherlands, with a water-use efficiency in the agricultural sector at \$55/m^3. The agricultural sector in that country is one

Figure IV.2

Share of freshwater withdrawals by region and income grouping, 2015

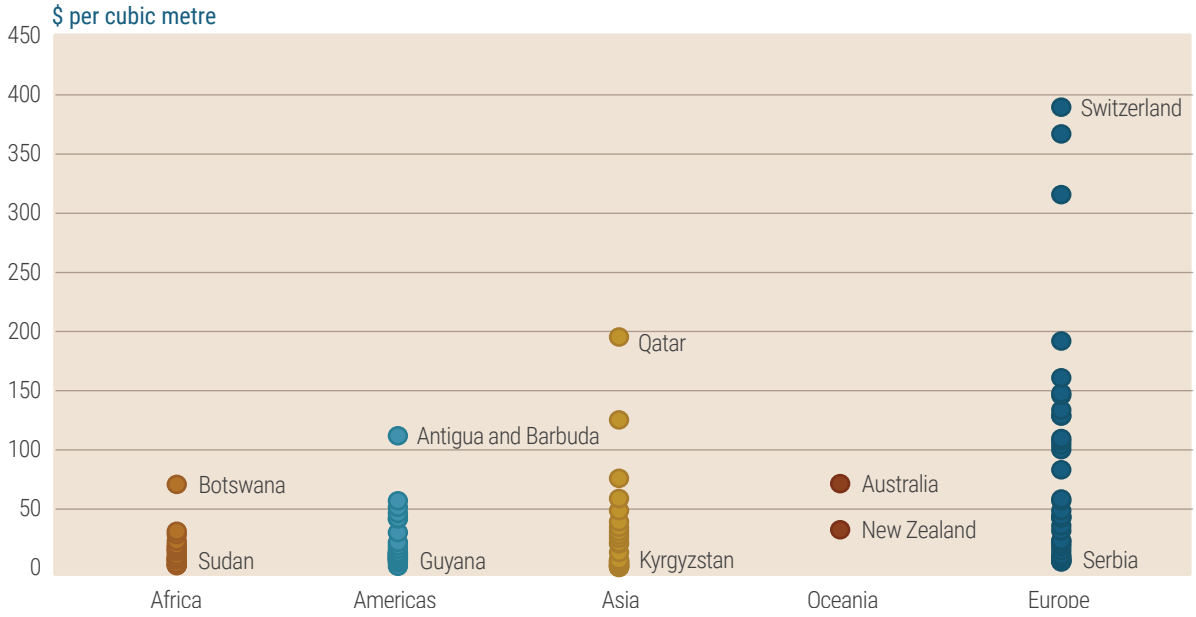
Percentage



Source: UN DESA, based on data from World Bank (2021).

Note: Withdrawals for domestic include uses by homes, municipalities, public services and commercial establishments.

Figure IV.3
Water use efficiency, 2017



Source: UN DESA, based on data from UNSD SDG database.

of the most innovative and productive in the world and has adopted numerous measures to maximize water-use efficiency. In the Netherlands, steps such as covering of basins, rainwater storage and water recirculation, are obligatory. The adoption of innovations on a large scale, such as hydroponic farming (growing plants without soil in nutrient-rich solutions) and closed greenhouses, have also contributed to high water-use efficiency in the Netherlands.

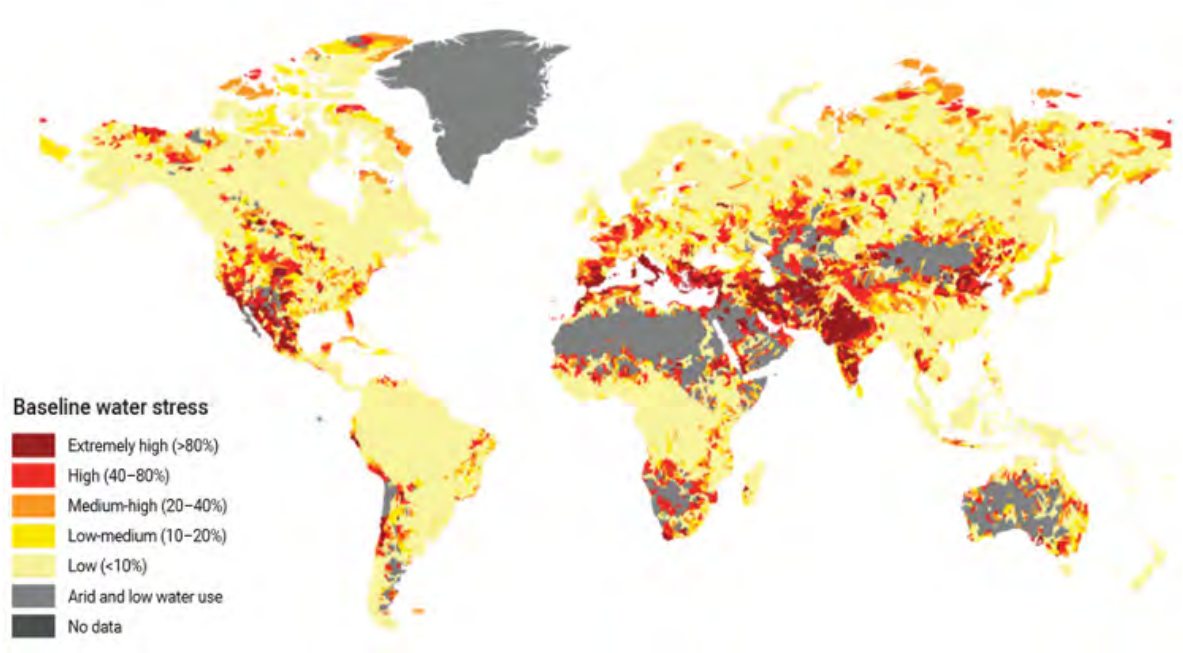
▸ Growing concern about water stress

Many Middle Eastern, Northern African and South Asian countries have high levels of water stress due to resource-intensive water consumption patterns. Countries like India, Iran, Libya, Pakistan, Saudi Arabia and United Arab Emirates, for example, have withdrawal rates of over 100 per cent, which means that they are overextracting from existing surface or groundwater aquifers. The United States of America and much of Southern and Eastern Europe have medium-to-high water stress. Canada, much of Latin America and the Caribbean (with the exception of Chile, Mexico and the southern part of Peru), Northern Europe, Oceania and sub-Saharan Africa (except Namibia and Botswana), in contrast, have water stress defined as low or low to medium, due to their large endowment of water resources (figure IV.4). Water stress can heighten security risks by impacting irrigation, manufacturing or energy generation. It also impacts human health, by limiting the access of people to basic water and sanitation.

Some parts of the world also experience water scarcity during particular periods of the year. For example, over four billion people live under conditions of severe water scarcity at least one month of the year (Mekonnen and Hoekstra, 2016). These seasonal patterns often affect women disproportionally because they have to spend more time and travel longer distances to collect water during the dry season.

In many places, the per capita availability of renewable freshwater resources is also further disrupted because of climate change (Ritchie and Roser, 2018). While the water supplies of some regions have been stable, others have experienced considerable fluctuations. The world's high-latitude regions, including the northern half of the United States, the global tropics and the low latitudes are getting wetter. By contrast, the mid-latitudes are getting drier. The shifting patterns of water availability, along with falling groundwater levels, will further limit the access of people to drinking water and water for irrigation in rural areas.

Figure IV.4
World map of annual baseline water stress, 2014



Source: UNESCO WWAP (2020).

Climate factors, such as droughts, are also playing a significant role in population movements from rural to urban areas. In the last century, the American Dust Bowl of the 1930s and the Sahelian droughts of the 1970s and 1980s drove many people to migrate to California and the regional urban centres in African countries like Burkina Faso, Mali, Mauritania and Niger, respectively. A common factor in many of these country experiences is that a period of relatively humid conditions was upended by significant decline in precipitation, meaning that the land could no longer sustain the same population size.

Large-scale withdrawal of water for irrigation purposes has diminished freshwater flows reaching the sea, thereby affecting marine life (Islam, 2020). Many fabled rivers of the world, such as the Colorado in the United States, Murray-Darling in Australia, and Huang He in China, fail to reach the sea. The drying up of major rivers through extraction of water for commercial uses is disrupting the Earth's basic hydrological cycle. It is estimated that the expansion of irrigation has decreased global river discharge to the oceans by 0.3 per cent, equalling 118 km^3 between 1901 and 2002 (Gerten et al., 2008). As an example, the Aral Sea has been suffering because of the interception of rivers for irrigation purposes and the excessive use of water for cropland. This is contributing to lowering the water table and the rise of salinity and toxicity, which impacts the biodiversity of the sea. Saline soils also reduce the ability of agricultural crops to absorb water and vital nutrients, while the constant accumulation of salts degrades soil quality and makes it infertile. In the Central Asia region, this process has provoked a migration of the population from former coastal areas, which has built up pressure on other parts in the region (Golovleva, 2016).

The overexploitation of freshwater resources over decades has thus contributed to an alarming level of global ocean degradation (SDG 14), with implications for biodiversity. This, over a period of nearly 100 years, has contributed to the habitat loss of some 20 per cent of coral reefs, 19 per cent of mangroves and 29 per cent of seagrass. The destruction of coral reefs has particularly damaging consequences for biodiversity because they provide the habitat for about 25 per cent of all oceanic species (United Nations, 2020b). Wetlands, the ecosystem where land meets water, are

similarly being lost due to agricultural expansion and rural development. Wetlands are an essential part of the water cycle as they filter pollutants and hold significant volumes of the world's available freshwater. An estimated 40 per cent of the world' s species live and breed in wetlands, but they are disappearing at a rate three times faster than forests (Portier, 2021). According to Earth observation data, there has been a 54 per cent loss of the extent of natural wetlands (SDG 6.6) worldwide between 2001 and 2015 (UN-Water, 2018b).

Water pollution

Water pollution is mainly the result of human activities that introduce contaminants in the natural environment. In many countries, agriculture has overtaken settlements and industries as the major source of pollution of inland and coastal waters, with farms discharging large quantities of chemicals, organic matter, sediments and saline drainage into water bodies.

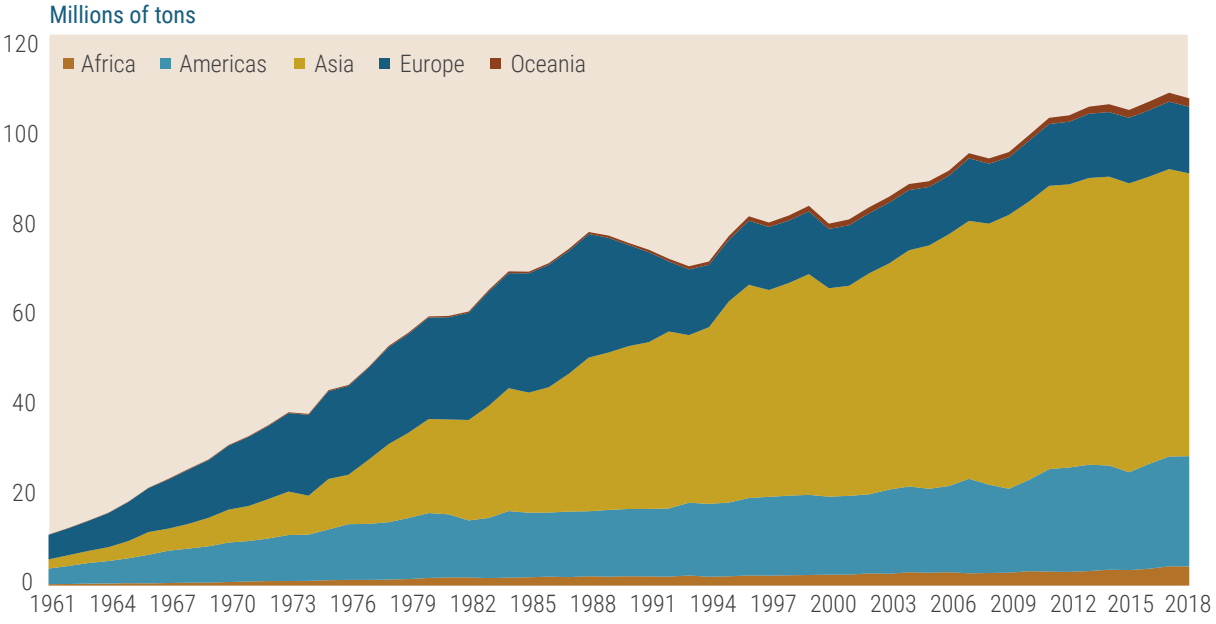
The global growth of agricultural production in recent decades has been achieved, in no small measure, by more intensive use of inputs such as chemical fertilizers and synthetic pesticides. While beneficial for food production, excessive and unsustainably managed use of such chemicals has contributed to significant growth in water pollution in many regions. Nitrate is the most common chemical contaminant found in the world's groundwater aquifers. In European Union countries, 38 per cent of water bodies are under significant pressure from agricultural pollution (UNESCO WWAP, 2015). Excessive fertilizer use has also led to run-off that has contributed to eutrophication, caused by an increase in plant and algal life, which has created "dead zones" that rob water of the oxygen necessary to support marine life, fish stocks and coral reefs (Walker, 2019).

The Baltic Sea, which is an arm of the Atlantic Ocean, has been heavily affected by eutrophication, with about 50 per cent of all nutrients in the sea originating from agriculture. Since 1995, however, nitrogen and phosphorus inputs into the Baltic Sea have decreased by 17 and 20 per cent, respectively, but it will take time before there are materially significant improvements in its water quality. It took decades for the Baltic Sea to become eutrophic and it will take decades for it to recover (McCrackin and Svanbäck, 2016).

Today, the world consumes ten times more mineral fertilizers than it did in the 1960s (figure IV.5). In

Figure IV.5

Nitrogen fertilizer consumption across regions, 1961–2018



Source: UN DESA, based on data from FAOSTAT (2020).

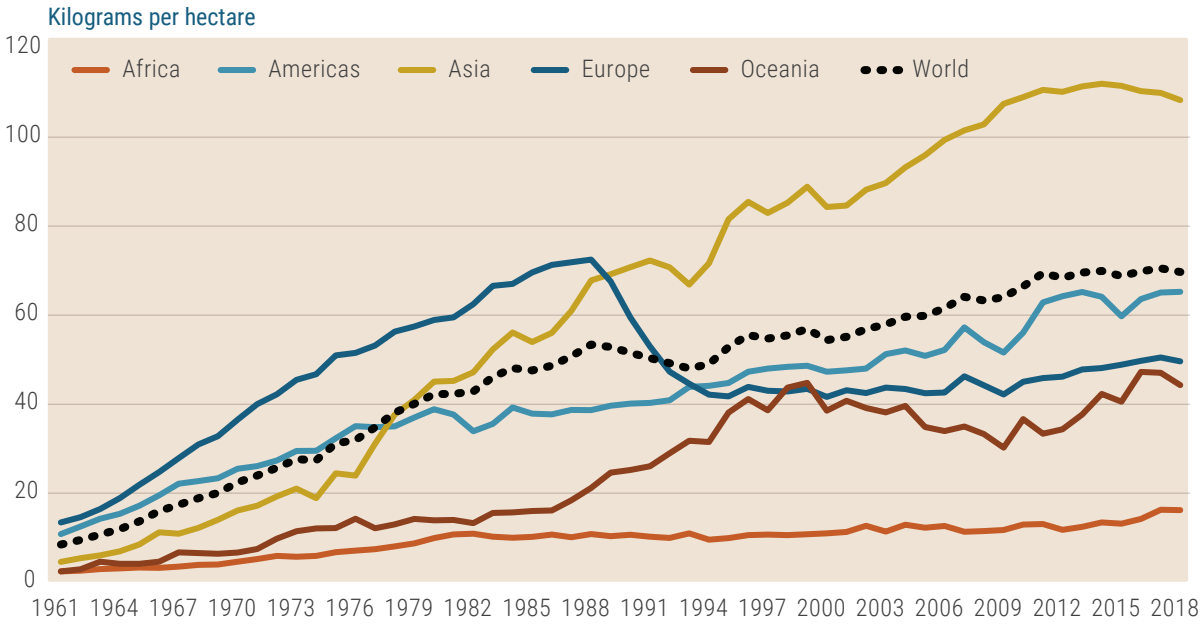
Europe, the use of fertilizers increased dramatically from the 1960s into the 1980s. However, fertilizer use decreased in Europe in the late 1980s and early 1990s, due in particular to the economic recession in Eastern Europe. Since the mid-1990s, fertilizer inputs in Europe have remained relatively stable at medium levels. The largest contribution to the global increase in nutrient consumption since 1990 has come from developing countries, particularly in Asia. Figure IV.6 shows that fertilizer use per hectare of arable land has been increasing in all regions except Europe between 1961 and 2018, with the most significant growth in the Asia region. The rate in East Asia is currently about 330 kilograms (kg) per hectare of cropland, with a slight stabilization in recent years. This stands in strong contrast to sub-Saharan Africa, where the use of fertilizers remains low and inputs have only marginally increased from 11 kg per hectare of cropland in 2000 to 16 kg per hectare in 2018. Hence, while in many regions the use of such chemicals is excessive, in other regions, especially sub-Saharan Africa, fertilizer use remains low, limiting agricultural productivity growth in many countries.

The increasing contamination of groundwater and freshwater resources is also affecting the health and well-being of rural people, particularly in terms of access to basic drinking water. Some 82 per cent of people in urban centres have access to safe drinking water, while the share in rural areas is only 43 per cent (figure IV.7). Inadequate water quality due to contamination thus hampers the provision of safe drinking water in rural areas.

The use of plastic products in agriculture is also contributing to water pollution. The global demand for agricultural plastics is estimated at about 8–10 million tons (Cassou, 2018). While agriculture is not the largest user of plastic products, accounting for around 3.4 per cent of total consumption in the European Union in 2014, this material is increasingly used in farming. Plastic films, for example, are used to cover greenhouses, to hug plants around the root zone, in plastic irrigation systems, and as ingredients in chemicals. Data on the final destination of agricultural plastics is missing, but recycling is limited—estimated at about 10 per cent in the United States, for instance, with the

Figure IV.6

Nitrogen fertilizer consumption across regions, per area of cropland, 1961–2018



Source: UN DESA, based on data from FAOSTAT (2020).

majority of such waste dumped in landfills, or ending as pollutants in land, water, or the oceans.

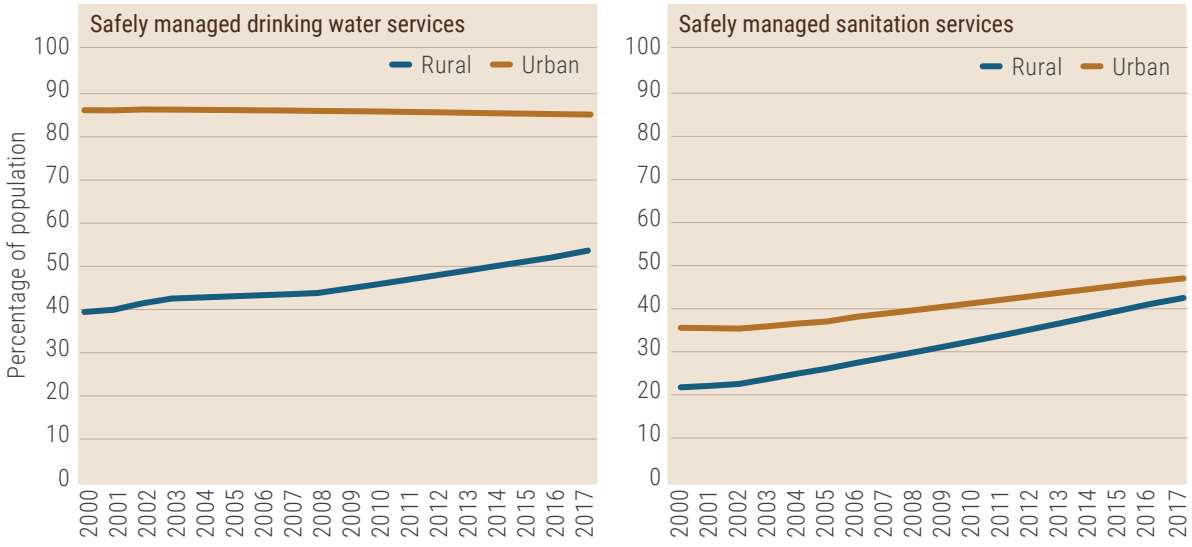
Plastic mulching (a farming technique in which crops are grown through holes in sheets laid over the ground) has also become a major agricultural practice because of benefits such as higher yields, earlier harvests, improved quality and greater water-use efficiency. The recycling level of plastic mulching, however, is very low. Mulching can contribute to enhanced pesticide run-off, and plastic residues are likely to fragment into microplastics and accumulate in the soil, as well as in water and coastal areas. Plastic production for agricultural mulch is growing rapidly and projected to increase from 4.4 million tons in 2012 to 7.4 million tons in 2019 (Srinidhi and Nazareth, 2018). The most common method for disposing plastic mulch is open burning in the farm, and the detrimental effects of such waste present an increasing challenge for many agricultural communities.

Agriculture and food production, at the same time, are being negatively affected by water pollution. The global crop area irrigated with unsafe wastewater is estimated to be ten times larger than the area using treated wastewater. Polluted water used in agriculture has caused contamination and accumulation of microbiological and chemical pollutants in crops, livestock products, soil or water resources, with potentially severe health impacts for consumers and farm workers (Rosegrant, 2020).

The expansion of human settlements, industries, infrastructure and other non-farm activities, is also a major source of pollution of water bodies in rural areas. Municipal and industrial wastewater is often discharged untreated into water bodies (UNESCO WWAP, 2017). High-income countries, on average, treat about 70 per cent of the municipal and industrial wastewater, while the ratio in upper-middle-, lower-middle- and low-income countries is 38, 28 and 8 per cent, respectively. Compared to urban regions, wastewater treatment in rural areas is generally much less advanced. Many rural areas, for example, are typically served by on-site wastewater treatment, without any formal sewer systems. While on-site systems can be well-suited to rural areas with low population density, their management may be expensive and complex, often resulting in unsafe emptying or waste being dumped or abandoned (UNESCO WWAP, 2017). In China, nearly 93 per cent of the municipal wastewater from residents of cities was treated in 2016, while the percentage in the rural regions stood at only 22 per cent (Wang and Gong, 2018).

Figure IV.7

Access to improved sanitation and water source globally, rural and urban areas, 2000–2017



Source: UN DESA, based on data from UNSD Global SDG database.

Women, especially in rural areas, are most affected by the lack of sufficient wastewater treatment, as they are often the main caretaker and user of domestic water.

Rural areas are also lagging behind in terms of access to safely managed sanitation services vis-à-vis urban centres, while the gap is smaller than when compared to access to basic drinking water, as shown in figure IV.7 earlier. A consequence of this is that rural areas with low access to safe latrines have higher rates of open defecation and experience greater soil and groundwater contamination.

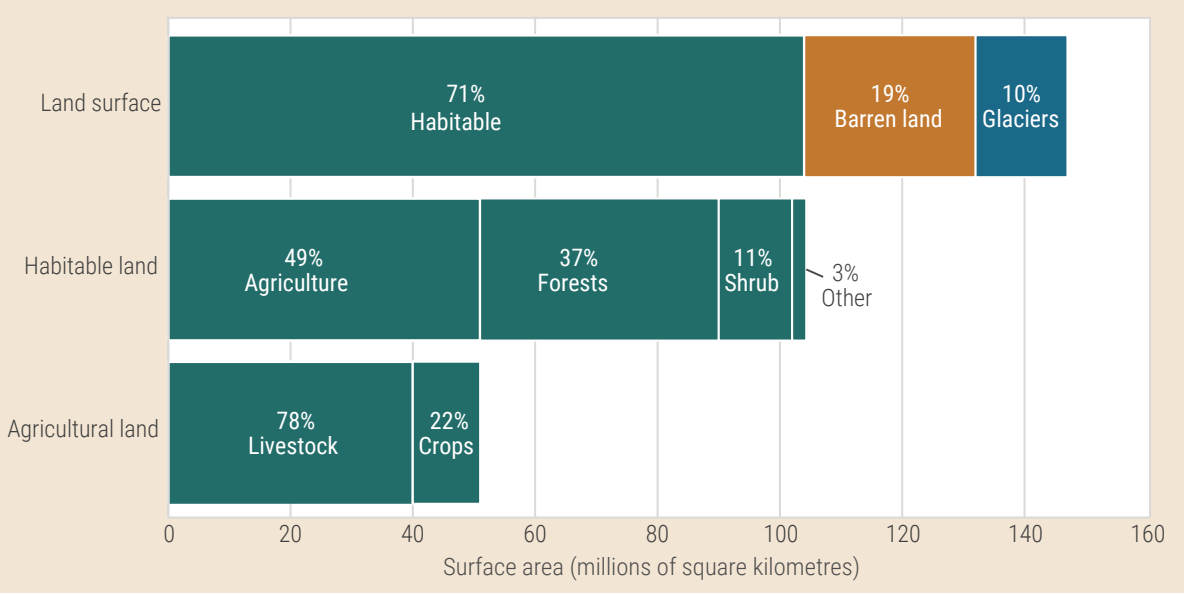
Expansion of rural infrastructure such as roads can also create problems for the management of water resources. Paved roads have increased rapidly in recent decades and are projected to grow by another 25 million kilometres by 2050 (United Nations, 2020b). Filling up of wetlands and other water bodies and misalignment of roads, highways, and railways with rivers and streams can reduce the availability of water in rural areas. Rainfall run-off from roads and highways, furthermore, frequently washes harmful pollutants into nearby rivers, streams, and lakes. Rain that falls on roadways is thus not able to soak into the ground as it would naturally, and instead generates run-off into local water bodies, carrying with it the polluting substances present on the road's surface.

In addition, the number of dams has grown rapidly in the past 50 years, reaching an estimated 50,000 large dams and 17 million reservoirs. Dams are predominantly constructed in rural areas for agricultural irrigation. A dam can be used to divert water for irrigation needs and limit the amount of water downstream. Dams contribute to the fragmentation of rivers, which affects aquatic life forms and contributes to upstream sedimentation and toxification of the return water. The use of reservoir water for industrial use also contributes to toxification as the return water carries many organic and inorganic pollutants (Islam, 2020).

Impact of current rural development strategies on land

Land is essential for the survival and prosperity of humanity, accounting for roughly 29 per cent of the Earth's surface (figure IV.8). Half of the Earth's habitable land is used for agriculture, with 37 per cent covered by forests. How land is used plays a critical role in determining the supply of food, fibre, energy and

Figure IV.8
Overview of global land use, 2015



Source: UN DESA, based on data from FAOSTAT (2020).

Note: The length of the bar is the surface in million km^2. Each bar breaks down the components of the bar right above.

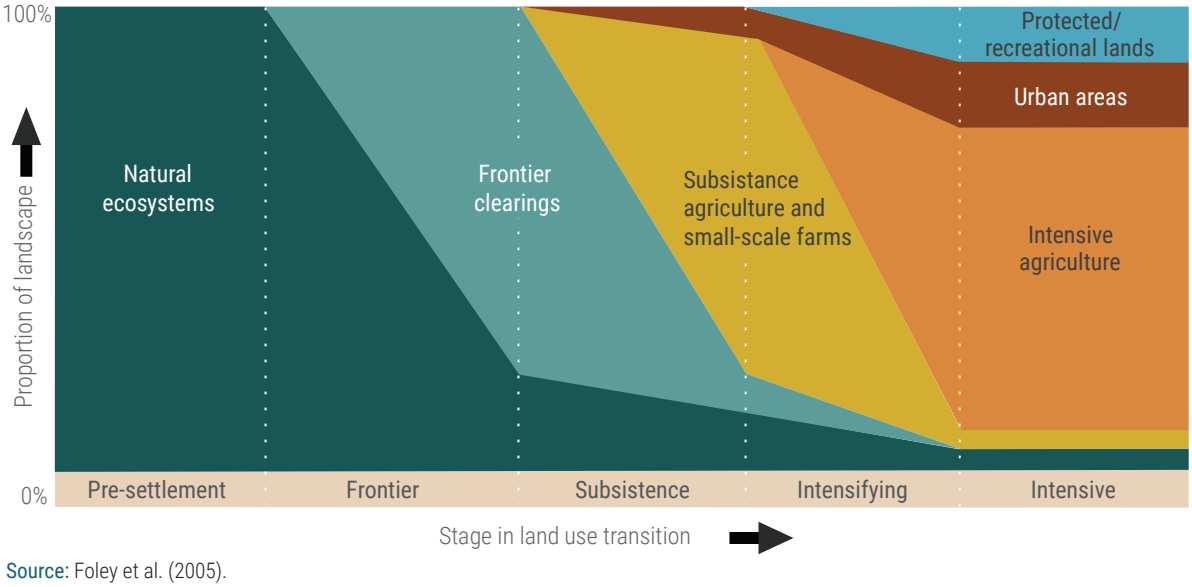
materials. Land also provides many vital functions for ecosystems, biodiversity, the climate system and people. This section examines how the current patterns of agricultural and rural development are affecting the sustainability of land resources.

Large swaths of the planet's land surface have been transformed by land-based activities. Clearing of forests, unsustainable agricultural intensification, and growth of human settlements and recreational lands have all reduced the share of natural ecosystems. Croplands and pastures have become one of the largest terrestrial biomes on the planet, surpassing forest cover in terms of size of land surface. The rapid expansion in croplands and pastures has resulted in losses of ecosystem services and the depletion of forests and wilderness. Figure IV.9 illustrates changes in composition of land use as it advances across stages.

The Intergovernmental Panel on Climate Change (IPCC) attributes 31 per cent of global greenhouse gas emissions directly to agriculture and land-use changes (IPCC, 2019). If the processing, transport, storage, cooling and disposal of food are added (which the IPCC ascribes to other sectors), more than 40 per cent of all global greenhouse gas emissions depend on the way we farm and eat. Land-use and land-cover change increases the release of carbon dioxide by disturbing soils and vegetation and is the main driver of deforestation. This means that rural land management practices have direct impact on climate change (SDG 13). Food-related emissions alone may result in the world exceeding the 1.5 degrees Celsius limit by 2050, and food emissions by themselves could bring the world close to the 2 degrees Celsius limit by 2100 (Clark et al., 2020). Without changes to food systems and consumption patterns in urban areas, food-related emissions could double by 2050. The climate goals are thus unlikely to be reached without changes to agricultural practices and food systems, including reduction of food waste and changes in food consumption patterns in urban areas. About 17 per cent of total global food production is wasted (11 per cent in households, 5 per cent in food service and 2 per cent in retail). This means that about 8-10 per cent of global greenhouse gas emissions are associated with food that is not consumed (UNEP, 2021a). Livestock-based food similarly tends to have a higher footprint than plant-based food. For example, producing one kilogram of beef leads to 60 kilograms of greenhouse gases, while producing one kilogram of peas causes just 1 kilogram of greenhouse gas emissions.

Figure IV.9

Illustration of transitions in land-use activities



Source: Foley et al. (2005).

Depletion of forests and wilderness

Deforestation has claimed about 30 per cent of global forest cover in the last century, and 20 per cent of the standing forest has been degraded in the 1990 to 2015 period (Griscom et al., 2017). The rate of deforestation has been increasing in tropical areas, especially in sub-Saharan Africa and Latin America and the Caribbean (FAO and UNEP, 2020). The forest areas as a share of total land mass decreased from 31.1 to 30.7 per cent between 2000 and 2015, with this decline continuing but at a slower rate. Since 1990, the world has lost forests equivalent to the size of South Africa (United Nations, 2019a). Only 54 per cent of current forest cover is subject to sustainable management plans (SDG 15.2.1).

The estimated annual rate of deforestation was 10 million hectares in the 2015–2020 period, down from 16 million per year in the 1990s. However, the global average masks significant regional variations, especially in sub-Saharan Africa and Latin America and the Caribbean, where forest areas have declined in the last decade. Forest degradation is also serious in other regions. In Australia and North America, for example, forest fires have been occurring at increasing frequency, with devastating impacts on forests and ecosystems.

Agriculture is the main driver of deforestation worldwide, with some variations between regions, as shown in figure IV.10. In Latin America and the Caribbean, commercial agriculture is the most important driver, accounting for about two thirds of all deforested area. In Africa and tropical and subtropical Asia, subsistence agriculture, on the other hand, accounts for a larger share of deforestation. When it comes to forest degradation, the need for fuelwood is the main driver in Africa, and timber logging in subtropical Asia and Latin America and the Caribbean.

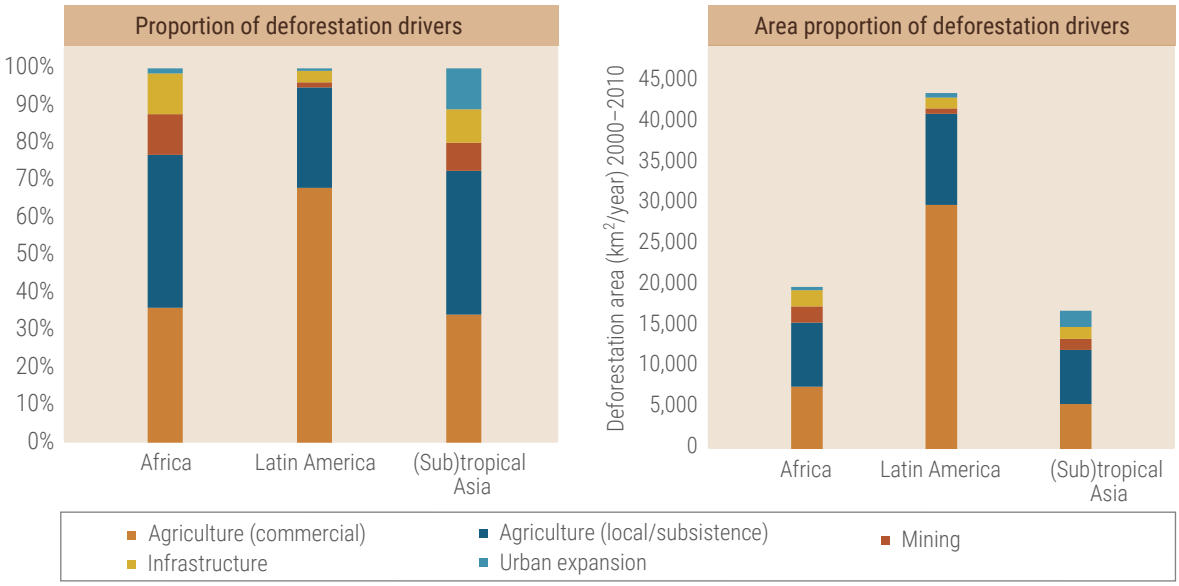
Many experts have argued that improving agricultural productivity is key to reducing deforestation. If countries can produce more food per hectare, they can protect critical forest areas while meeting the growing food demand. In Brazil, for example, the increase in agricultural productivity attributed to the expansion of rural electrification contributed to less forest loss, while in Zambia, improved maize seeds reduced the rate of deforestation (Assunção et al., 2016; Pelletier et al., 2020). However, it is not clear if the relationship between agricultural productivity and deforestation applies at the more local levels, where the increase in profitability for farmers may raise the opportunity cost of conserving natural forests, which can lead to greater agricultural land expansion. Effective government policies and the role of local communities in managing natural resources, have also been found to play an important role in improving the relationship between agricultural productivity and deforestation.

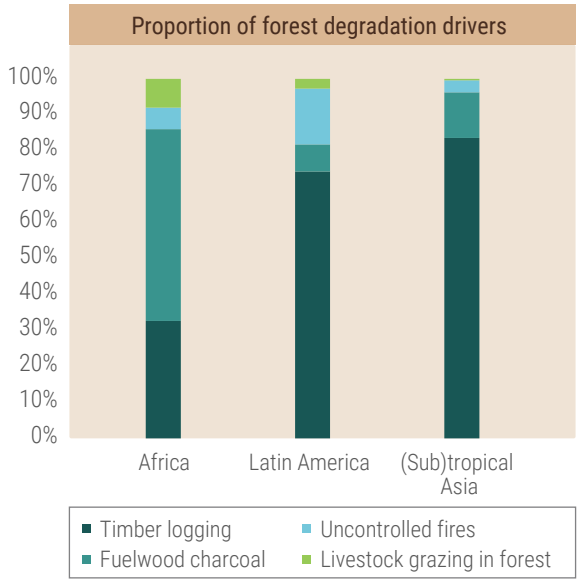
Another important driver of deforestation has been the high demand for fuelwood. Rural development strategies have not been successful in displacing the use of traditional fuelwood with cleaner energy sources. In sub-Saharan Africa, fuelwood consumption remains high due to habits, taste, customs and experience, and is often preferred, even when alternative energy sources are available (FAO, 2017a). The introduction of incentives and appropriate policies may be required to change this dynamic. While fuelwood is used in both urban and rural areas, the share is generally much higher in the latter. If current rural development patterns continue, 2.3 billion people could still be deprived of access to clean cooking fuels and technologies by 2030, which means that the world is not on track to reach SDG target 7.1 (universal access to affordable, reliable and modern energy services), and the demand for fuelwood is likely to continue to contribute to deforestation.

Biofuels have also been promoted as a cleaner alternative to fossil fuels, which sparked a production surge in the early 2000s. Biofuels have also been promoted because of their potential to promote rural development through new employment opportunities and higher local revenues. However, growing biofuels production has added to existing pressures on forests in tropical regions. The relationship between biofuel production and deforestation is also complex and often difficult to quantify, with biofuels from oil palm estimated to have been responsible for up to 2.8 per cent and 6.5 per cent of direct deforestation in Indonesia and Malaysia, respectively. Biofuel from soy-

Figure IV.10

Deforestation and forest degradation drivers, 2000–2010





Source: Kissinger, Herold and De Sy (2012).

beans in the Brazilian State of Mato Grosso may also have been responsible for up to 5.9 per cent of annual deforestation over the last few years (Gao et al., 2011).

Infrastructure development, in addition, has contributed to significant deforestation. A classic example is the impact of construction of roads in the Amazon in the 1960s, which accelerated deforestation. A more recent study in the Democratic Republic of the Congo shows that road development caused reduction of more than 2 per cent of all forest cover (Li et al., 2015).

▸ COVID-19 is exacerbating deforestation

The COVID-19 pandemic has also had an impact on forests, according to a global assessment by the United Nations Forum on Forests. Reduced monitoring by public forest agencies has created opportunities for

increased illegal activities, including logging, poaching, charcoal production and land-use change (FAO, 2020e). In many cases, forest management activities, such as reforestation projects, have also been postponed or cancelled. Furthermore, the negative economic impact of COVID-19 on livelihoods has increased the encroachment of forest reserves by farmers. As a result, there are concerns that the COVID-19 pandemic has led to increased depletion and degradation of forests and associated biodiversity loss. On the other hand, some positive benefits of COVID-19 have also been recorded, such as cleaner coastlines and reduced crowds in ecotourism sites. Due to the movement restrictions, the isolation of natural spaces has also enabled the regeneration of fauna and flora in some locations.

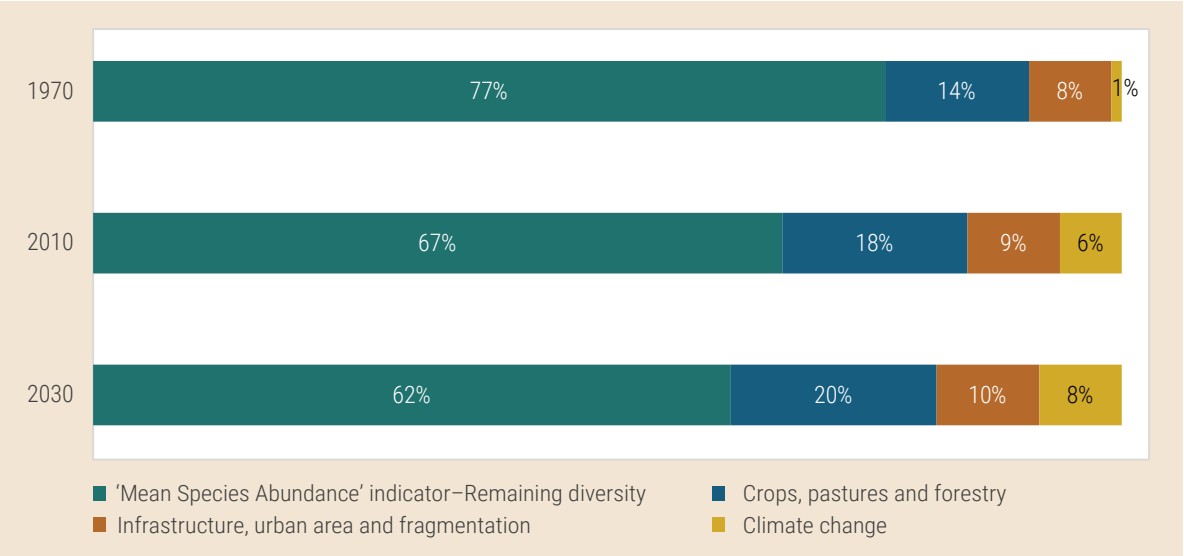
Loss of biodiversity

Land-use changes brought about by rural development around the world are threatening more species with extinction than ever before. An average of about 25 per cent of species in assessed animal and plant groups are threatened, suggesting that about 1 million species already face extinction in the next decades, unless action is taken to reduce the intensity of the drivers of biodiversity loss. Tropical forests, which account for two thirds of the world's biodiversity, have experienced the highest loss, driven primarily by expansion of agriculture (Wilson and Peter, 1988). As a result, it is estimated that, by 2030, 40 per cent of insects could be extinct (van Huis et al., 2013). Many pollinating species have also declined in large numbers and are threatened with further loss, putting at risk the production of 75 per cent of the current food crops (United Nations, 2019a).

The unprecedented loss of biological diversity is driven by a range of human activities. Figure IV.11 shows the main drivers of biodiversity loss. By 1970, about 23 per cent of the original naturalness of ecosystems globally had disappeared. By 2010, the loss had increased to 33 per cent, and by 2030, it is estimated that 38 per cent of the original naturalness of ecosystems could be lost. Historically, the conversion of natural habitats to agricultural land has had the largest impact on biodiversity, contributing 60–70 per cent of total biodiversity loss in terrestrial ecosystems. In the projections for 2030, the impact of infrastructure and urban areas as well as climate change will increase, but

Figure IV.11

Pressures driving global terrestrial biodiversity loss, 1970, 2010 and 2030



Source: Kok et al. (2014).

conversion of natural habitats will continue to have the largest impact on biodiversity.

The impact of agriculture, climate change and infrastructure development on biodiversity loss is also expected to further accelerate until 2030. None of the Aichi targets set out in the Convention on Biological Diversity, were fully achieved by 2020.[2] At the United Nations Climate Ambition Summit in 2020, countries such as Chile, Colombia, France, Italy and the United Kingdom of Great Britain and Northern Ireland and others thus pledged to go beyond the Aichi targets by more than doubling the protection of biodiversity and ecosystems.

The COVID-19 pandemic has also highlighted the importance of the relationship between people and nature, including the consequences of human ecological disruption caused by deforestation and loss of biodiversity. Pandemics emerge from the microbial diversity found in nature, with land-use change causing more than 30 per cent of new diseases reported since 1960 (IPBES, 2020).

Degradation of soil

Roughly one quarter of the global soils is estimated to have been degraded, an area nearly the size of India and the Russian Federation (IPCC, 2019). Up to 24 million km^2 of land has become degraded, largely due to unsustainable agricultural practices such as excessive fertilizer use and heavy tillage practices. It is estimated that 3.2 billion people globally are affected by land degradation, while an estimated 12 million hectares of land in the European Union alone are affected by soil erosion, reducing crop yields by 0.43 per cent at an annual loss of €1.25 billion (Panagos et al., 2018). Climate change also exacerbates land degradation, particularly in low-lying coastal areas, river deltas and in permafrost areas (IPCC, 2019).

If the current trend continues, some 95 per cent of the Earth's land areas could become degraded by 2050. So far, only 40 countries have committed to setting voluntary targets to achieve "land degradation neutrality" (SDG 15.3) by 2030, with 80 countries endorsing the target.

The per hectare loss of soil nutrient is highest in sub-Saharan Africa and the cost of restoration is estimated at 7 per cent of the continent's GDP (Craswell and Vlek, 2013). On a global scale, the annual loss of about 75 billion tons of soil each year costs the world about $400 billion, or approximately $70 per person (Eswaran et al, 2001). In the United States, soil erosion from agriculture is estimated to cost annually about $44 billion, or about $247 per hectare of cropland and pasture, while in India, the cost is nearly $50 billion annually, or 2.5 per cent of the country's GDP (Sethi, 2018). Changes in land use and land cover also increase the risk of floods and destruction of infrastructure, which has come at high cost to many countries. In Bangladesh, the 1998 floods inundated two thirds of the land area, resulting in damages and losses estimated at over $2 billion, or 4.8 per cent of the country's GDP.

Pollution of rural land and air

Air quality in rural areas remains a neglected issue, but all over the world and particularly in some developing countries, the pollution of the air is a significant problem. Industries such as mining, coal processing and cement-making contribute to air pollution in rural areas. The production processes of these industries are not only harmful to the environment because of their impact on water quality; they also cause air and land pollution, such as soil contamination, through direct exposure to the pollutant, leakage of toxic gases, and improper waste disposal. Cement manufacturing in rural areas, also generates serious atmospheric pollution and contributes to the deterioration of the air quality by producing hazardous air pollutants. Cement manufacturing, furthermore, requires large energy consumption, making that industry alone contribute about 8 per cent of global CO^2 emissions.

Economic growth and urbanization have led to increased demand for construction materials. Brick

2 The Convention on Biological Diversity has stipulated five Aichi targets to be achieved by 2020: (i) address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society; (ii) reduce the direct pressures on biodiversity and promote sustainable use; (iii) improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity; (iv) enhance the benefits to all from biodiversity and ecosystem services; and (v) enhance implementation through participatory planning, knowledge management and capacity-building.

is one of the major building materials, and brick kilns have become a leading source of air pollution in many rural areas, particularly in Asia. The technologies used for brick-making in South Asia are generally both inefficient and polluting. In Bangladesh, the contribution of the brick sector to the country's total annual CO^2 emissions is 17 per cent, much higher than its share of the national GDP (1 per cent). Air pollution caused by brick-making has important health effects, with 6,100, 55,000 and 600 deaths attributed to the brick kiln industry in Bangladesh, India and Nepal, respectively, in 2015 alone (Eil et al., 2020).

Sparsely populated and remote rural areas are also often the most neglected by waste management services (e.g., due to financial and geographical constraints). Low-income countries tend to collect, on average, only about 48 and 26 per cent of the waste in cities and rural areas, respectively (Kaza et al., 2018). Because of the lack of waste collection schemes in many rural areas, household and industrial garbage often ends up in dumps in the wilderness and subject to open burning practices, which cause considerable air pollution.

Current agricultural practices also contribute to air and land pollution. This includes manure and other wastes from farms, poultry houses and slaughterhouses; harvest waste; fertilizer run-off from fields; pesticides that enter into air or soils; and salt and silt drained from fields. Intensive production methods and the growing concentrations of animals have also contributed to increased waste pollution in many rural areas, leading to nutrient depletion and soil degradation. The indiscriminate use of pesticides and burning of wheat and paddy straw, also contribute to the rising levels of air pollution in rural areas. Sugar cane farmers without access to heavy machinery, for example, burn the crop just before harvest. This makes it easier to harvest the sugar cane crop and clear the weeds, but can be a major cause of rural air pollution, as is the case in Thailand and the Mekong region.

Despoliation of the rural landscape

The construction of infrastructure such as roads, electricity and water supply in rural areas often causes irreplaceable loss to natural and cultural sites. Many such projects have been constructed without adequate attention to the impact on the rural landscape. As a result, *pristine* natural landscapes are becoming increasingly rare. The design of many infrastructure projects is also often heavily focused on functionality, utility and efficiency, with resulting despoliation of the rural landscape. In addition, in many countries, dams are being built without due regard to the preservation of the original landscape. The construction of dams for hydroelectric power generation and for irrigation of agricultural land has thus often left behind large areas where the ground surface has been disfigured, contributing to land erosion and climate change.

The increasing sprawl of both rural and urban settlements has implications for the natural rural landscape. The rapid urban growth and sprawl have direct impact on the rural landscape by turning pristine and fertile lands into settlements, often encroaching on critical ecosystems like wetlands and forest habitats. Rural settlement projects are also driving changes to the natural landscape and generating deforestation.

In many European countries, the long-term discussion on the impact of roads and hydropower projects on the rural landscape is now shifting to the negative aesthetic effects of windfarms. Wind energy projects are sometimes promoted as a part of a rural development strategy to provide new jobs and additional revenue for farmers, while simultaneously increasing the local tax base. While wind power can generate economic benefits for rural areas and is likely to play an important role in the global renewable energy mix of the future, policies to regulate the construction of windfarms must take into account their impact on the local population, as well as the value of pristine landscapes and wildlife.

Hill cutting and clearing in rural areas is another growing development challenge in many developing countries. Hills are cut and levelled for reasons such as informal settlements, housing projects, farming, industrialization, and for the construction of dams and roads. Hill cutting and clearing of vegetation and forests are often done to promote cultivation of commercial crops such as rubber, pineapples and tea. The

impact of such hill cutting has been the degradation of habitats, ecological imbalances, loss of biodiversity, deforestation and, in some instances, weakening of indigenous cultures and heritage. The nature and lifestyle of the people connected to the hills may thus be under threat from the drastic changes to the balance of their ecosystems.

Towards rural development strategies more conducive to achieving the SDGs

Rural development has had considerable impact on the achievement of many SDGs, as discussed in the previous section. This section focuses on strategies that countries can adopt to help ensure that rural development is more conducive to the protection of the environment and achievement of the SDGs. At the same time, rural development is intrinsically dependent on greater preservation of the environment. The preservation of natural resources is a means to building resilience and sustainability and reducing the vulnerability of rural livelihoods to climate change, pandemics, climate-related natural disasters or extreme weather. The adoption of the various initiatives discussed in this section would signal a marked shift in rural development strategy away from a business-as-usual approach (baseline scenario) to a strong commitment to a sustainable and resilient rural development and the achievement of the SDGs by 2030 (sustainable scenario).

The framework for fostering more sustainable and resilient rural development is organized around significant strengthening in three key areas: water- and land-use technologies, circular and conservation practices, and investment in institutions (table IV.1).

Water- and land-use technologies

Increasing water-use efficiency

Reducing global water demand will require improvements in irrigation efficiency in agriculture. The adoption of modern irrigation and other precision technologies in agriculture can significantly improve water-use efficiency (Rosegrant et al., 2017). However, an increase in water-use efficiency for an individual farmer may not save water in the river basin or the irrigation system. In accordance with this approach, much of the water that is "wasted" by farm-level upstream irrigation is recovered through downstream use of drainage water and recharge of groundwater that can be used for irrigation. There is thus a need to translate improved water-use efficiency at the farm level to the larger basin. For example, introducing appropriate physical controls and incentives on water usage, which could include rationing, quotas, and trading through enforce-

Table IV.1
A portfolio of strategies to foster sustainable rural development

Water and land-use technologies	Circular and conservation practices	Institutions
▸ Drip irrigation	▸ Circular wastewater use	▸ Social institutions (e.g. water user associations)
▸ Precision agriculture	▸ Conservation agriculture	▸ Economic institutions (e.g. water and tenure rights)
▸ Rainwater harvesting	▸ Organic farming	
▸ ICTs for smallholder farms	▸ Rotational livestock grazing	
▸ Crop productivity	▸ Land restoration	
▸ Agricultural intensification	▸ Indigeneous seed banks	
▸ Small-scale hydropower		
▸ Land-use planning		

Source: UN DESA.

ment of water rights, can lead to improved basin-wide water use after the introduction of new technologies.

Irrigation technologies with potential to materially reduce water use include small-scale pumps, solar irrigation pumps, canal lining, drip irrigation and microsprinklers. In the Coimbatore City of India, the use of drip irrigation methods has increased grain yields by almost 30 per cent, while using 27 per cent less water relative to conventional rice production. In the San Joaquin Valley in California, the yield of tomatoes under drip irrigation was about 20 per cent higher than under sprinkler irrigation when a similar volume of water was used (FAO, 2020d). Similarly, water losses in unlined canals are usually high. Lining of canals is a method to reduce water losses due to seepage, which has proved to be efficient and appropriate for smallholder farmers.

Precision farming can greatly improve water-use efficiency, while having other benefits as well, such as better time management and reduced use of chemicals, both of which contribute to healthier crops and better yields, and ultimately to higher productivity and income of farmers, as discussed in chapter 2. In precision agriculture, farmers can optimize returns on inputs while preserving resources by using satellite imagery and advanced sensors, which enable them to decide when to plant and harvest crops. Precision agriculture, however, has mainly been applied in large-scale farming, thus potentially further disadvantaging smallholder farmers due to lack of technology and expertise and high financial start-up costs. It is important to develop precision technologies in agriculture that are suited to smallholder farmers (Rosegrant, 2019).

More widespread application of sensor technologies that measure surface and groundwater levels can also provide local governments and water utility companies with a better picture of the available resources to meet current and projected water demand. In Somalia, a water and land information management project developed by the Food and Agricultural Organization of the United Nations (FAO) is monitoring surface and groundwater levels with a view to promoting more efficient management of water resources. The Africa Regional Data Cube is another recent tool harnessing remote sensing and satellite-based technologies to help Ghana, Kenya, Senegal, Sierra Leone and the United Republic of Tanzania monitor the state of their water resources. In Central Tanzania, a satellite-based data system is used to monitor the impact of droughts on the availability of water resources, including on Lake Sulunga, which many surrounding communities rely on for drinking water, fishing, agriculture, livestock farming and salt production. The use of Earth observation data has made it possible for local governments and the affected communities in the Lake Sulunga area to use the water resources more efficiently.

Box IV.1 discusses the likely state of global water resources by 2030 under both a *baseline* and a *sustainable scenario*. As shown in box IV.1, there is likely to be a significant water deficit by 2030, unless countries make concerted efforts to improve water-use efficiency, particularly in the agricultural sector.

Enhancing water harvesting

While more efficient irrigation will continue to play a key role in increasing agricultural productivity, the harvesting of rainwater also has much potential. Rainwater harvesting involves the collection and storage of this resource, rather than allowing it to run off. The water Johads of India provide an example of a low-cost method to collect rainwater. The technique collects rainwater by placement of thousands of small structures throughout the rural areas, which store excess rainwater from the monsoon months and allow it to slowly percolate into the groundwater during the dry season. In Rajasthan in India, the installation of such harvesting structures brought back water to 1,000 drought-stricken villages, with five rivers that used to run dry but are now flowing again, and groundwater levels rising by an estimated six metres (UNESCO WWAP, 2018).

Tamil Nadu was the first State in India to make rainwater harvesting compulsory for every building to avoid groundwater depletion. The project was launched in 2001 and has been implemented in all rural areas of Tamil Nadu. Posters placed all over the State create public awareness about rainwater harvesting. The rainwater harvesting strategy of Tamil Nadu delivered excellent results within five years, and over time every

BOX IV.1

Depletion of water resources by 2030: a baseline and a sustainable scenario

Global water consumption is now about 4,500 billion m^3, with 70 per cent used by agriculture. Water demand is projected to increase annually by 2 per cent by 2030 (Addams, et al., 2009). The Organisation for Economic Co-operation and Development also estimated in 2012 that water demand could increase by 55 per cent globally between 2000 and 2050. Industrial water demand is likely to grow faster than that for agriculture, although agriculture will remain the largest water user in 2030.

Baseline scenario

Water demand in 2030 is thus projected to be around 6,030 billion m^3, based on 30 per cent growth in agricultural and municipal use and 50 per cent in industry. Figure IV.1.1 shows the baseline scenario for the estimated total water withdrawals from agricultural, industrial and municipal users by 2030. The projected total withdrawals by 2030 will exceed the available water supply, at around 4,400 billion m^3, resulting in a water deficit of around 1,630 billion m^3.

Sustainable scenario

In the sustainable scenario (figure IV.1.1), the focus is on achieving water-use efficiency improvements that exceed the historical trajectory, with a view to reducing total water withdrawals by 2030. Improvement in water-use efficiency in agriculture (WUE agr) is achieved through modernization of irrigation systems, including investment in water delivery infrastructure; enhanced groundwater governance; increased role of farmers in irrigation management (e.g., through water user associations); and more widespread adoption of farm-level irrigation technology. Rosegrant (2020) estimates that such measures can reduce agricultural water use, relative to the above baseline, by 9.5 per cent in 2030, or some 400 billion m^3. Integrated soil and water management measures (ISWM)—which include the benefits of technologies such as no-till agriculture, water harvesting, and integrated soil and water management to increase the water holding capacity of the soil or make precipitation readily available to plant—can save another 1.5 per cent of water use by 2030, compared to the baseline scenario, or 150 billion m^3. Another 250 billion m^3 in water demand can be saved by 2030 by reducing leakage and improving water efficiency in the domestic and

continued >>

State in India has adopted it as a model. The State of Chennai, for example, had a 50 per cent rise in water level in a five-year period and the water quality improved significantly. In Uganda, the high demand for clean drinking water has led many local governments to invest in rainwater harvesting technologies. The uptake of such technology in local communities has been stimulated by the introduction of microfinancing schemes and cost-sharing grants. Apart from promoting rainwater harvesting at offices, schools, hospitals and households, the adoption of other technologies, such as subsurface and sand dams, ponds and floodwater buffering, has been promoted by many local communities in Uganda. Canada is an example of a developed country that has actively encouraged local communities to harvest rainwater for agricultural, industrial and residential use. Rainwater is used for a number of purposes including stormwater reduction, irrigation, laundry and portable toilets. Rainwater harvesting is also the normal practice for most rural households in New Zealand, although the western and southern parts of the country have plentiful rainfall. And, in Bermuda, a law has been established that requires all new construction to include rainwater harvesting.

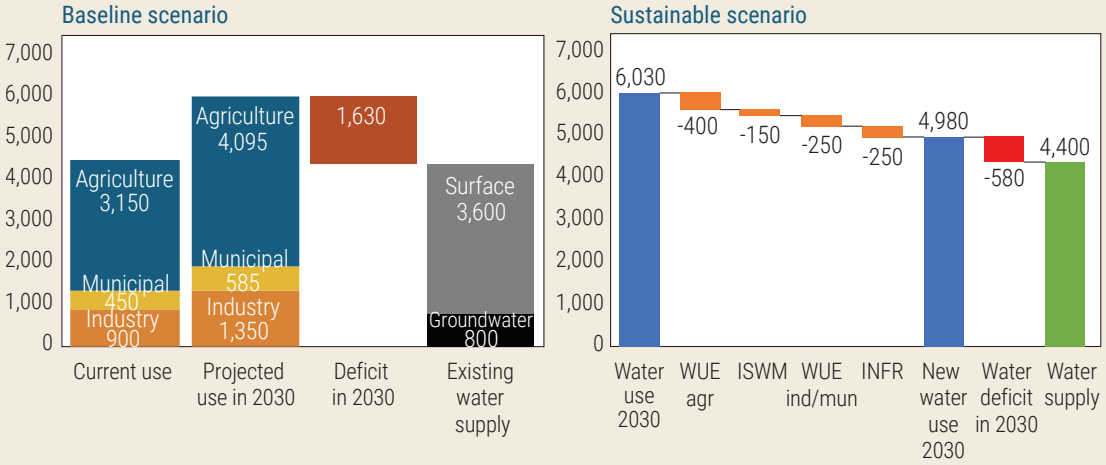
Improving water quality

The rapid growth in agricultural production in recent decades has taken a heavy toll on the environment in many rural areas, especially rivers, lakes and coastal zones, which are often suffering from nutrient, pesticides and soil sediment run-off, as discussed earlier. Various technologies are available to help increase the

BOX IV.1 continued

Figure IV.1.1

Projected water demand, supply and deficit by 2030 (billions of cubic metres)



Source: UN DESA projections, based on Addams et al. (2009), UNESCO WWAP (2019) and OECD (2012).

industrial sectors (e.g., through water recycling and reuse and shift to biomass produced from waste material) or, otherwise, by not having water impacts (WUE ind/mun). Greater reliance on water harvesting, water recycling and other water-related infrastructure (INFR) can also reduce water demand by an estimated 250 billion m^3.

The above measures would reduce the estimated water deficit in 2030 from 1,630 billion m^3 to some 580 billion m^3 (see figure IV.1.1, sustainable scenario). Knowing that water supply has historically increased by around 1 per cent annually, the above measures would help close the water deficit soon after 2030. Otherwise, there is considerable risk that more fossil reserves would need to be depleted, water reserved for environmental needs would be drained, or water demand would go unmet with associated social and economic costs.

Source: UN DESA.

efficiency of fertilizer application in agriculture. This includes conservation tillage practices that help reduce surface run-off, including nitrogen in water bodies. Improved fertilizer management and water-saving irrigation are other source control methods in agriculture. The creation of ecological ditches as part of an irrigation and drainage system can also remove pollutants during the transport of the agricultural run-off. Breeding crops for nitrogen use efficiency, in addition, has shown great promise to reduce water pollution in the agricultural sector.

Technology options for household water treatment in rural areas are generally based on either filtration or disinfection methods. However, few household treatment technologies have so far achieved significant scale in rural areas, particularly in developing countries. In some low-income countries, particularly in South and South-East Asia, commercial water treatment kiosks are reaching a growing number of people. The water treatment kiosks can vend water at low prices and have been shown to reduce the incidence of diarrhea (Sima et al., 2012). However, there is need for increased investment in capacity development and improved financing mechanisms to significantly scale up such commercial water treatment enterprises in developing countries.

Salinity is one of the leading sources of low water quality for irrigation. Salinity from irrigation can occur over time wherever irrigation occurs, since almost all water (even natural rainfall) contains some dissolved salts. When the plants use the water, the salts are left behind in the soil and eventually begin to accumu-

late. Effective salinity control also requires coordination between countries sharing water resources and a combination of agronomic practices that focus on better fertilizer management, improved soil quality and more effective crop management. There are also promising technologies available that, through innovative water treatment, can efficiently reduce salinity in soils and negate the harmful effects of irrigating with saline water.

Water pollution caused by road run-off is a significant problem in many rural areas. Installing effective stormwater control measures, such as constructed wetlands, can reduce the costly impact of such water pollution. The adoption of green infrastructure that is infiltration based can also help maintain or restore the natural hydrology of the watershed. Green infrastructure uses vegetation, soils, and other elements and practices to restore some of the natural processes required to manage water and create healthier rural environments.

Box IV.2 presents both a baseline and a sustainable scenario for significantly reducing water pollution by 2030. The sustainable scenario demonstrates that with significant investments in water and wastewater treatment policies, technologies and management practices, it is possible to achieve major reductions in water pollution and accelerate progress towards SDG 6.3 on water quality by 2030, with positive impact on SDGs related to human health, economic development and aquatic ecosystems.

Promoting sustainable agricultural intensification

There have been substantial benefits from agricultural intensification in terms of feeding the world and reducing hunger and malnutrition. Global production of cereals has increased at a higher rate than the growth of the global population. Countries have raised agricultural output either through land expansion or improvement in yields, or a combination of both. Globally, most of the increase in output stems from increases in yields, which have allowed the "sparing" of land that would otherwise have been converted to agricultural use.

Regions have differed in terms of whether increased agricultural output has been achieved through land expansion or improved yields, as shown in figure IV.12. In South Asia, land use for cereal production has increased by less than 20 per cent since 1961, as yields have more than tripled, which has meant that much more food could be produced without an expansion of the agricultural land. This is in contrast to sub-Saharan Africa where land use for cereal production has more than doubled since 1961, while yields have only increased by 80 per cent. This highlights the potential to improve agricultural yields in sub-Saharan Africa through greater use of fertilizers; improved planting material and breeds; enhanced water management; and better agronomic practices.

Going forward, the demand for food, fibre and fuel, which have been key drivers of increased land use in recent decades, is likely to continue to grow. With the global population projected to increase from 7 billion in 2010 to nearly 10 billion in 2050, and incomes growing across the developing world, overall food demand could rise by more than 50 per cent (WRI, 2019). The rising global demand for food could require the conversion of natural land to cropland ranging between 320 and 850 million hectares, with the higher estimate equivalent to the size of Brazil (UNEP and IRP, 2014). To avoid further shrinkage of forests and wilderness because of the need for further expansion in food production, agricultural intensification and productivity will have to continue to increase. The previous agricultural revolution resulted in rapid productivity growth due to high reliance on chemical inputs and farming practices, such as deep ploughing, which has caused serious problems of topsoil loss. The concept of sustainable agricultural intensification implies that yield gains must not come at the expense of forests, biodiversity or other ecological factors.

Weighing the benefits and downsides of agricultural biotechnology

Rapid advances in biotechnology, especially in genetically modified crops, have also played an important role in agricultural development in recent decades. This has, in some instances, contributed to higher crop

BOX IV.2

Major reduction in water pollution by 2030: a baseline and sustainable scenario

Approximately 650 million people live in areas where water quality risks are high due to elevated levels of biochemical oxygen demand (BOD), and about 1 billion people live in river basins experiencing excessive nitrogen (N) and phosphorous (P) loadings. High BOD levels can indicate contamination with fecal matter, while too much N and P in water equates with pollution. The estimated total annual loadings of BOD, N and P, are 209, 131 and 10 million metric tons, respectively, or 350 million metric tons per year.

Baseline scenario

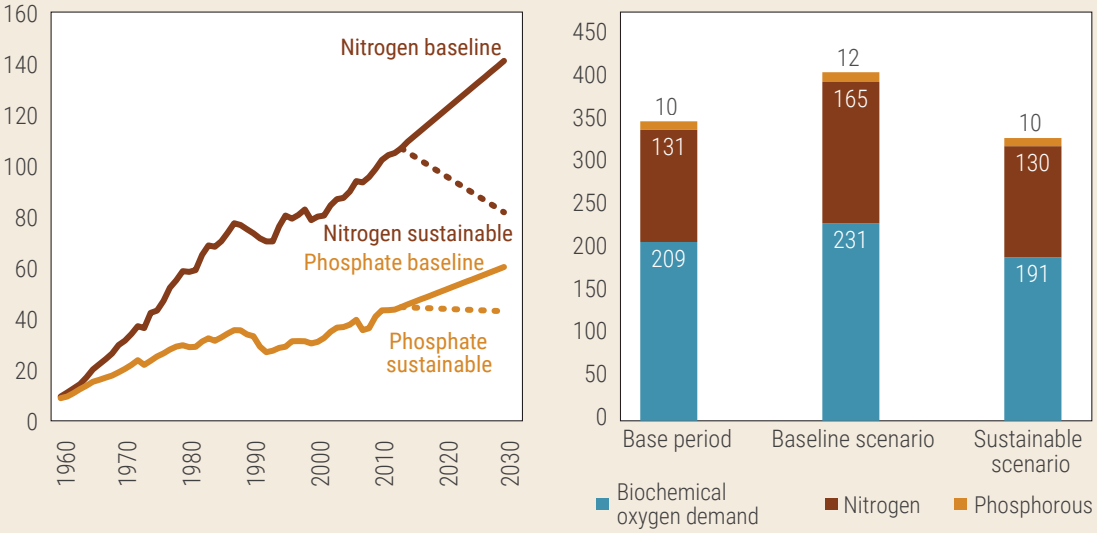
Growing population, income, crop and livestock production, and fertilizer use, are the main drivers of increases in water pollution. Agricultural intensification with extensive use of inorganic fertilizers is regarded as the major source of N and P (Rosegrant, 2020, based on International Food Policy Research Institute and Veolia, 2015), estimates that total annual loadings of the three key water pollutants could reach 409 million metric tons in 2030 (figure IV.2.1), with BOD, N and P increasing to 231, 165 and 11.5 million metric tons, respectively, with 1 in 4 and 1 in 6 people subject to high risk of N and P pollution, on one hand, and BOD, on the other.

Sustainable scenario

In the sustainable scenario, there would be 40 and 24 per cent improvement in N and P use by 2030 in agriculture as the result of increased investment in breeding techniques; adoption of sustainable agricultural methods; advanced irrigation technology; and more effective water management, coupled with several other complementary measures (Rosegrant, 2020). As a result, nitrogen fertilizer consumption in 2030 would decline from 143 million tons in the baseline scenario to 83 million tons in the sustainable scenario, with phosphate consumption reducing from 62 to 45 million tons as well (figure IV.2.1). The sustainable scenario also assumes that all developing countries reach 90

Figure IV.2.1

Projected growth in BOD, N and P by 2030 under baseline and sustainable scenarios (millions of metric tons)



Source: Data from FAOSTAT (2020). Projections by UN DESA based on Rosegrant (2020), Sutton et al. (2013), and IFPRI and Veolia (2015).

continued >>

BOX IV.2 continued

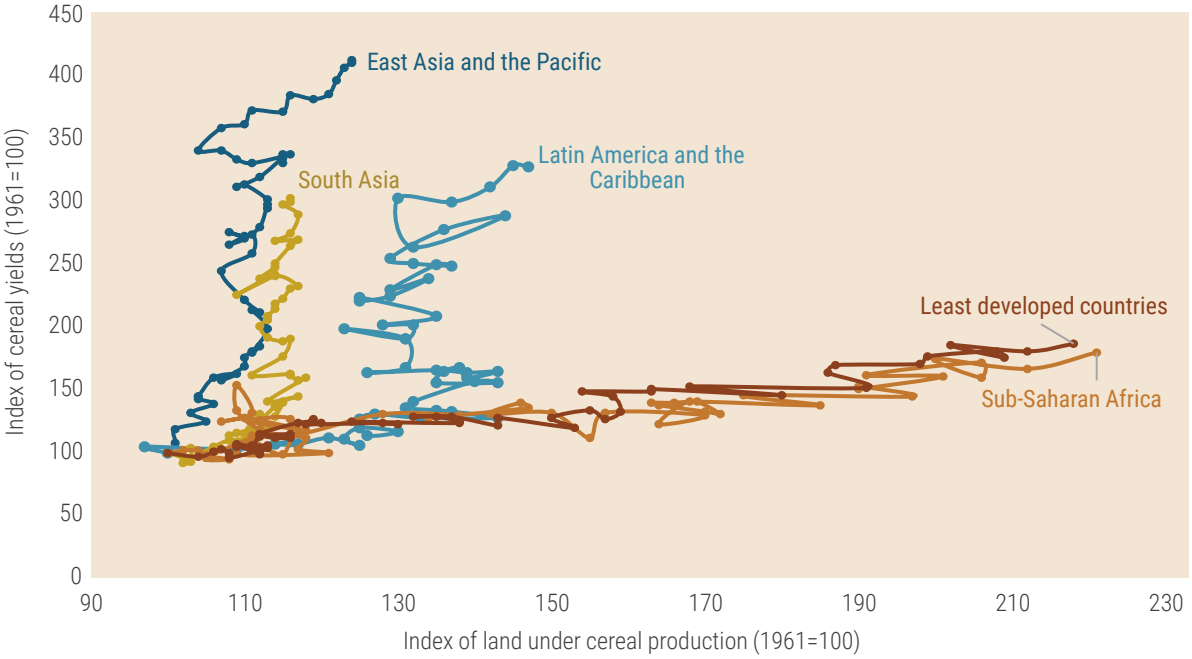
per cent connection to sewerage systems by 2030, with 50 per cent of households receiving primary waste treatment, 30 per cent secondary treatment and 10 per cent tertiary treatment. The reduction in fertilizer consumption, improvements in pollution control and more sustainable water resource management practices would result in projected total loadings of the three pollutants of 331 million metric tons in 2030, or 191, 130 and 9.5 million metric tons of BOD, N and P, respectively. These figures are lower than the corresponding values in the base period.

The sustainable scenario shows that with significant investments in water and waste treatment and improved policies, technologies and management practices, it is possible to achieve major reductions in water pollution, and accelerate progress towards SDG 6.3 on water quality, with positive impact on a range of other SDG related to human health, economic development and aquatic ecosystems.

Source: UN DESA.

Figure IV.12

Interlinkages between land use and yields in different regions



Source: United Nations (2018b).

Note: Figure IV.12 shows the indexed change in land area used for cereal production from 1961–2014 (on the y-axis), measured against the indexed change in cereal yield over the same period (on the x-axis).

yields; lower pesticide and fertilizer application; less demanding production techniques; and more nutritious staple foods. Improved productivity from genetically modified crops can thus contribute to less expansion of land for agricultural production and reduced pollution from excessive fertilizer use. A prominent example is how genetically modified cotton in India has been beneficial to most farmers by contributing to increased profits and yields, while reducing pesticide use (Raman, 2017).

However, these benefits must be weighed against the environmental concerns regarding genetically modified crops, which are manifold. Environmental risks include genetic pollution, effect on non-target organisms, evolution of resistance, and loss of biodiversity. The replacement of local varieties with genetically mod-

ified ones has contributed to genetic erosion, which threatens plant genetic diversity. Only approximately 170 crops are currently grown at commercially significant scale and the majority of the nutrient and calorie uptake is limited to about 30 crops. For example, more than 40 per cent of daily calories come from three staple crops: rice, wheat and maize. As a result, roughly three-quarters of the crop genetic diversity has been lost as farmers have switched to genetically modified crops and abandoned local varieties (FAO, 2013). Genetically modified crops have also evoked a range of social, economic and ethical concerns such as loss of traditions, private sector monopoly and loss of income of resource-poor farmers (FAO, 2012).

Making smallholder farming more sustainable through the application of technology

Smallholder and family farms account for a significant share of the global food production. Major improvement in the productivity of smallholder farmers, particularly in low-income countries, will require enhanced adoption of new technologies. The new technologies at the same time must contribute to better performance on various sustainability metrics.

A number of information and communications technologies (ICTs) have recently been developed to enhance the productivity of small-scale farmers in a sustainable way, including

- ***Zenvus***, a Nigerian precision farming start-up, measures and analyses soil data including temperature, nutrients, and vegetative health to help farmers apply the right amount of fertilizer and optimally irrigate their farms. Zenvus seeks to improve farm productivity and reduce waste of water and fertilizer by using analytics to enable data-driven practices by small-scale farmers;
- ***UjuziKilimo***, a Kenyan start-up, uses big data and analytics capabilities to transform farmers into knowledge-based communities with the goal of improving productivity by adjusting irrigation.;
- ***SunCulture***, another Kenya company has developed drip irrigation kits that use solar energy to pump water from any source, with a view to making irrigation more affordable;
- ***FruitLook***, developed by a South African company, helps fruit and grape farmers in the Western Cape to become water efficient and climate-smart;
- ***Chameleon and Wetting Front Detector Sensors*** have enabled small-scale farmers in Mozambique, the United Republic of Tanzania and Zimbabwe, to cut irrigation frequency and double the productivity of water use.

Promoting clean energy by investing in small-scale hydropower

Investment in energy is essential for small farmers in developing countries. Energy is needed to pump and distribute water from ground and surface sources in the field, and for many applications in the agricultural value chain. Hydropower is a renewable and clean energy source (SDG 7). But expansion of hydropower from dams can create other environmental challenges, such as forcing the resettlement of the rural population, flooding biodiversity hotspots, disrupting river systems and blocking the migration of wildlife. Growing water stress and scarcity are also affecting the functioning of hydroelectric plants in various regions. For hydropower plants to be truly sustainable, the construction of such infrastructure must consider and address these environmental issues. Small-scale hydropower plants, as an alternative to large hydropower dams, can also be designed to run "in-river" (rather than constructing new storage facilities), which is considered more environmentally friendly because it does not interfere with the flow of the river.

Improving land-use planning

Innovations in remote sensing and high-resolution technologies, along with computer modelling, is making it possible for rural planners to better assess the environmental impact of different agricultural and human settlement strategies. Through the application of such technologies, local authorities can better deal with the challenges of depletion, degradation and pollution of water and land resources. The growing availability of affordable remote sensing technologies

also allows rural planners to use high-resolution topographical and hydrological data in the design and construction of roads with a view to reducing soil erosion or encroachment on critical habitats. In addition, land-use planning methods can help ensure that road and market infrastructure is designed in a way to facilitate the most efficient connection between rural producers and consumers in urban areas.

The availability of rural services often plays a pivotal role in the decision-making of farmers and other businesses regarding whether to adopt improved land management technologies and participate in markets. The most critical rural services, in terms of direct impact on agriculture, include all-weather roads, extension and veterinary services, market infrastructure, water, access to credit, and communications infrastructure. Access to markets, for example, has been found to increase investment in grazing land improvement in Africa (Kihiu and Amuakwa-Mensah, 2017). The decisions of landowners to improve the land are also generally driven by their expected return on investment. Remunerative returns are enhanced when producers have easy access to markets to buy inputs and sell their produce. Poor market access increases transaction costs and lowers the returns and is thus likely to reduce the incentives of smallholder farmers to invest in land improvement.

Circular and conservation practices

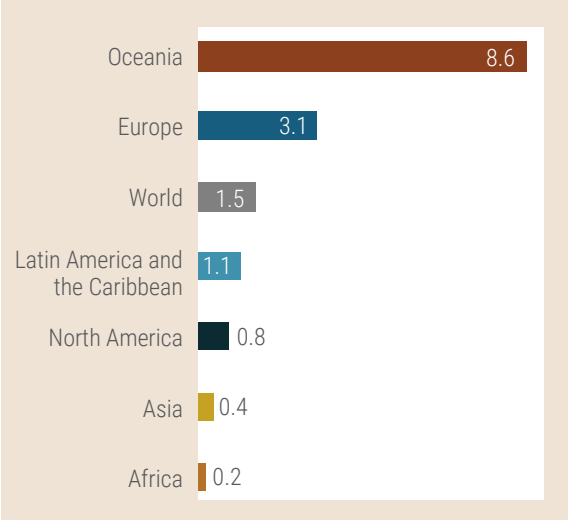
Scaling up organic farming

A shift to organic farming offers an increasingly viable approach to strengthening the sustainability of agriculture. Organic farming has lower environmental impact than conventional agriculture. Organic farming minimizes inputs by focusing on the use of legumes, green manures, crop rotation and organic fertilization, with a view to increasing soil organic matter, maintaining soil quality, reducing groundwater pollution, delivering greater ecosystem services, and protecting biodiversity. Some 1.5 per cent of the global agricultural land is currently cultivated in an organic manner. The highest

Figure IV.13

Organic share of total agricultural land, 2018

Percentage



Source: Willer et al. (2020).

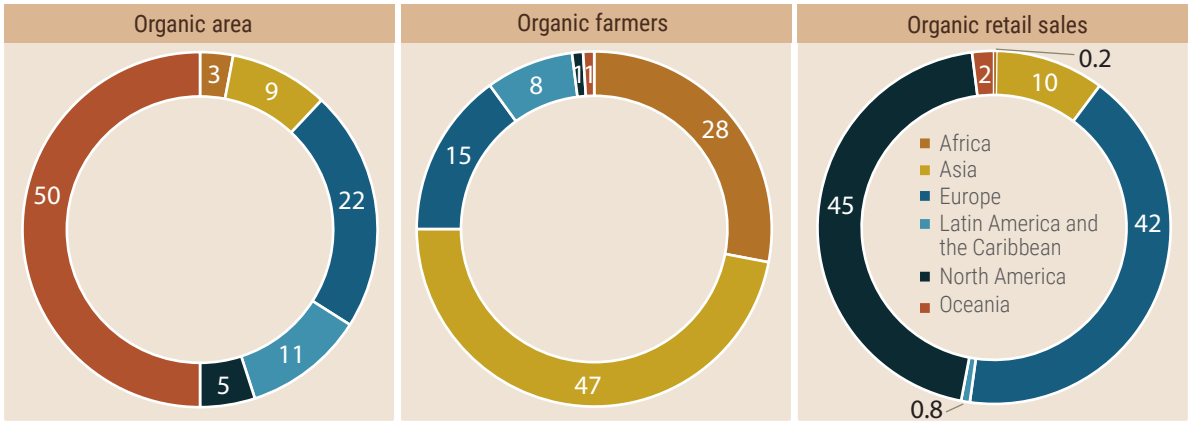
organic share of the total agricultural land, by region, is in Oceania (8.6 per cent) and the European Union (7.7 per cent) (figure IV.13). Australia was an early adopter of organic agriculture and is now the country with the largest certified organic area, nearly 23 million hectares. Organic agricultural land has increased more than sixfold since 1999, reaching 71.5 million hectares in 2018.[3]

While the largest share of the global demand for organic agricultural produce is in developed countries, almost 90 per cent of organic farmers live in developing countries in Asia, Africa, and Latin America and the Caribbean. The countries with the largest number of organic farmers are India (0.6 million), Ethiopia (0.2 million), and Mexico (0.2 million). The largest organic markets in terms of retails sales are Europe and North America (figure IV.14).

While conventional agriculture has historically produced higher yields than organic farming, the deple-

3 Smallholder farmers in many low-income countries also practice organic farming as crops are grown with no external inputs. In Uganda, only 5 per cent of farmers use fertilizer. However, this is seldom certified and thus often not classified as organic farming.

Figure IV.14
Share of global organic area, farmers and sales, 2018
Percentage



Source: Willer et al. (2020).

tion of the soil quality has reduced this advantage over time. Crop yields in organic farming have also increased significantly, which has narrowed the gap between the two methods. Under certain conditions and management practices and for crop groups such as rice, soybean, corn and grass clover, organic farming has come close to matching conventional agricultural systems in terms of yields and land requirements (Reganold and Wachter, 2016).

Organically managed farms have also been shown to produce higher yields than those relying on conventional methods in some context—for example, where there is greater risk of drought. Techniques such as rotational farming, cover cropping, multi-cropping, and polyculture in organic systems further reduce the yield and land-use difference (Ponisio et al., 2015). Conventional farming systems have provided growing supplies of food, but their negative externalities have not been properly accounted for when compared against organic agriculture. This has made it difficult to compare the total environmental impact of conventional and organic farming practices.

In terms of rural development and structural transformation, an issue discussed in chapter 2, one of the successes of conventional agriculture has been its ability to produce more with less labour, which has enabled surplus workers to move to other productive sectors. Organic farming, on the other hand, is typically more labour intensive, thereby absorbing more workers and furthering social inclusion and creating sustainable economic opportunities.

There are still considerable obstacles to the adoption of organic farming practices presented by vested interests and existing policies; lack of information and knowledge; weak infrastructure; and other economic challenges, as well as misconceptions and cultural biases. Weak certification institutions in developing countries also often do not capture the share of smallholder farmers practicing organic farming. Agricultural companies enjoying a high share of food markets have an interest in maintaining the conventional model. Organic farming has also been subject to less public and private research and investment than conventional practices, especially in developing countries. To scale up the role of organic agriculture in food production, the factors limiting organic yields need to be more fully understood and addressed. Also, scaling up organic farming without expanding arable land, could require a change in food consumption behaviour, including a shift in diets and reduced food waste.

Nonetheless, some countries have already set ambitious goals for developing organic agriculture. Bhutan has set the goal of becoming the world's first 100 per cent organic nation. Sikkim, a State in north-eastern India managed to go 100 per cent organic in 2016 by implementing a phase out of chemical

fertilizers and pesticides, as well as a total ban on the sale and use of chemical pesticides. Denmark adopted an action plan in 2010 to encourage organic farming and consumption and has the highest market share of such products in the world at 10 per cent, with almost 80 per cent of the population purchasing organic food. Austria, as part of its strategy to protect biodiversity in rural areas, has focused on creating incentives for farmers to practice organic agriculture (ELCI, 2002). This agricultural strategy has not only been successful in terms of preserving biodiversity, but strengthened Austria's attraction as a tourist destination as well. In Germany, the provision of subsidies to encourage organic farming has played an important role in fostering the growth of this sector (Brenes-Muñoz, Lakner and Brümmer, 2016).

Box IV.3 presents both a *baseline* and a *sustainable scenario* for making food and agricultural systems more sustainable by 2030, based on work by the FAO. While there are significant limitations and uncertainties associated with this approach, the scenarios provide a globally comprehensive and consistent foresight exercise on food and agricultural systems. As shown in box IV.3, it will not be necessary to substantially increase agricultural production by 2030 in order to meet the SDG targets for ending hunger and achieving food security. These targets can be met with modest expansion of agricultural output, as long as agricultural

BOX IV.3

Achieving sustainable agriculture and food security by 2030: a baseline and a sustainable scenario

Globally, agricultural systems are facing many challenges, such as providing sufficient food and other agricultural products to meet a growing demand; eradicating hunger and food insecurity; enhancing the productivity and sustainable use of natural resources; and responding to the impact of climate change. The Food and Agricultural Organization of the United Nations has extensively studied what changes are required to food and agricultural systems to end hunger and food insecurity by 2030 in a sustainable way.

Baseline scenario

In the baseline scenario, there is limited innovation in production processes and little progress towards sustainability, including hardly any changes in the energy mix. Lifestyle changes are also minimal. As a result, agricultural CO^2 emissions increase by 16 per cent by 2030, further exacerbating the risk of climate change. The share of arable land is also estimated to increase by 6 per cent by 2030, from 1,600 million hectares in 2012 to 1,703 hectares in 2030. The share of undernourished people in the baseline scenario would decline from around 11 per cent in 2012 to 6.7 per cent in 2030, but this will not be sufficient to reach Sustainable Development Goal (SDG) 2.

Sustainable scenario

In the sustainable scenario, production processes experience a shift towards more sustainable, less resource-intensive technologies in response to changing consumer preferences. There is increase in research, development and innovation in agriculture, including the use of environmentally sound technologies, precision farming and applied robotics. Boosted investment ensures a transition towards a more sustainable use of natural resources and climate change mitigation, and a shift to a "circular" economy. Farmers in countries with sufficient per capita income and adequate public support gradually shift towards more sustainable practices such as conservation agriculture and organic farming. Chemical fertilizer use is also restrained, which favours the adoption of precision and organic agriculture. Consumers receive information on the origin, content, quality and sustainability levels of processed food. As a result, food preferences are assumed to shift to less emphasis on animal-based foods and vegetable oils and fats, creating incentives for farmers to adopt more sustainable farming practices.

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systems become more sustainable and food is more equitably distributed across and within countries.

Promoting smallholder, mixed farming and conservation agriculture

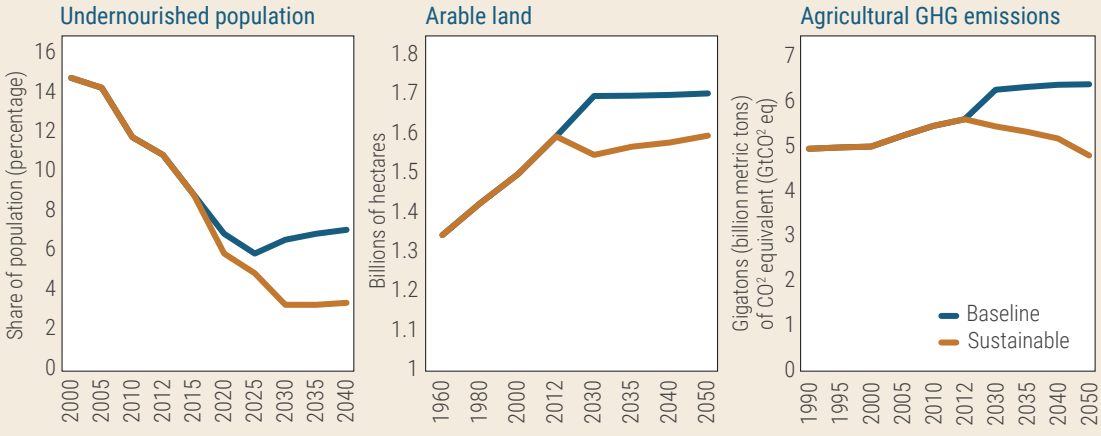
Smallholder agriculture may also be more sustainable than large-scale, mono-crop farming when pursued in combination with the benefits of organic, mixed and circular approaches. Under mixed-farming practices, the waste from one crop is used as a fertilizer for another. Mixed farming also allows for combination of crop cultivation and animal husbandry, so that waste from one can serve as production input for the other. Mixed farming can play an essential role in land management and promote sustainable practices, and the combined production of different crops and legumes can raise yields in a sustainable way. Smallholder farms, for example, are important for maintaining nutrient diversity, as the shift to large-scale industrial agriculture often implies a decline in the diversity of production. Smallholder farmers and indigenous peoples can also play a critical role in the conservation of crop genetic diversity, as local varieties are often more resilient than the modern ones. The adoption of smallholder organic farming, in addition, often has the complementary benefits of ecosystem services in terms of improved soil organic matter, reduced soil erosion and greater biodiversity (Walpole et al., 2013).

BOX IV.3 continued

This makes it possible to reduce global CO^2 emissions from agriculture by 3 per cent by 2030. The share of arable land is also reduced from 1,600 million hectares in 2012 to 1,554 million hectares in 2030, a decrease of 3 per cent. The share of undernourished people is more than halved compared to 2012 and reduced to 3.4 per cent of the global population by 2030. It is thus possible to achieve a strong reduction in the number of undernourished people without expanding arable land while also lowering CO^2 emissions. In sum, it will not be necessary to substantially increase agricultural production by 2030 in order to meet the SDG targets for ending hunger and achieving food security. These targets can be met with modest expansion of farming output as long as agricultural systems become more sustainable, and food is more equitably distributed across and within countries. The shift to sustainable food and agricultural systems thus constitutes a pathway for ending hunger and food insecurity by 2030 with potential impact across the entire SDG agenda.

Figure IV.3.1

Projections for baseline and towards sustainability scenario, varying time periods



Source: UN DESA, based on data from FAO (2018b).

Conservation agriculture is another alternative approach to conventional farming that aims to foster a more balanced use of land resources. While similar to organic farming in many ways, conservation agriculture is based on the principle of minimum mechanical soil disturbance. Conservation agriculture increases soil organic matter and soil fertility in general, and can reduce soil erosion by up to 75 per cent on gently sloping soils (Panagos et al., 2018). Agroforestry practices can help smallholder farmers overcome some of the barriers to conservation agriculture. In Zambia, the integration of nitrogen-fixing trees and maize has reduced the need for fertilizers. In China, conservation agriculture has contributed to yield increases from 2 to 8 per cent for wheat, maize and rice. In India, this practice has substantially reduced production costs for farmers and increased irrigation water productivity (FAO, 2020d). Conservation agriculture has expanded rapidly, reaching about 180 million hectares across 79 countries in 2018, an increase of approximately 69 per cent globally since 2008–2009 (Kassam, Friedrich and Derepsch, 2019).

Increasing wastewater recycling and use

Reusing wastewater for both municipal and agricultural purposes means less pollution, more conservation, and additional resources for recharging aquifers. The use of treated wastewater for peri-urban irrigation has the most potential in rural towns and villages, where wastewater is more easily available and there is a market for agricultural produce. If adequately treated and safely applied, wastewater is a valuable source of both water and nutrients, contributing to food and nutrition security and the improvement of livelihoods.

Municipal wastewater accounts for the majority of wastewater used in agriculture. Such use is common in many countries of the Middle-East and North Africa as well as in Australia, China, Mexico, and the United States. In 2013, 71 per cent of the wastewater collected in the Arab States was safely treated, of which 21 per cent was used for irrigation and groundwater recharge. Municipal water demand corresponds to 11 per cent of global water withdrawals, of which only 3 per cent is consumed and the remaining 8 per cent is discharged as wastewater. If used in agriculture, such wastewater could potentially irrigate 40 million hectares or 15 per cent of all irrigated land (Mateo-Sagasta, Raschid-Sally and Thebo, 2015). Agricultural drainage and wastewater also account for 32 per cent of water withdrawals, a much larger share than municipal use. These figures show the enormous potential for increasing water recycling of municipal and agricultural wastewater.

Whereas public health and safety concerns have traditionally been the main reason for public resistance to wastewater use, cultural aspects and consumer behaviour appear to be the overriding factors today, even if the reclaimed water resulting from advanced treatment processes is safe (UNESCO WWAP, 2017). Awareness-raising and education are important tools to overcome social, cultural and consumer barriers and to contribute to building trust among consumers and changing public perception about wastewater use. In Singapore, a comprehensive educational and awareness campaign branding reclaimed water as "NEWater" increased social acceptance regarding wastewater use.

Large-scale recycling plants tend to be energy intensive and produce sludge that is sometimes difficult to discard. Newer technologies may be able to alleviate these problems by developing new sludge by-products that move towards recycling at net zero energy cost by capturing biogas. Biogas, a by-product of the treatment process, could then be captured and used to offset the energy consumption of the facility. These advances offer new opportunities not just to close the water cycle, but also to reduce carbon emissions, energy costs, and environmental contaminants.

The use of ICTs like smart meters can also help reduce water consumption and waste at the household and community level and improve the treatment and recycling of wastewater. The use of telephone applications and text messages to alert local latrine emptying services can also help ensure that such waste is properly discarded for people living in informal settlements in rural areas with no connection to sewerage networks (Ryder, 2018).

Shifting to more sustainable livestock management practices

Livestock production systems contribute significantly to total greenhouse gas emissions and land degradation. Multi-pronged approaches are required to address such emissions and environmental pollution from livestock. Breeding programmes have generated animal breeds with up to 20 per cent less methane emissions (González-Recio et al., 2020). Increasing feed conversion efficiency and improved livestock solid waste management, can also contribute to reducing CO^2 emissions and environmental pollution. A low-cost strategy to addressing the problem of land degradation is to increase rotational livestock grazing (Bogaerts et al., 2017). Soil carbon stored in rotational grazing plots is 19 per cent higher than on continuously grazed plots. Rotational grazing also increases soil carbon by 25 per cent and is often feasible in dry areas with expansive rangelands (Byrnes et al., 2018). Rotational grazing, however, is becoming less amenable in mixed crop-livestock systems and in areas with high human population density.

Investing in land restoration and reforestation

Land restoration can raise groundwater levels, increase crop yields, and induce positive changes in the fauna of the respective region (United Nations, 2019a). It is estimated that roughly 40 per cent of the currently degraded land has the potential for restoration at low cost (UNEP and International Resource Panel, 2014). In Europe, it has been observed that reduced tillage plots can increase topsoil organic matter and microbial biomass by 25 and 32 per cent, respectively, compared to the conventional approach (Krauss et al., 2020). Soil organic matter is one of the indicators used by the United Nations Convention to Combat Desertification to monitor achievement of SDG 15.3 (land degradation). Low-cost soil fertility management techniques have also been found to work in low-income countries experiencing high loss of soil organic matter (Zomer et al., 2017).

Addressing deforestation and forest degradation requires tree-planting and protection programmes. Farmer-managed natural regeneration, tree planting and protection, have been used successfully on agricultural lands in the drylands of the Sahelian region. These practices reduce soil erosion, increase soil carbon, soil fertility and provide solid bioenergy and other non-timber forest products for poor households. In tree-planting programmes, native trees have proven to have higher survival rate and more resilience than exotic trees (Hänke et al., 2016). Using native trees avoids the risk of disrupting local ecosystems. Trees with multiple functions are also more likely to be widely adopted than single-purpose trees (Benz et al., 2020).

The COVID-19 recovery process could accord high priority to ecological investments—such as land restoration, reforestation and revitalization of rural ecosystems—as they can be implemented quickly, have few training requirements, and meet social distancing norms. Many countries have also already planned such projects as part of international agreements on climate change.

Protecting indigenous seed banks

Seed banks developed by farmers and indigenous peoples are an important instrument for protecting and conserving crop genetic diversity. Indigenous communities around the world have been pioneers in preserving traditional agricultural varieties in such seed banks. The seed banks are not only archives containing records of crop genetic diversity, but their use can open up new opportunities to protect the environment and boost food security by developing more resilient, productive and nutritious crops. Given the changing climate, traditional crops can become the key for sustainable food production as local varieties with a high degree of genetic diversity may better withstand and adapt to environmental stress and change. It may thus be critical for sustainable rural development to protect indigenous seed banks and ensure their ability to conserve the local seed collection, as well as to ensure that scientists and farmers have access to seeds, which can foster crop improvement efforts and result in positive ripple effects for food production.

Investment in institutions

Empowering local actors

The perceived inefficiency of large-scale water schemes operated by local and central governments, and the legal, administrative and regulatory challenges of relying on private providers in the water sector, has prompted many countries to strengthen the role of social institutions, such as water-user associations, in the management of water resources, particularly at the local level.

In Europe, water-user associations have a long tradition in water management at the local level. This includes farmers creating water associations to manage irrigation systems. Such associations may collect water tariffs, organize irrigation procedures, control the application of rules, establish sanctions, and deal with the operation and maintenance of the irrigation system. In other regions, such as the Middle-East and Northern Africa, the creation of water associations is a more recent development, generally dating from the 1990s (Kroll, 2002).

Lao Peoples Democratic Republic is an example of a country that has managed to close the rural-urban gap in water and sanitation services by strengthening the involvement of local communities in the management of water resources along with enhanced emphasis on sanitation marketing tools, often in partnership with the private sector. In 2002, only 20 per cent of people in rural areas of Lao Peoples Democratic Republic, compared to 48 per cent in urban centres, had access to basic sanitation; but by 2016, the percentages were 53 and 61 per cent, respectively.

Paraguay is another country that has managed to significantly improve the percentage share of the rural population with access to clean water through institutional reform, from 51 per cent in 2000 to 94 per cent in 2015. The responsibility for water and sanitation in the rural areas of Paraguay was assigned to community associations and subsidies were provided for groups of less than 150 people. Paraguay also placed its sanitation and water agency within the Department of Health, which helped to ensure that access to clean water was defined as a public health priority. In addition, in 2007, the country recognized—in law—that equal access to water of sufficient quantity and quality is a human right, shared by all.

The collective management of communities of forests and wilderness has also shown to be more effective than relying on individuals or central authorities, particularly when it comes to the restoration of degraded forests (Poteete, Janssen and Ostrom, 2010). This suggests that the achievement of SDG 15.2 (sustainable management of forests) may require a stronger mandate to local institutions to manage forests and for rural people to share in the benefits of such resources.

The impact of farmer groups on forest management is often seen to provide evidence for Elinor Ostrom's eight principles for managing common pool resources (Ostrom, 1990; Ostrom, 2008).[4] A recent review by the FAO of community-based forest management also confirms its effectiveness (Gilmour, 2016). Community-based forest management has been increasing in developing countries, but less so in sub-Saharan Africa (figure IV.15), where deforestation has often been more severe due to land and water grabbing for large-scale agriculture and livestock production systems.

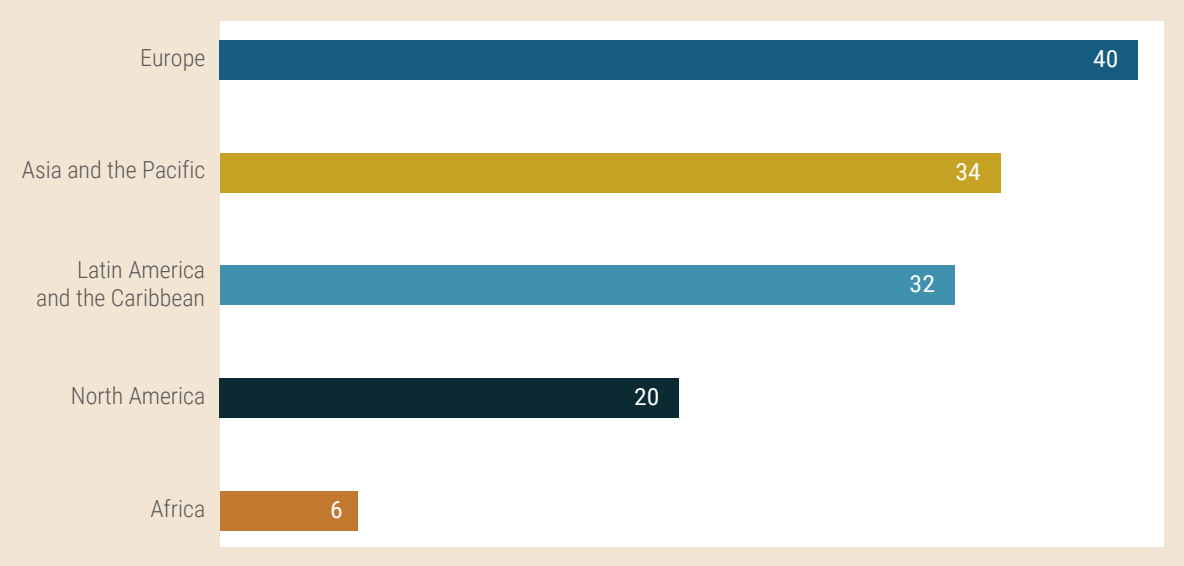
Local and indigenous communities could also play a greater role in addressing forest deforestation. Indigenous communities have been successful when it comes to forest protection. In Bolivia, Brazil and Colombia, the average annual deforestation rates in tenure-secure indigenous lands in 2000–2012 were 2-3 times lower than in similar forests without secure tenure (Ding et al., 2016). Experience also suggests that the conservation of protected biodiversity areas benefits from the adoption of community-based approaches (Buschke, Brownlie and Manuel, 2019).

4 The eight principles are (i) define clear group boundaries; (ii) match rules governing use of common goods to local needs and conditions; (iii) ensure that those affected by the rules can participate in modifying the rules; (iv) make sure the rule-making rights of community members are respected by outside authorities; (v) develop a system, carried out by community members, for monitoring members' behaviour; (vi) use graduated sanctions for rule violators; (vii) provide accessible, low-cost means for dispute resolution; and (xiii) build responsibility for governing the common resource in nested tiers from the lowest level up to the entire interconnected system.

Figure IV.15

Share of total forest extent owned by communities across regions, 2015

Percentage



Source: Gilmour (2016).

The introduction of market-based strategies, such as biodiversity offsets, have also proven to be effective in expanding and conserving protected areas. Successful biodiversity conservation programmes have generally relied on strong local institutions and financial incentives. Poaching in the Mburo National Park in Uganda, decreased significantly after community-based management was introduced (Ullah and Kim, 2020). Another example comes from the Kruger National Park in South Africa where 25,000 hectares were assigned to a local Makuleke tribal group, which has since managed this area in a sustainable manner (Brockington, Duffy and Igoe, 2008).

In middle- and high-income countries where government capacity is generally strong, local institutions usually play a key role in implementing participatory natural resource management. In the European Union, over 60 per cent of forests are privately owned, but managed under government regulations (EEA, 2016). Despite such high private share of forest ownership, government policies and regulations in Europe have been effective because they were developed with active participation of local communities.

In Eastern and Western African countries, decentralization of authority has fostered greater propensity of local communities to enact natural resource bylaws and regulations than generally is the case with the central government (Nkonya et al., 2015). Compliance with the bylaws and regulations enacted by local councils is also higher than for those established by the central authorities (Nkonya, Pender and Kato, 2008). Furthermore, decisions of farmers to adopt agricultural intensification practices that reduce the demand for land have been found to be positively correlated with the perceived state of local governance (Ceddia et al., 2014).

For example, the 2004 forestry law in Niger gave landowners tenure for trees on their farmland. These and other changes improved the ability of the Government to manage forests more effectively than other countries in West Africa (Moussa et al., 2016). The tenure system incentivized landowners to plant and protect trees. The value of timber and non-timber forest products also increased since deforestation created severe shortages (Specht et al., 2015). As a result, there was no longer need for an expensive government programme to implement a tree planting and protection programme (Carey, 2020), yet Niger succeeded in

significantly reducing deforestation. Such institutional changes and incentives contributed to the regreening of the Sahel (Herrmann, Anyamba and Tucker, 2005). The results from Niger demonstrated the key role that incentives play in achieving sustainable forest and tree management even among the poorest landowners.

Capitalizing on the potential of economic instruments

Today, governments in most countries amplify adverse environmental externalities by providing more subsidies to exploit nature than they do to protect it. Direct subsidies that are harmful to biodiversity total about $500 billion per year globally, while financing associated with the conservation and sustainable use of biodiversity amount to some $68 billion annually (Dasgupta, 2021). Policy reforms should include the elimination of perverse subsidies in agriculture, energy and transportation, which damage natural resources and common-pool resources. Removing such harmful subsidies could improve both economic and environmental outcomes. Also, adopting a tax on the extraction of certain natural resources and the disposal of waste to reflect their full costs would increase incentives to recycle and reuse existing materials (UNEP, 2021b).

Since the 1980s, there has been growing interest among policymakers in how economic instruments and institutions can play such an effective coordination role in the area of water resources management. Generalized water, energy and fertilizer subsidies incentivize the overuse of such inputs, with resultant environmental degradation. In addition, subsidies are often ineffective at reaching the poor because they tend to mostly support richer farmers. Such subsidies could be phased down or eliminated with the savings invested in agricultural and water research and development, compensatory income support to small farmers, and targeted smart subsidies to achieve specific water management goals.

The capital intensity and economy of scale of surface water supply often provide a strong rationale for public provision of this resource, whether by a user collective or a monopoly seller such as a utility company. The incentive problem has led some economists to argue for a greater role for economic instruments such as water rights in the management of this scarce resource. A system of water rights can create incentives for improved irrigation management by farmers, including the adoption of more advanced technology. With strong water rights, farmers know they can retain their additional income in the long-term to invest in new irrigation technologies and crop varieties and improved crop management (Rosegrant and Binswanger, 1994).

Some countries have opted to strengthen the role of private providers in the water sector with a view to fostering incentives for greater efficiency and reduction of operating costs. One of the factors driving the argument for a greater role for private providers in the water sector is often the perceived inability of governments to finance the necessary infrastructure, operations and maintenance of water systems. It is recognized at the same time that a greater role of private providers in the water sector requires more effective regulatory and enforcement capacity of governments. It is also important to note that water privatization has gender implications, and rural women might be disadvantaged by such market mechanisms.

Economic instruments can play an important role in furthering sustainable land management. Landowners are generally more likely to invest in long-term land improvement if they have secure tenure (Abdulai, Owusu and Goetz, 2011; de Soto, 2001). A study of Peruvian indigenous communities has shown that giving titles to indigenous people significantly reduces deforestation (Blackman et al., 2017). In many countries, women are without property rights. The recognition of women's land and forest rights could contribute to the fight against deforestation. The definition of secure tenure, at the same time, is contextual. The majority of smallholder farmers in developing countries do not have a formal title, yet they have been observed to invest as much in land improvements as those granted such a right, if they perceive that land ownership is secure (Barrows and Roth, 1990). This suggests that a major driver of long-term investment in land improvement is the perception of land security, regardless of formal titling (Lawry et al., 2014).

In some sub-Saharan African countries, farmers have been incentivized to improve soil management through direct subsidies. Governments have also introduced specific subsidies to target poor, smallholder farmers, which has contributed to improved food security (Jayne and Rashid, 2013). Subsidy programmes in the region could be further improved by treating them as payment for ecosystem services. The subsidies could, for example, be paid on the condition that farmers adopt an easily verifiable organic soil fertility management practice, which sequesters a certain amount of carbon. Such conditional fertilizer subsidies have been shown to be acceptable to smallholder farmers in Malawi (Marenya, Smith and Nkonya, 2014).

Conclusion and key policy recommendations

The rapid growth that has taken place in agriculture, industry, infrastructure and settlement in rural areas in past decades has resulted in major depletion, degradation and pollution of the environment and natural resources. This chapter particularly calls for more sustainable use and management of water and land resources because of their impact on the achievement of almost all SDGs.

The chapter shows that a business-as-usual approach to water- and land use is not sufficient to achieve the SDGs by 2030. For example, by 2030, an estimated 20 per cent of the global rural population is not likely to have access to basic drinking water (SDG 6.1.1) and 41 per cent could be without access to basic sanitation services (SDG 6.2.1). The population affected by water stress, a significant share of which resides in rural areas, could also increase from 2.5 billion to 3.7 billion people by 2030, despite the projected increase in global water-use efficiency (SDG 6.4.1).

With water demand estimated to increase to about 6,000 billion m^3 by 2030, the world is likely to experience a significant water deficit. The share of people exposed to high water pollution is also projected to increase significantly if the current patterns in chemical fertilizer use are not modified. Some 38 per cent of biodiversity could similarly be lost by 2030 because of the impact of agricultural and industrial activities and climate change (SDG 15.5). It is also predicted that about 95 per cent of the Earth's land areas could become degraded by 2050, and the world could run out of topsoil in 60 years, unless there is a major change in the current rural development strategy (SDG 15.3). Furthermore, food-related CO^2 emissions alone—which are projected to double by 2050 without changes to current foods systems and consumption and production patterns—could result in the global average temperature rising 1.5 and 2.0 degrees Celsius by 2050 and 2100, respectively (SDG 13).

The chapter has proposed a sustainable scenario as an alternative to the business-as-usual approach, which involves the adoption of a strategic portfolio of initiatives aimed at significantly improving the performance of the water sector and achieving land neutrality by 2030. If successfully implemented, this portfolio of initiatives focused on new investment in water- and land-use technologies, greater application of circular and conservation practices, and renewed efforts to strengthen institutions and incentives, could help ensure food and water security in rural areas, and the achievement of the respective SDGs by 2030. This shift in rural development strategy must also be accompanied by changes in food consumption and production patterns in both rural and urban areas, including a shift in diets and a reduction in food waste.

In the ***agricultural sector***, it will be important to select technologies on the basis of their effectiveness in contributing to both productivity growth and environmental sustainability. The introduction of advanced technologies such as drip and sprinkler irrigation, precision farming, ICTs and remote sensing, could contribute to increased income of farmers from higher value crops, enhanced convenience in farming operations, reduced labour use, lower pumping costs and enhanced water savings. The adoption of integrated soil fertility management and agroforestry practices could also contribute to enhanced agricultural productivity and lower the use of inorganic fertilizers. Conservation and organic farming, furthermore, offers many environmental benefits in terms of reduced CO^2 emissions and the rejuvenation of soil quality. Other

measures such as increased research on crops that use less chemicals like nitrogen and phosphorous; modernization of irrigation systems; and development of precision technologies suited to smallholder farmers in developing countries, would also be important to ensure that agriculture is effectively aligned with planetary boundaries. Furthermore, countries could consider establishing a global target for halting the expansion of croplands at the expense of grasslands, savannahs and forests.

Industries and services account for significant resource extraction in rural areas and this sector needs considerable environmental sustainability improvements. There is need to diversify from agriculture and further expand non-farm activities in rural areas, as discussed in Chapter 2. If done in a coordinated way, this could be a win-win strategy by reducing the pressure on land and water, creating employment and reducing post-harvest losses. This will require new investments in the expansion of water supply and connectivity, including putting in place incentives for more efficient water use and cost recovery. The strengthening of wastewater collection and treatment is particularly critical to reduce pollutants discharged into the environment in rural areas. Improved management, recycling and use of wastewater also requires new investment in treatment facilities combined with better regulation of pollution and taxes on polluters. In sum, there is much need to accelerate the adoption of circular approaches in the industry and services sector.

The greening of ***settlements and infrastructure*** could also be accorded high priority in rural areas. This could include further institutionalizing sustainability considerations in rural development planning. Greater participation of stakeholders in rural development planning is also likely to result in enhanced public demand for the greening of infrastructure and settlement projects. ICTs and remote sensing, furthermore, are new tools that can improve the participation of young people and vulnerable groups in shaping the future of rural areas and communities. There is also significant potential in rural settlements to increase the use of small-scale technology such as standpipes, water kiosks, and household-based water filters and purification devices to improve wastewater collection and treatment. Another priority in rural settlements could be to climate-proof infrastructure, e.g., by changing the composition of road surfaces so that they do not deform in high temperatures and cause run-off during the rainy season. The use of small-scale hydropower plants could also be scaled-up in many rural areas.

Chapter V

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Policy recommendations

The preceding chapters of *World Social Report 2021* have discussed the role of rural development in achieving the Sustainable Development Goals (SDGs) from economic, social and environmental perspectives, and offered conclusions and policy recommendations. The goal of this concluding chapter is to bring these together, taking note of the potential synergies among them and the nexus role of some of them. The policy recommendations are grouped into three parts. The first comprises strategic principles that are needed for successful rural development. The second includes programmes and policies that impact more than one dimension of sustainable development. The third covers sectoral policies that are directly relevant for a particular dimension of sustainable development. Reflecting the three dimensions of sustainable development, the sectoral policies are grouped under three categories, pertaining to (i) growth and balanced settlement; (ii) poverty and inequality; and (iii) protection of environment. Together, these principles, programmes and sectoral policies can help countries to achieve sustainable rural development that leads to the SDGs.

Elements of overall rural development strategy

Assigning an active and preceding role to rural development

In countries with large rural populations, rural development needs to be viewed as an active driver of national development. Productivity growth in agriculture releases labour and other resources to the other sectors while maintaining the required food supply for urban population growth. The experience of the early and newly industrialized countries points to a *preceding* role of rural development, in which a productivity increase in agriculture in rural areas leads the industrial and overall development. The experience of the Green Revolution in the 1960s also shows that growth in agricultural productivity can be an autonomous process and force. It would therefore be a mistake to consider the historical evidence on structural transformation to mean that rural development is only a subsequent outcome of urban growth. Instead, policymakers need to pay attention to the beginning of the processes that led other countries to industrialize rapidly, identify the forces that led to the successful end results, and draw lessons from them. For agriculture, this means policies that (i) increase agricultural yields and productivity; (ii) provide better and more stable prices of inputs and outputs; (iii) open new domestic and international markets; (iv) expand non-farm rural economies that produce much needed goods and services; and (v) provide more and better earning opportunities.

Recognizing the key role of rural development in protection of the environment

Rural development demands more attention from policymakers, not only because of the necessity for improving the material standard of living of rural populations, but also because rural development has a key role in the protection of the environment. Most of the natural capital of a country is located in rural areas, and agriculture—generally the predominant economic activity of the rural population—is intimately connected with nature, both depending and having impact on it. Rural development therefore requires more attention from policymakers, both for achieving the socioeconomic SDGs as well as those related to the health of the planet.

More attention to the protection of forests and wilderness is also warranted in order to prevent frequent occurrences of zoonotic epidemics and pandemics, such as the world is currently experiencing with COVID-19. The possibility of such an event as this shows that rural development demands the attention of policymakers in not only developing countries but developed countries as well. Clearly, the importance of rural development in the protection of the environment does not diminish simply because the share of population living in rural areas is lower.

Recognizing the changing role of rural development in the age of the fourth industrial revolution

Policymakers need to adopt a forward-looking approach and view rural development from the perspective of the fourth industrial revolution that is now in progress. They need to be aware that the technologies of the fourth industrial revolution are changing the context of rural development fundamentally, thereby creating new opportunities. The information and communications technologies (ICT) revolution and the spread of digital technologies are rapidly undercutting the material basis for the rural-urban divide. Economic activities that once were thought to be the exclusive province of urban areas can now be easily carried out from rural locations. The COVID-19 experience, although tragic overall, has accelerated this process. Digital methods of communication have put rural and urban residents on equal ground regarding everything that can be delivered digitally, including education, health, various public services and cultural amenities. In addition, new technologies, such as 3D printing, are converting manufacturing into boutique activities that can be carried out in rural areas too.

Shrinkage of the rural population is thus no longer required for development, allowing new scope to reconsider what constitutes optimal rural-urban combination. Policymakers need to be aware of these transformational changes, and to make sure that rural populations in their countries have the wherewithal to adopt and make use of these new technologies, and therefore do not fall behind.

Adopting in situ urbanization as the model of rural development

More attention needs to be given to the in situ urbanization as a model of rural development. Unlike the classical and greenfield urbanization models, the in situ model envisages raising the living standard of the rural population to that of the urban population without migration and loss of the essential characteristic of rural areas (namely, the low density of population). It also helps to avoid such urban ills as slums, squalor and sprawls. Specific versions of the in situ model may however differ, and countries such as China, Japan and Sri Lanka offer examples from which other countries can learn.

Guided approach to optimal spatial rural-urban combination

Models of urbanization and rural development are interdependent. Adopting the guided approach, policymakers can decide what combination of classical, greenfield and in-situ urbanization is optimal for a country and how these can be made more conducive to sustainable development, from both socioeconomic and environmental viewpoints. From the socioeconomic viewpoint, policymakers may guide the process towards a rural-urban spatial configuration in which, on the one hand, rural residents can enjoy income and standards of living similar to that of urban residents, thus feeling less compulsion for migration; on the other hand, migrants do not have to end up in urban slums and squalor. From the environmental viewpoint, policymakers may adopt the guided approach to ensure a rural-urban spatial combination that avoids wasteful urban sprawls and unjustified (when negative externalities are taken into account) expansion of agriculture at the expense of forests and wilderness.

Guided approach towards optimal combination of agricultural models

Guidance from policymakers is also necessary to determine the optimal combination of various agricultural models that is suitable for a particular country, given its resource endowments, institutions and technology. Different agricultural models have their respective strengths and weaknesses regarding economic, social and environmental dimensions of sustainable development. However, both positive and negative externalities associated with different agricultural models are not accurately reflected in the market outcomes. Consequently, market incentives do not always lead to the optimal combination of agricultural models from the viewpoint of sustainability and resilience. Policymakers can study and benefit from international experience in choosing the combination of agricultural models that is most suitable for a country, given its concrete conditions.

Country-specific nature of rural development strategies

Agriculture, the dominant economic activity of rural areas,[1] is more location specific than other types of economic activities. The type of rural-urban spatial combination—to be achieved through classical, greenfield and in-situ urbanization—that is most suitable for a country depends on the per capita land availability and other physical conditions, including the natural resource endowment of a country. Similarly, the choice of agricultural model has to be country specific, depending on its unique conditions, including its history. Thus, while it will be important to learn from both historical and contemporary experiences of other countries, the rural development strategy needs to be country specific (much more so, for example, than a country's industrial strategy).

1 Even off-farm activities significantly depend on what kind of agriculture is practiced in a country.

Cross-cutting programmes

This section summarizes some of the cross-sector programmes that pertain to more than one dimension of sustainability.

Public investment in rural basic infrastructure

One of the important policy recommendations that emerged from chapters II, III, and IV is to ensure that basic infrastructure is in place in rural areas. Basic infrastructure in turn has many components. The two most prominent are (i) reliable transportation (mostly road, rail, and water transportation) and (ii) adequate electricity supply. The public goods nature of transportation and electricity has generally meant that these deserve more public investment than what the market would generate. Although the advent of modular solar and wind power has opened up the possibility for private initiatives regarding electricity, it generally remains an area requiring public investment. Basic infrastructure also includes the provision of clean drinking water and hygienic sanitary facilities, which are also critical for human capital development. While significant advances have been made in these spheres during the past decades, rural areas will not catch up with urban areas by 2030 at the current rate of progress. Hence, a comprehensive public investment programme is needed to overcome the deficiencies that exist in rural basic infrastructure. Progress in this regard can help achieve many SDGs directly, and others indirectly through secondary effects, as discussed in chapters II, III and IV.

Public investment in human capital development in rural areas

In tandem with the public investment in physical infrastructure, a comprehensive investment programme focused on human capital development in rural areas is needed. This includes adequate provision of education, health care and cultural amenities. Positive externalities associated with human capital are more

pronounced than those associated with physical capital. Investment in human capital must also be complemented by incentives to retain talent in rural areas, not only to engage in private economic activities, but also to provide public services to rural people. Priority should be placed on avoiding the "hollowing out" of local government leaders and staff, which would undermine public sector effectiveness, including in delivering basic public services. Public investment in human capital can help achieve SDG 3 (good health and well-being) and SDG 4 (quality education) directly. Availability of educated rural youth is also key for achievement of the economic goal of SDG 8 (decent work and economic growth).

Provision of basic public administrative services

Discussions in the preceding chapters have also stressed the necessity of ensuring the access of rural people to essential public services—often called, collectively, social infrastructure. These include law and order; adjudication and justice; and public administration services. Provision of public services, together with physical infrastructure and human capital development, can provide a conducive environment for the growth of private entrepreneurship and bring about the necessary expansion of the non-farm sector in rural areas, as noted in chapter II.

Promotion of communal management of common property resources

Many natural resources in rural areas—including forests, animal grazing lands, water bodies, and even parts of cultivable land—are under common property jurisdiction. These resources often serve as a source of an important part of the consumption and income of rural people who have few private assets. It is important for policymakers to protect these common property resources from encroachment and privatization. One way to do so is to strengthen communal management of these resources by providing the legal basis and creating necessary institutions. Apart from helping to achieve the social goals of equity, research has shown that, under the right incentive framework, communal management of natural resources can be more effective in protecting them, and thus in ensuring environmental sustainability.

Access to internet and digital technologies and platforms

Ensuring basic physical infrastructure, such as roads and electricity, is no longer enough to achieve successful rural transformation in the current era of digital technologies and the fourth industrial revolution. Adequate access to broadband Internet has become essential, and public initiatives have to play a major role in this regard in most developing countries. One of the success stories of recent technological diffusion is the rapid-fire expansion and adoption of mobile phones by people in developing countries who, in many cases, have leapfrogged over the stage of using landlines and gone directly to using mobile phones. In many cases, this was achieved through private sector initiatives (including initiatives by foreign phone companies). To the extent that most people in developing countries connect to the Internet through their mobile phones, private companies can play an important role in providing Internet services. However, governments still have a critical role to play, both as regulators and investors—for example, in ensuring backbone connectivity through either a submarine cable or satellite connection. Adequate access to broadband Internet is the sine qua non for rural populations to make use of the new technologies of the fourth industrial revolution.

Having considered above the cross-sectoral programmes, it is now possible to turn to the sectoral policies pertaining to particular dimensions of sustainable rural development. These are presented in the next three sections, devoted to issues of (i) growth and balanced settlement; (ii) poverty and inequality; and (iii) environmental protection.

Policies directly addressing issues of inclusive growth and balanced settlement

Discussions in the previous chapters have offered many policy suggestions that pertain directly to the issues of inclusive growth and balanced settlement of the population.

Raising agricultural productivity

Policymakers need to realize that the starting point for rural transformation in most countries is increasing agricultural productivity, primarily as the outcome of private initiatives of farmers. However, public policies and investments have a critical and complementary role to play. Thus, public investment in rural physical and social infrastructure and human capital development can be an important determinant in raising agricultural productivity. Public programmes to improve crop varieties and provide necessary extension services are also important. Other public policies, such as ensuring stable remunerative prices for agricultural output—partly by reducing or eliminating middle interests and instead establishing direct connection between producers/farmers and consumers—can play an important role as well. To the extent that global value chains (GVCs) are expanding in agriculture, and a greater share of agricultural output is produced for export, ensuring stable remunerative prices may also require regional and global cooperation. Public policy can also play an important role in raising agricultural productivity by ensuring the needed financing without leading farmers into debt traps.

Expansion of non-farm activities

If raising agricultural productivity is the first step in successful rural transformation, the second step is translating the productivity growth into expansion of non-farm activities in rural areas. These activities can either be related to agriculture—for example, following its forward and backward linkages—or unrelated to agriculture. Expansion of non-farm activities may primarily be the outcome of private sector initiatives, in which case public policies can play a supportive role through financing, providing information, knowledge, training and administrative support, among others. These policies can also help to recruit the necessary personnel, for example, by encouraging the rural youth to stay and join the non-farm activities instead of migrating to cities where they face an uncertain future. In many countries, the expansion of non-farm activities has been greatly facilitated—initially, at least—by the growth of cooperative enterprises. In those cases, public initiatives, particularly of local governments, have a more direct role. Policymakers need to be aware of these alternatives and choose those that would be the most effective for achieving sustainable development.

Choice of the appropriate spatial model for non-farm activities

Public policies also have an important role in guiding the impact of expansion of non-farm activities on the nature of rural-urban spatial combination. For example, left to itself, this expansion may take the form of greenfield urbanization, under which a rural area loses its basic physical characteristics and becomes inflicted by various urban ills. By contrast, policymakers may guide the process in a way that maintains the general rural nature of the area and thus conform with the in-situ urbanization model of rural development. Guiding the expansion of non-farm activities towards the in situ modernization model can help to achieve environmental goals of rural development also.

Policies for successful rural transformation under global value chains

To ensure that participation in agricultural GVCs would truly contribute to rural transformation, countries need to carefully calibrate their participation based on domestic and external conditions, including factor endowments, institutions, geography and market size. Based on their understanding of these conditions, policymakers need to pursue tailored policies that, among other things, aim to (i) maintain fair valuation of the exchange rate; (ii) expand market access through trade

agreements; (iii) encourage foreign direct investment; (iv) provide a stable and predictable legal environment for business transactions; (v) ensure product compliance with international standards; and (vi) reduce trade costs by improving connectivity and simplifying customs and border procedures.

Creating an enabling trade environment, however, is not sufficient for successful participation of rural economic actors in the GVCs. These economic actors also need to have a practical grasp of their options, required capabilities, and the actions they can take to achieve desirable participation in global production. Rural economic actors are at a particular disadvantage, given their relative lack of access to such information. In developing countries, where rural producers are generally short of resources, Governments must play an active role in providing the necessary information and must help rural producers to find their niche within GVCs and utilize it efficiently.

Policies for successful use of new technologies

The right underlying infrastructure and supportive financial and regulatory environment can help technology serve as a catalyst and accelerant for rural transformation. Infrastructure investment in physical or digital connections, in the form of roads and digital networks, expands the reach of technologies into more remote and rural areas. At the same time, Governments can continue to accelerate their investments in expanding access to electricity, lowering Internet costs, providing education and digital literacy, and implementing regulatory changes to encourage new digital ventures and services.

The new technologies should not crowd out investments for the old. Billions of people are still stuck with pre-industrial technologies, with limited access to the modern education and health systems necessary for accumulating the minimum level of human capital required for adopting many digital technologies. Governments should redouble their investment in lifting these people from the pre-industrial technological level to a level from where they can take advantage of the new digital technologies. Developing the right financing and public-private partnership structures can accelerate investment in providing basic services to those most in need.

Policies directly addressing issues of rural poverty and inequality

Discussions in the previous chapters have offered many policy suggestions that pertain directly to issues of rural poverty and inequality.

Access to land and promotion and support of smallholder agriculture

With agricultural growth being two to three times as effective in reducing poverty as growth in other sectors, one of the important tasks of policymakers is to decide which particular agricultural model(s) to promote. Research has shown that smallholders—many of whom live in poverty and lack access to resources—use more labour per unit of land, so that more land in their hands can create more employment, especially among low-income earners. The experience of successful newly industrial countries shows that equitable initial distribution of land can provide the basis for a broad-based economic growth with desirable socioeconomic outcomes. By contrast, unequal distribution of land concentrates the benefits of increased agricultural productivity growth in the hands of the few, thus widening inequality, hindering broad-based growth, limiting the expansion of domestic demand, and dampening the expansion of non-farm activities. Practicing mixed and organic farming is generally considered easier for smallholders. Thus, the smallholder agricultural model has both socioeconomic and environmental merits for developing countries with limited land and large rural population.

Policymakers may therefore consider land and tenure reform policies that can promote smallholder agriculture. By increasing the security of rights, tenure

reform can encourage investment in land and raise productivity, even in the absence of outright ownership. Policymakers need to devise creative compensation packages that can help to overcome political difficulties, considered to be the most important hurdle to land and tenure reforms; this will also be important for upgrading the technology of smallholder agriculture to the industrial level.

Digitization of land registration

An important step towards progressive land ownership and tenure systems is comprehensive and accurate land registration. Digital technologies have created new opportunities in this regard. Combined with digital mapping, accurate cadastral surveys and land recording and registration can now be conducted faster and with less effort. Digitization of land records can greatly aid transparency and dissemination. Policymakers of all developing countries should take up digitization of land registration as an important and urgent task.

Social protection

Faced with disproportionate levels of poverty, seasonal and informal employment, unsafe working conditions, limited access to markets, lack of access to basic services, and exclusion based on gender, ethnicity and other factors, it is essential for rural people to have access to social protection. However, social protection coverage in rural areas is generally lower than in urban areas and few programmes are explicitly tailored to match rural specificities. There are a number of structural, legal, administrative and financial barriers that must be addressed in order to overcome this disparity. Legal frameworks can be adjusted and expanded, contribution schemes can be modified to account for rural employment types, participation in contributory schemes can be improved through subsidies, and the hidden costs of participation can be lowered.

Social insurance schemes are generally based on contributions, and the benefits are tied to the contributions made. However, there is increasing recognition of the merits of ensuring a universal social protection floor, irrespective of the amount of the contributions. Universal protection floors also avoid the stigma that is often associated with targeted welfare programmes. Universal protection programmes also accord well with the general principle of the 2030 Agenda for Sustainable Development—to leave no one behind.

Special attention to rural women

In most developing countries, rural women play a crucial role in production and output processing activities. In many cases, homesteads are also where a variety of production and output processing operations are conducted, and women take on many of these functions as part of their extended household work. Many women also work outside in the fields and in non-farm activities as hired labour. They need special protection. Ensuring adequate opportunities for education and health for the rural girls can be the starting point of ending gender disparity in rural areas.

Rural women often have limited rights over land and natural resources. In many parts of the world, they still face discrimination in relation to land rights, due to a combination of traditional practices and discriminatory laws. It is vital to ensure rural women's equal access to land and natural resources and address discriminatory laws and practices that impede their rights in this regard. Furthermore, obstacles such as high female illiteracy rates, discriminatory application of laws and inadequate enforcement must also be addressed in order for women to fully exercise their land rights.

Secure and equal access to land is necessary, but it is insufficient by itself to foster the effective use of land by rural women. Rural women also need improved access to other resources, such as credit, technology, extension services and markets. Land reform policies should be complemented by efforts to improve these aspects as well.

Special attention to indigenous peoples

Overcoming the history of marginalization, discrimination and poverty faced by indigenous peoples and

ethnic minority communities requires a broad set of economic and social policies. Education, for example, should be offered to indigenous peoples in their native languages, and should acknowledge and promote their cultural heritage. The design and implementation of social protection programmes should be based on intercultural dialogue and the participation of indigenous peoples and ethnic minority communities in decision-making. The spatial disadvantages of living in remote rural areas can be partially offset by investing in high-quality public services in those areas.

Indigenous peoples are vital partners in achieving the SDGs. Their in-depth understanding of natural cycles, indigenous food systems and traditional knowledge contributes to the protection of biodiversity and the fight against climate change. Their lands and territories are home to a vast biological diversity of species. For indigenous peoples, land is often not seen as a commodity: it is a sacred part of their cultural identity. Most indigenous peoples have land tenure systems based on collective rights, regulated by customary laws and tradition. However, in many parts of the world, these rights are either only partially recognized or not recognized at all by national Governments. A lack of recognition of their customs and how they conceive of territory leads to conflict, marginalization and, ultimately, poverty. To ensure a prosperous future for indigenous peoples, both culturally and economically, secure access to their ancestral lands must be guaranteed.

Special attention to older persons

Policies need to be directed at meeting the needs of older persons living in rural areas. In many countries, old age pension and social security programmes do not encompass the rural areas, so older persons in those areas often have to depend on their children. A particular area in which they need assistance is health care. Even in countries where comprehensive social security programmes may take more time to emerge, Governments need to adopt special policies and programmes to ensure adequate income and health care for the rural elderly.

Special attention to the needs of youth

At the other end of the age spectrum, youth also require special attention. Migration of rural youth to urban areas can result in workforce and talent losses for the rural economy. Fortunately, the Internet has created new possibilities for retaining the youth in rural areas and revitalizing societies. Also, further application of high-end technologies has created the possibility of making agriculture attractive to youth. However, special policies are needed to make use of these possibilities. General policies aimed at provision of electricity, broad-band Internet connection, and others, are important in this regard.

Micro-insurance

Policies promoting micro-insurance can play an important role in protecting rural people from the impact of crop loss due to unexpected weather events and in ensuring minimum income in the event of disabilities and death (for survivors). Weather-indexed crop insurance schemes, based on objective indicators such as deviation of rainfall from the average, have been found to be simpler and less costly than traditional insurance, where losses have to be verified after occurrence. Similarly, micro-insurance aimed at protection against unexpected injury and death can be affordable and effective for many in the rural areas. Policymakers can help to make these effective micro-insurance schemes available for the rural population.

Policies addressing environmental issues

Since most of the natural capital of a country is generally located in the rural areas, rural development has a particular role in protecting the environment. Some of the recommendations that emerged from the analysis in chapter IV and other chapters focus on (a) adoption of technologies to conserve and protect water and land resources; (b) promotion of circular and conservation practices; and (c) strengthening of institutions for natural resource management.

Policymakers have a major role to play in preventing water and land resources from depletion, degradation, and pollution.

Policies for protecting water

- ***More efficient irrigation***. Past policies, particularly heavy investment in dams and barrages to make cheap water available, have led to inefficient methods of agricultural irrigation. Policies are needed to move away from that path. These include the adoption of *drip irrigation* in agriculture;
- ***Increasing local availability of water***. Policies may be directed towards increasing local availability of water instead of relying on transported water from faraway and often depleted rivers. Promotion of *rainwater harvesting*, through construction of *local reservoirs* and other means, can be effective in this regard;
- ***Recycling and reuse.*** Promotion of recycling and reuse of water, through use of appropriate retention, treatment, and redirection of water, is needed. This can be particularly effective in conserving water;
- ***Shifting towards precision agriculture***. Policies promoting technologies of precision agriculture can provide a win-win solution. Precision agriculture can reduce the necessity of chemical fertilizers and pesticides drastically and at the same time improve water-use efficiency and mitigate water pollution that result from chemical run-offs. Promotion of precision agriculture will require provision of ICTs for all, including smallholder farmers.

Policies for protecting land

- ***Raising crop productivity***. An important policy objective is raising the productivity of agriculture by minimizing the use of land and water resources. Land use planning and sustainable agricultural intensification can help in reducing the demand for land;
- ***Reduction in the use of chemical inputs***. Reduction in the use of chemical fertilizers and pesticides through adoption of precision agriculture can help to protect the soil quality in the long run;
- ***Adoption of light ploughing***. Policies need to encourage a move away from deep ploughing for increasing crop output. The adoption of precision agriculture can help to attain higher agricultural productivity through the method of light ploughing;
- ***Rotational livestock***. Livestock production systems contribute significantly to total greenhouse gas emissions, which needs to be considered when addressing land degradation. A low-cost strategy to address the problem of land degradation is to increase rotational livestock grazing;
- ***Land restoration***. Land restoration can raise groundwater levels, increase crop yields and induce positive changes in the fauna of the respective region. Farmer-managed natural regeneration and tree planting and protection have been used successfully on agricultural lands.

Apart from the above policies directed towards the protection of water and land resources, there are policies that can be beneficial in a more general way.

Promotion of mixed farming

Policies are needed to promote mixed farming over mono-crop agriculture. Under mixed farming, waste from one crop can serve as a fertilizer for another. Also, mixed farming allows combining crop cultivation with animal husbandry, so that waste from one can serve as production input for the other. Under mixed farming the same water can serve multiple purposes, thus ensuring greater efficiency of water use. Farmers of developing countries used to practice mixed farming. Policies can be directed to encourage reinstatement of this practice, although with upgradation to a new technological level.

Promotion of organic agriculture

Policies are needed to promote organic agriculture, which can have multi-dimensional impact in promoting environmental sustainability and resilience and can also respond to changing consumer preferences in ur-

ban areas, as noted in chapter IV. However, government policies are needed to ensure that organic agriculture is not a return to pre-industrial, low-productivity farming but instead is an upgradation to a high-productivity, technologically sophisticated and more valuable agricultural output. Government policies can advance upgradation through promotion of necessary research to further close the yield gap between organic and conventional farming. Government policies can also help raise public awareness of the merits of organic agriculture, particularly in avoiding the negative externalities associated with conventional farming based heavily on inorganic, chemical inputs.

Promotion of indigenous seed bank and species

Government intervention and policies are needed to protect the indigenous seed bank and species, which are under increasing threat from large companies promoting new seed varieties that need to be purchased each year. Government can promote research that helps to raise the productivity of the indigenous varieties of crops. It can also help to raise awareness among the public about the merits of the indigenous varieties of crops and species. Given the changing climate, traditional crops can become key for sustainable food production as local varieties with a high degree of genetic diversity may better withstand and adapt to environmental stress and changes. It will be critical for sustainable rural development to protect indigenous seed banks and ensure their ability to conserve their seed collection as well as ensuring scientists' and farmers' access to these seeds, which can foster crop improvement efforts and result in positive ripple effects for food production.

Policies for strengthening institutions

Policies are needed for creation and strengthening of local institutions that are necessary for ensuring environmental sustainability of rural development. Both land and water protection often require collective effort of the farmers and rural residents. This is particularly true for the protection of water bodies, which are generally common property resources. However, collective efforts cannot materialize unless there are appropriate institutions that can organize and provide leadership on such efforts. In building and strengthening these local institutions, authorities can benefit from the successful experiences of other countries. However, such measures must also suit the specific physical, social and cultural conditions of a country. With appropriate attention to the country specificities, rural institutions can be a driving force for environmentally sustainable rural development.

Economic instruments can also play an important role in furthering sustainable land management. Direct subsidies can incentivize farmers to improve soil management. Conditional fertilizer subsidies could, for example, be provided if farmers adopt an easily verifiable organic soil fertility management practice. Subsidy programmes could also be further developed to provide payment for ecosystem services and compensate farmers for their reforestation efforts.

Conclusion

A concerted effort is needed to harness the potential of rural people and rural resources to ensure sustainable development in general, and achieve the SDGs in particular. That effort should be grounded on the principle of improving the lives and livelihoods of rural populations, and not be a technocratic exercise of economic, social or environmental policy. It is important to achieve growth of rural economies without sacrificing environmental sustainability. Inequality must be addressed without undermining the incentives for growth and risk-taking. Protecting the environment must be balanced with new, sustainable livelihood options for rural people. More importantly, the political voice and concerns of rural populations must be part of the process that aims to change their lives. Once necessary attention is given to these issues, rural development can be a powerful force driving overall national development towards achieving the 2030 Agenda for Sustainable Development, including the SDGs.

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World Social Report 2021

An urgent reconsideration of rural development is needed for achieving the 2030 Agenda for Sustainable Development. The current strategies and patterns of rural development are failing to meet either the socioeconomic or the environmental Goals of this Agenda. Four out of every five people who face extreme poverty around the world live in rural areas. Many rural areas are witnessing severe depletion and degradation of natural resources, contributing to climate change and the recurrence of zoonotic diseases, such as COVID-19.

The *World Social Report 2021: Reconsidering Rural Development* points to the ways in which rural development can be reset to achieve sustainable development. It calls for moving rural development to the centre of attention, instead of relegating it as an appendage of urban development; for ending the rural-urban divide through the adoption of the in situ urbanization model; for ending within-rural inequality; and for achieving rural development while preserving the environment. *World Social Report 2021* shows that new digital and frontier technologies are creating opportunities for achieving these goals. What is needed is to seize these opportunities and to convert into reality the long-standing goal of eradicating the rural-urban disparity.

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