MULTIDIMENSIONAL EVOLUTION OF RURAL DEVELOPMENT POLICY IN THE PEOPLE'S REPUBLIC OF CHINA

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NO. 44

December 2021

ADB EAST ASIA WORKING PAPER SERIES

ASIAN DEVELOPMENT BANK

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ADB East Asia Working Paper Series

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This paper was prepared as a background paper to "Poverty, Vulnerability, and Fiscal Sustainability in the People's Republic of China" under TA 8997-PRC: Promoting Partnerships for South-South Cooperation II.

ASIAN DEVELOPMENT BANK

ADB

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www.adb.org

Printed in the Philippines

Publication Stock No. WPS210494-2
DOI: http://dx.doi.org/10.22617/WPS210494-2

Notes:
In this publication, "CNY" refers to yuan and "$" refers to United States dollars.
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ABBREVIATIONS

CCCPC	Central Committee of the Communist Party of China
CNY	Chinese yuan
COD	chemical oxygen demand
EU	European Union
FAOSTAT	Food and Agriculture Organization of the United Nations Statistics
FPC	Farmer Professional Cooperatives
ICT	information and communication technology
MOA	Ministry of Agriculture and Rural Affairs
MEE	Ministry of Ecology and Environment
MEP	Ministry of Environmental Protection
MWR	Ministry of Water Resources
NBS	National Bureau of Statistics
OECD	Organisation for Economic Co-operation and Development
OECDSTAT	Organisation for Economic Co-operation and Development Statistics
PRC	People's Republic of China
R&D	Research & Development

EXECUTIVE SUMMARY

In February 2021, the People's Republic of China (PRC) officially announced it had eradicated absolute poverty in 2020. The PRC has a long, successful record of poverty reduction. The dramatic drop in absolute poverty was roughly equivalent to 850 million people, or some 70% of poverty reduction worldwide over the period. However, persistent urban–rural income disparities continue. Agriculture, farmers, and rural areas (*three nong*) comprise the core government policies for the country to become a moderately prosperous society (*xiao kang*) by closing the income gap. Since 2010, rural policy has gradually shifted to a more integrated and balanced approach to improve economic, social, and environmental welfare in rural areas. The 2018 Rural Vitalization Strategy adopts a wider approach to promote integrated rural development.

The PRC successfully adjusted rural development policy to fit rapidly evolving socioeconomic conditions in rural areas. The policy focus has evolved from boosting food production to a more integrated and balanced approach to improve economic, social, and environmental welfare of the country's vast rural population. Institutional innovations have been introduced in encouraging scale operations such as the emergence of farm mechanization service providers and cooperative organizations. The PRC has invested heavily in the network infrastructure in rural areas including roads, the telephone system, and internet, integrating small-scale farms to wider value chains. The multidimensional evolution of rural development policy provides important policy implications for preparing integrated and balanced development strategies in ADB's developing member countries. This report is developed to facilitate South-South knowledge sharing in rural development.

Reinvigorating rural development by leasing out farmland can generate off-farm income opportunities, reduce vulnerability, and narrow the urban–rural income disparity. A Household Responsibility System that originated in the late 1970s allocated land contract rights to individual households. Since the 2000s, a variety of institutional innovations consolidated small scale operations into larger units. These also allowed farmers to lease out farmland or contract farming tasks, giving them more time for off-farm employment activities. Off-farm income now accounts for more than 70% of rural household income, compared to 25.6% in 1990.

Integrated urban–rural development ultimately requires continued reform toward universal provisions of basic public services. Although the disparity within the basic public services between urban and rural has narrowed over time, there remain restrictions related to *hukou* (PRC's household registration system) registration. The PRC is moving toward universal provisions of basic public services—such as education, employment opportunities, old age care, healthcare, and housing—to permanent residents within urban areas (with or without *hukou*). Allowing labor to freely flow between urban and rural areas not only contributes to narrowing the urban–rural income gap, but would also attract more human capital to rural areas.

A more comprehensive agri-environmental policy—coupled with more investment in rural environmental infrastructure—could become an incentive for more sustainable production. Along with the remarkable growth in agricultural productivity over the past 4 decades, intensive use of chemical fertilizers, pesticides, plastic mulch, untreated waste from livestock and poultry production, and burning of crop residue resulted in ecological and environmental damage. Institutional frameworks and policies have been formulated in recent years to improve the agricultural and rural environment. These include protecting and rehabilitating agricultural land resources, regulations on the use of chemical fertilizers, pesticides and other chemicals, and the protection of agricultural water resources. It also introduced economic mechanisms such as use of subsidies and sustainable cost recovery models in sanitation and rural wastewater financing.

Developing the "rural experience"—such as ecotourism—would diversify farmer income sources and create additional income and employment opportunities. Challenges in environmental protection would include managing the conversion of agricultural land to other uses, preventing pollution of water resources, and promoting policies against non-point source pollution. Income from new industries such as ecotourism would help cover costs associated with environmental protection. Also, the government and private sector can work together to better use underutilized rural resources, including organic waste and its byproducts, to improve incomes alongside environmental management.

I. EVOLUTION OF RURAL AREAS

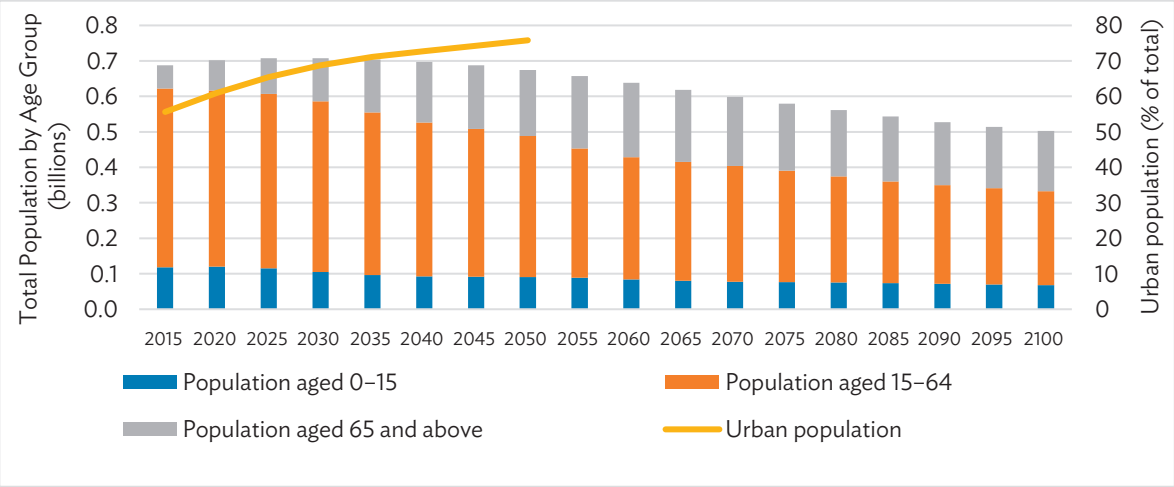
In February 2021, the People's Republic of China (PRC) announced the eradication of absolute poverty at the end of 2020. The country has placed agriculture, farmers, and rural areas (*three nong*) at the core of its policy agenda to achieve the goal of a moderately prosperous society (*xiao kang*). Since the beginning of economic reform in the late 1970s, the PRC has achieved remarkable economic growth and transformed rural areas. The focus of rural development policy has evolved from food security to wider economic, social, and environmental objectives. This report provides (i) an overview of the evolution of and profile of rural areas in the PRC, and (ii) a review of the multidimensional evolution of rural development policy. The report concludes with the remaining challenges for the PRC and the implications of the PRC's rural development experience to other developing member countries of ADB.

A. Demographic Structure of the Rural Population

1. Shrinking and Aging Rural Population

The PRC is the world's most populous country, with an official population of 1.4 billion as of the end of 2018, an increase of around 400 million compared to 1978. Projections from the United Nations (2015) suggest that the population will plateau around 2030, before gradually declining (Figure 1) throughout the rest of the 21st century, due to decreasing birth rates and increasing aging. With an increasing trend in the share of urban population, rural areas are expected to face a shortage of labor in the future.

Figure 1: People's Republic of China–Projections on Population and Demographic Structure, 2015–2100

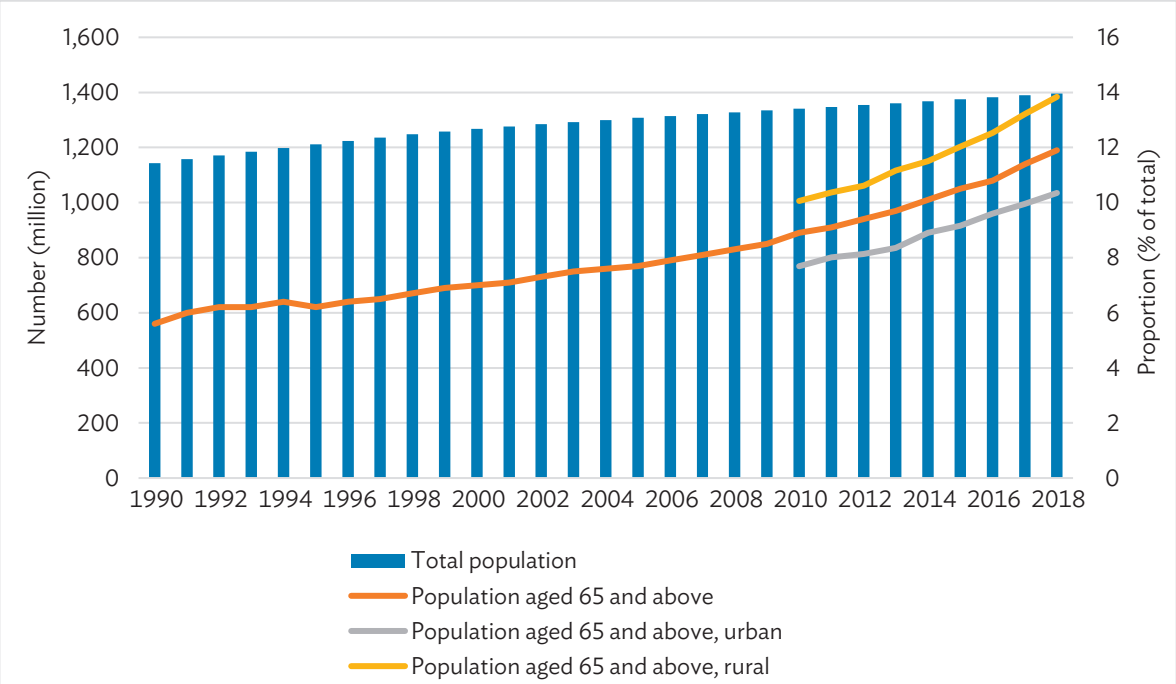


Source: United Nations. 2015. World Population Prospects: 2015 Revision. New York.

In terms of age structure, the Chinese population has become older due to improved life expectancy in recent decades. By the end of 2018, the population aged 65 and over accounted for 11.9% of the total population, and the rate of population aging is gradually accelerating (see Figure 2). Population aging in the rural areas is more evident. According to the Sixth Census of China conducted in 2010, the elderly population over 60 years old in rural PRC accounted for about 15% of the country's total rural population. By 2015, the rural elderly aged 60 and above had reached 112 million and accounted for 18.5% of the total rural population.

An aging rural population affects the rural labor force. According to the Third National Agricultural Census (National Bureau of Statistics of the PRC [NBS] 2017), about one-third of the rural labor force were aged 55 or older in 2016. An aging rural labor force not only poses a challenge to the PRC's agricultural development but also raises questions on how the PRC can manage to provide old-age care in its rural society (Yang et al. 2019).

Figure 2: Total Population and Proportion Aged 65 and Over

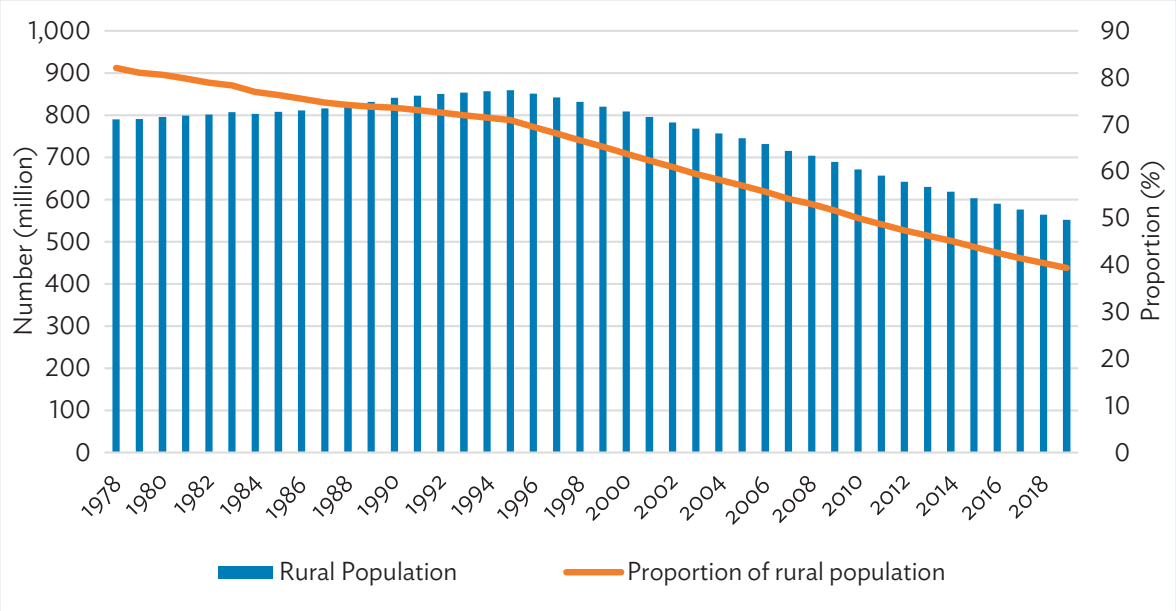


Source: NBS. 2019. China Population and Employment Statistics Yearbook. http://cdi.cnki.net/Titles/SingleNJ?NJCode=N2019030259 (accessed 8 October 2020).

2. Urban–Rural Migration and the *Hukou* System

The urban–rural divide in the PRC's population has undergone drastic changes. According to data from the Sixth National Census (NBS 2011), the rural population (defined as the difference between total and urban population) was 674.2 million in 2010, accounting for 50.3% of the total population of the country. By 2019, the PRC's rural population had shrank to 551.6 million, accounting for only 39.4% of the total population (see Figure 3; also *China Population and Employment Statistics Yearbook 2019*). At the same time, the rural population has been increasingly concentrated in several provinces, with half of them located in seven of the most populated provinces (Henan, Sichuan, Shandong, Guangdong, Hebei, Hunan, Anhui and Yunnan) (see Figure 4).

Figure 3: Rural Population and Its Share in Total Population



Note: Population-related data for 1981 and earlier years are drawn from household registration statistics; data for 1982, 1990, 2000, and 2010 are drawn from national census data; data for other years are from annual population sample surveys.

Source: NBS. 2020. China Population and Employment Statistics Yearbook. http://cdi.cnki.net/Titles/SingleNJ?NJCode=N2019030259 (accessed 8 October 2020).

Reductions in the share of rural population in the PRC's total population have been achieved through rapid urbanization and massive urban–rural migrations connected with employment opportunities in the urban areas, often located in the coastal provinces (Li 2019). The *hukou* system established in 1958, however, has been a major impediment to the PRC's urbanization and urban–rural migration. After the 16th National Congress of the Communist Party of China (2002), a series of *hukou* system reforms were started, including the abolition of a variety of restrictions imposed on migrant workers, the so-called "floating populations" in major urban centers. These reforms have created a more favorable environment to facilitate urban–rural migration. Nevertheless, certain restrictions associated with the *hukou* system still remain (Jiang 2019), and a large number of migrant workers and other floating population still have their *hukou* registered in their rural villages.

The *hukou* system creates an issue in classifying the rural and urban populations. The official classifications on permanent versus registered rural and urban populations are as follows:

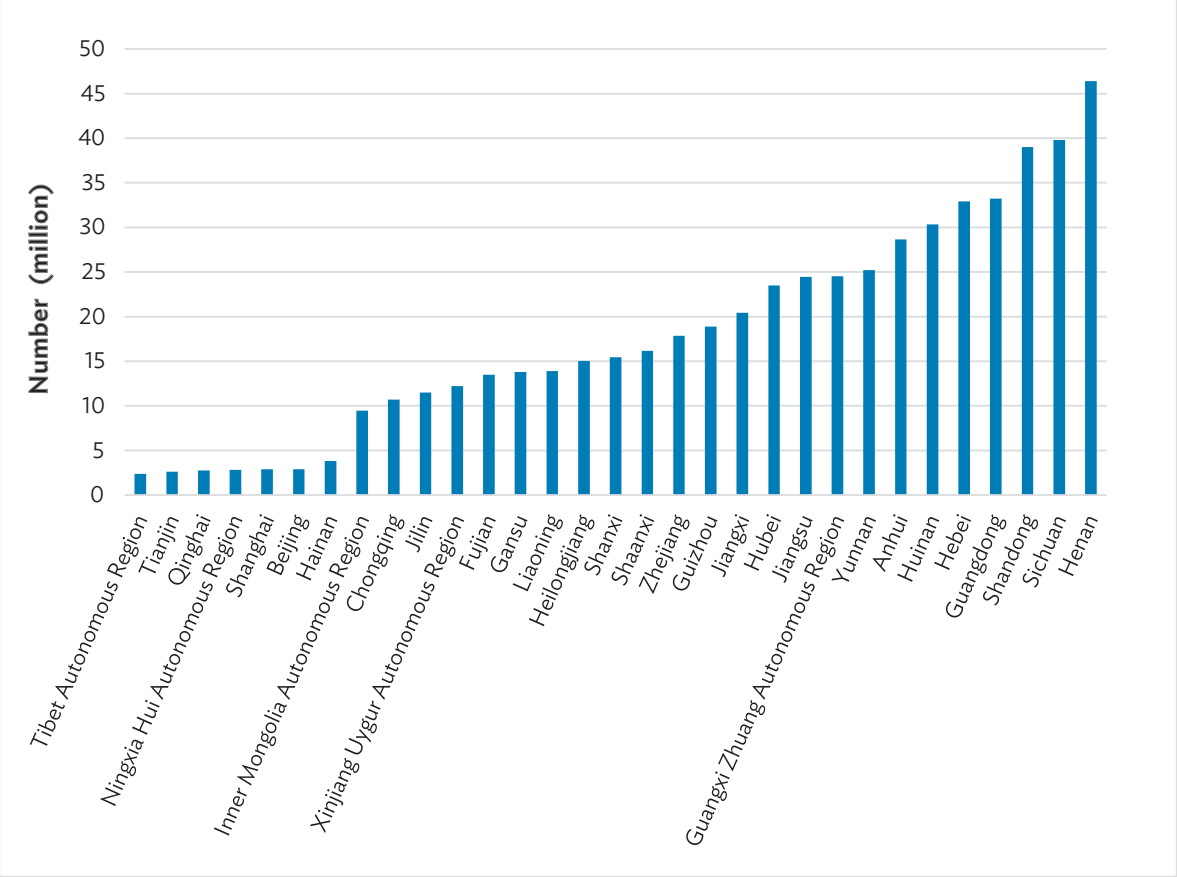
(i) *Permanent rural (urban) population.* This refers to the number of residents spending more than 6 months within a calendar year residing in rural (urban) areas, regardless of their *hukou* status.

(ii) *Registered rural (urban) population.* This refers to the number of residents with official residence or *hukou* in the rural (urban) area.

(iii) *"Residence–registration separation."* This is the condition where a person lives for more than half a year in an area other than his or her *hukou* registration area. The majority of the population under "residence–registration separation" belong to the "floating population," or rural residents living in cities, or city residents living in other districts within the same cities (prefecture level or above) other than the location where they hold *hukou* (NBS 2008).

At the end of 2018, of the total population of around 1.4 billion, 561.4 million were permanent rural residents, suggesting an urbanization ratio (measured on the basis of permanent urban population) of 59.5%. When measured on the basis of registered urban population, the urbanization ratio falls to 43.3% in the same year. The presence of "residence–registration separation" and the "floating population" explains this discrepancy: in 2018, there were 290 million people under "residence–registration separation," of which 240 million were classified as floating population. The total number of migrant workers nationwide was 288.4 million, among which 172.7 million were cross-region migrant workers and 117.7 million were local migrant workers. Without *hukou* in the urban area where they live and work, migrant workers still face many restrictions in seeking stable employment opportunities and in accessing social security and social benefits. These restrictions make it difficult for migrant workers to put down roots in the cities (Jiang 2019).

Figure 4: Rural Population by Province, 2019



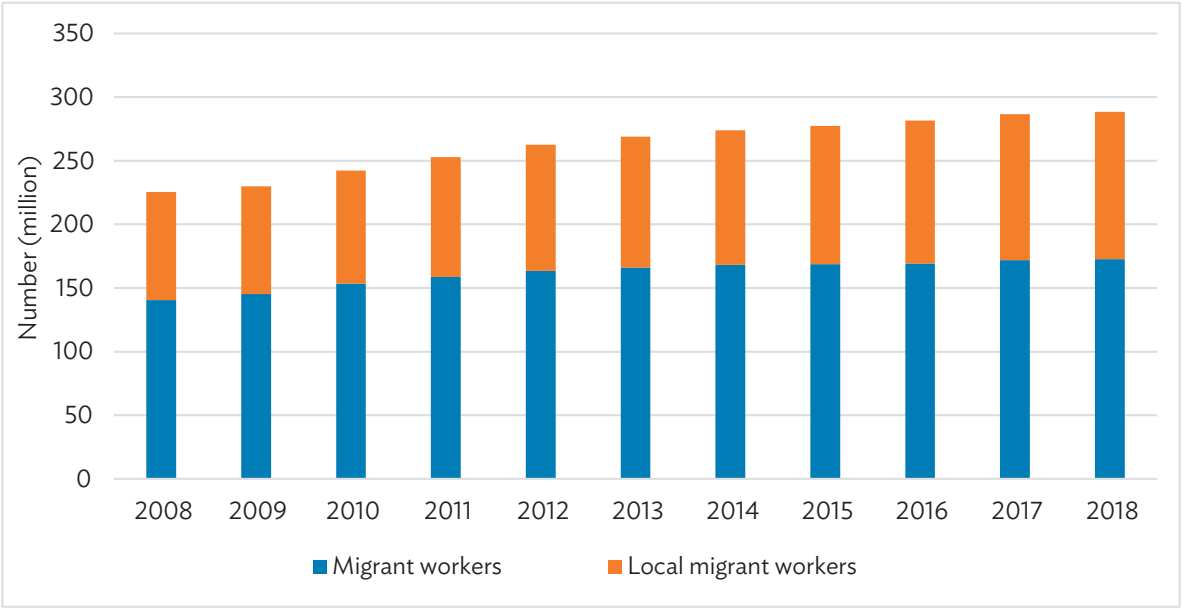
Source: NBS. 2020. China Population and Employment Statistics Yearbook. http://cdi.cnki.net/Titles/SingleNJ?NJCode=N2019030259 (accessed 8 October 2020).

B. Socioeconomic Trends in the Rural Areas

1. Development of Rural Income and Income Inequality

Rural reforms headlined by the household responsibility system during the late 1970s has unleashed tremendous productivity gains in the PRC's agriculture and increased farm income. Urban–rural migration and general economic development, particularly in the urban sector, fundamentally changes the rural labor force and provides many farm households with more nonagricultural income such as wage income. As a large number of young and middle-aged people in rural areas choose to seek employment in the cities, part-time farming has become a common phenomenon. Industrialization in the rural area further accelerates the differentiation of the rural labor force, resulting in an increasing share of the rural labor force deriving their primary income from nonagricultural activities (Li 2019). As can be seen from Figure 5, as cross-region migration slows down, within-region migration or local migration has become more important in recent years. This development implies that the rural household has greater flexibility to engage in both agricultural and nonagricultural activities.

Figure 5: Total Rural Workers and Number of Migrant Workers

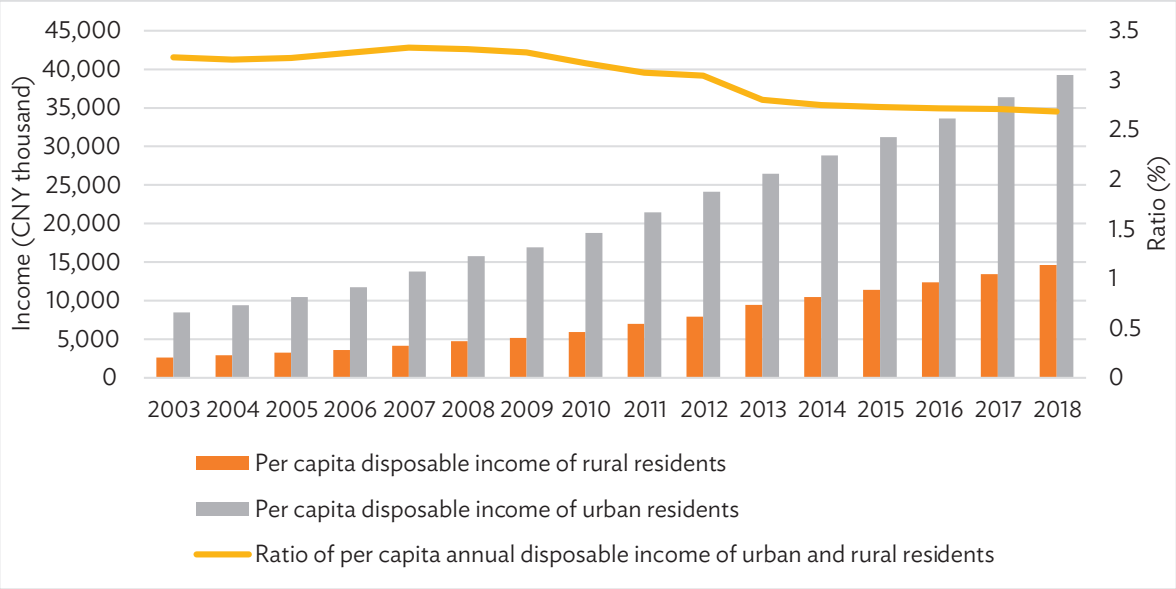


Source: NBS. 2019. China Yearbook of Household Survey. http://cdi.cnki.net/Titles/SingleNJ?NJCode=N2012010053 (accessed 8 October 2020).

According to Liu and Wang (2020), rural households can be classified into four different categories according to their income sources: households relying exclusively on agricultural income, households primarily relying on agricultural income but with income from nonagricultural sources, households with nonagricultural activities as main income sources, and rural household with no agricultural income. For the first and second types of rural households, older members of the households have increasingly taken over agricultural production, as the younger generation has moved to employment opportunities in the urban areas.

During the period 1978–2018, per capita rural disposable income increased by nearly 110 times, reaching the level of CNY14,617 in 2018 (see Figure 6). On average, rural household income increased by 11.9% per year in 1990–2019 (in contrast, urban household income rose by 12.4% annually during the same period).

Figure 6: Annual Disposable Income of Urban and Rural Residents



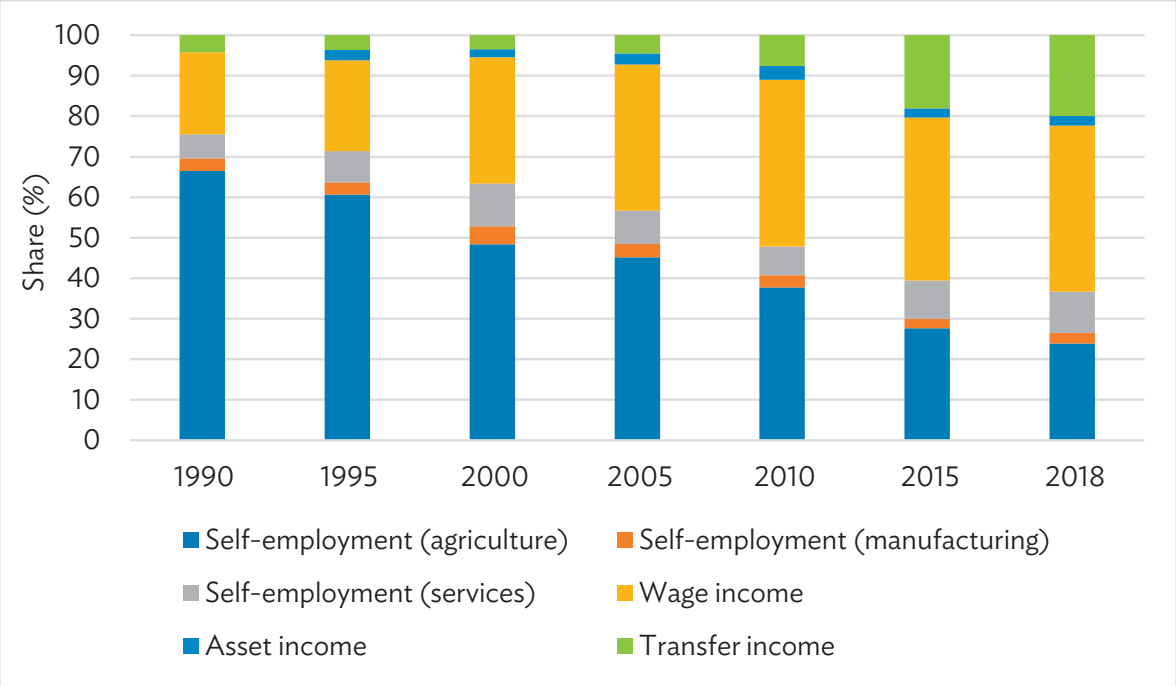
CNY = yuan.

Source: NBS. 2020. China Statistical Yearbook. http://www.stats.gov.cn/tjsj/ndsj/2020/indexeh.htm (accessed 8 October 2020).

Underlying the rapid growth of per capita income are major structural shifts of income sources. The primary income sources of rural residents in the PRC are income from self-employment in agriculture, services, and manufacturing; wage income from employment; transfer income; and asset income (Figure 7). Since 1990, rural income sources have undergone major structural changes, with shrinking shares of income from agriculture and rising shares of wage income and transfer income. In 1990, rural residents on average derived two-thirds of their disposable income from their self-employment in agricultural operations. This share has since decreased continuously, reaching 23.9% by 2018. During the same period, the average share of income derived from self-employment in services and manufacturing increased from 9.1% to 12.8%, representing a modest increase of such income. Wage income share rose from 20.2% in 1990 to 41% in 2018, exceeding the income share of agriculture and becoming the dominant income source for rural residents. Another notable development is that transfer income has also become an important source of income for rural residents. In 1990, 4.2% of rural residents' income were transfer income; in 2018, per capita transfer income reached CNY2,920, representing 20% of total per capita disposable income.

Despite rising per capita income in rural areas, persistent urban–rural income disparities still exist. As shown in Figure 6, the ratio of per capita disposal income of urban residents over that of rural residents was more than three during 2003–2010, before a noticeable drop in 2010–2014. Since 2015, this ratio has stabilized at around 2.7. This income gap remains quite large, particularly compared to the situation in high-income countries. In terms of low-income population and poverty incidence, rural areas also have more low-income populations receiving the minimum government income assistance. Government

Figure 7: Income Structure of Rural Households in the People's Republic of China, Selected Years



Source: NBS. 2020. China Statistical Yearbook. http://www.stats.gov.cn/tjsj/ndsj/2020/indexeh.htm (accessed 8 October 2020).

statistics show that by the end of September 2019, there were 42.8 million people receiving transfer payments in the form of the minimum living provision (*dibao*), of which 34 million were rural residents (representing 6.2% of the rural population) and only 8.8 million were urban residents (about 1% of the urban population).[1]

It is important to note that significant income disparities exist across rural income groups. As shown in Table 1, the lowest income quintile of the rural population had an average annual disposable income level of CNY1,067 in 2005, right at the level of the official rural poverty line in 2008. In contrast, in the same year, income of the rural residents in the upper-middle-income group was approximately three times higher, and that of the high-income group, six times higher. By 2018, despite the fact that the average annual per capita income in the low-income group rose to CNY3,666 and exceeded the then poverty line of CNY2,300 by a wide margin, the relative gaps between incomes in the low- and high-income groups widened from the levels in 2005. Similar observations can be made in comparing the low-income and lower-middle-income groups with the upper-middle-income and high-income groups, reflecting more rapid average annual growth of income for the latter two groups.

[1] Source: China Social News. 2019. http://www.mca.gov.cn/article/xw/mtbd/201912/20191200022425.shtml (accessed 13 May 2021).

Table 1: Annual Disposable Income per Capita of Rural Residents by Income Group (yuan)

Sector	2005	2008	2011	2014	2017	2018	Average Annual Growth Rate, 2005–2018 (%)
Poverty Standard		1,067	2,300	2,800	2,952	2,995	
Low-Income (20%)	1,067	1,500	2,001	2,768	3,302	3,666	10.2
Lower-Middle-Income (20%)	2,018	2,935	4,256	6,604	8,349	8,509	11.8
Middle-Income (20%)	2,851	4,203	6,208	9,504	11,978	12,530	12.2
Upper-Middle-Income (20%)	4,003	5,929	8,894	13,449	16,944	18,052	12.4
High-Income (20%)	7,747	11,290	16,783	23,947	31,299	34,043	12.1

Source: NBS. 2019. China Yearbook of Household Survey. http://cdi.cnki.net/Titles/SingleNJ?NJCode=N2012010053 (accessed 8 October 2020).

Rural income disparities can also be observed across regions, as can be seen from Table 2 where per capita income in four regions are listed. Not surprisingly, rural residents in the Eastern Region have the highest income, followed by the Northeastern Region, the Central Region, and the Western Region. Per capita rural income in the Western Region was roughly half of that in the Eastern Region in 2005. By 2018, the absolute income gaps had widened between the eastern and western regions; however, the relative gap actually shrank slightly.

Table 2: Annual Disposable Income per Capita of Rural Residents by Region (yuan)

Sector	2005	2008	2011	2014	2017	2018	Average Annual Growth Rate, 2005–2018 (%)
Eastern Region	4,720	6,598	9,585	13,145	16,822	18,286	3.1
Central Region	2,957	4,453	6,530	10,011	12,806	13,954	8.9
Western Region	2,379	3,518	5,247	8,295	10,829	11,831	13.9
Northeast Region	3,379	5,101	7,791	10,802	13,116	14,080	14.0

Source: NBS. 2019. China Yearbook of Household Survey. http://cdi.cnki.net/Titles/SingleNJ?NJCode=N2012010053 (accessed 8 October 2020).

In summary, rural reforms, urban–rural migration, and general economic development in the PRC have resulted in rising per capita income in the rural PRC. Since early 2000s, nonagricultural income such as wage income has become an important driver of rural income growth. However, per capita income of rural residents still lags far behind their urban counterparts, despite a narrowing of such gap in the recent years. Moreover, regional rural income imbalance still exists across the more affluent eastern, central, and northeastern regions.

2. Poverty Reduction

Poverty alleviation in rural areas is a top priority of the central government. From 1985–2012, the rural poverty headcount was reduced by 560 million, based on the poverty line defined by the government. Since 2012, the "targeted" or "precision" poverty alleviation campaign has led to reduction of poverty headcount by over 10 million yearly.

Rural reforms have helped reduce poverty incidence in the PRC. From 1978 to 1985, the rural poor headcount was reduced from 250 million to 130 million, as measured by the official poverty line in 1978[2] (see Table 3). During the mid-1980s, the PRC started to implement a planned process of poverty reduction and development aiming at reducing regional imbalances, with a focus on poverty alleviation in key poor areas. From 1986 to 1992, the rural poverty headcount was further reduced to 80 million. In 1994, the PRC started to implement an ambitious poverty reduction plan called "Eight-Seven Poverty Alleviation Plan" (State Council 1994). Under this 1994 plan, the lack of basic living provisions ("温饱"in Chinese, referring to essential needs such as food, clothing, and shelter) for the remaining 80 million poor people should be solved within the remaining seven years of the 20th century. The implementation of the plan resulted in a further reduction of poverty. As shown in Table 3, using the 1978 poverty line, the PRC's poverty headcount dropped to 32 million and poverty rate decreased to 3.5% in 2000 (per the poverty line of 2008, the poverty headcount in 2000 was 94 million and poverty rate was 10.2%).

Table 3: Rural Poverty in the People's Republic of China

	1978 Poverty Line		2008 Poverty Line		2010 Poverty Line		Poverty Headcount Ratio ($1.90/day; 2011 PPP) (%)
Year	Poverty Population (million)	Poverty Incidence (%)	Poverty Population (million)	Poverty Incidence (%)	Poverty Population (million)	Poverty Incidence (%)	
1978	250	30.7			770.4	97.5	
1980	220	26.8			765.4	96.2	
1981	152	18.5					
1982	145	17.5					
1983	135	16.2					
1984	128	15.1					
1985	125	14.8			661.0	78.3	
1986	131	15.5					
1987	122	14.3					
1988	96	11.1					
1989	102	11.6					
1990	85	9.4			658.5	73.5	66.2
1991	94	10.4					
1992	80	8.8					
1994	70	7.7					56.6
1995	65.4	7.1			554.6	60.5	
1997	49.62	5.4					41.7
1998	42.1	4.6					
1999	34.1	3.7					40.2
2000	32.1	3.5	94.2	10.2	462.2	49.8	
2001	29.3	3.2	90.3	9.8			
2002	28.2	3	86.5	9.2			31.7
2003	29	3.1	85.2	9.1			

continued on next page

[2] The poverty line in 1978 was CNY200 per person per year at 1984 prices. According to the 1978 poverty line, the rural poverty rate was 30.7% in 1978 and 14.8% in 1985. The poverty line was twice adjusted afterward.

Table 3 *continued*

Year	1978 Poverty Line		2008 Poverty Line		2010 Poverty Line		Poverty Headcount Ratio ($1.90/day; 2011 PPP) (%)
	Poverty Population (million)	Poverty Incidence (%)	Poverty Population (million)	Poverty Incidence (%)	Poverty Population (million)	Poverty Incidence (%)	
2004	26.1	2.8	75.9	8.1			
2005	23.7	2.5	64.3	6.8	286.6	30.2	18.5
2006	21.5	2.3	57.0	6			
2007	14.8	1.6	43.2	4.6			
2008			40.0	4.2			14.8
2009			36.0	3.8			
2010			26.9	2.8	165.7	17.2	11.2
2011					122.4	12.7	7.9
2012					99.0	10.2	6.5
2013					82.5	8.5	1.9
2014					70.2	7.2	1.4
2015					55.8	5.7	0.7
2016					43.4	4.5	0.5
2017					30.5	3.1	
2018					16.6	1.7	
2019					5.5	0.6	

PPP = purchasing power parity.

Source: NBS. 2000-2020. Poverty Monitoring Report of Rural China, World Bank. Poverty and Equity Data Portal. https://povertydata.worldbank.org/poverty/home/ (accessed 16 October 2020).

From 2000 to 2020, two decadal rural poverty alleviation and development plans (outline of poverty alleviation and development in the rural areas during 2001–2010 and 2010–2020) were adopted (State Council 2001, Central Committee of the Communist Party of China [CCCPC] 2011). In the 2001–2010 decade, poverty headcount decreased further to 26.9 million, representing a poverty rate of 2.8% (according to the 2008 poverty line). In the 2010-2020 decade, particularly following the 18th Chinese Communist Party Congress, a "targeted" poverty alleviation campaign was launched to achieve "decisive progress." According to the poverty line of 2010, during 2013–2018, more than 10 million people were lifted out of poverty annually, and, in total, a reduction of poverty headcount of 82.4 million was achieved. As a result, the rural poverty rate decreased from 10.2% in 2012 to 0.6% in 2019.[3] Applying the World Bank poverty line of $1.9 per day per capita largely confirms the achievement: in 2010, the poverty ratio was 11.2% and in 2016 the poverty ratio dropped to 0.5%. Provinces and even counties have undertaken these campaigns (Box 1).

[3] Source: Keqiang. 2020. Government Work Report (On-site Record) at the Third Session of the Thirteenth National People's Congress. http://www.gov.cn/zhuanti/2017lh/live/premier.htm (accessed 3 June 2020).

Box 1: Case Study of Yongsheng County in Yunnan Province

The experience of Yongsheng county, Yunnan province, describes the general measures taken to improve efficacy and efficiency as well as specific programs that address poverty and vulnerability (Government of Yunnan 2021).

Yongsheng county covers northwestern Yunnan and central Lijiang, a 4,950-square kilometer area with a population of 406,800, three-quarters of which live in rural areas. Ten ethnic minorities account for 140,000 people, or 34.4% of the population. They include the Yi, Lisu, Tibet, and Pumi ethnic minorities, among others. The county has registered 16,211 households with 62,215 people as poor, mostly ethnic Lisu.

In the 5 years from 2014 to 2019, 15,117 households with 58,912 people were officially lifted out of poverty—equivalent to 94 villages. The poverty incidence rate dropped from 18.0% to less than 1.0%. Three measures were behind this dramatic drop:

- *Funds were coordinated and integrated to strengthen financial security.* To ensure the war against poverty would succeed, authorities used all resources available to provide financial guarantees. Proceeds from the country's capital investments rose annually, while other expenditures were kept to a minimum. Since 2016, CNY266.5 million was added to the county's revenues. Another measure was to coordinate and integrate financial agriculture-based and special poverty alleviation funds. Authorities prioritized allocating funds, projects, and personnel to poor areas through, for example, the "two assurances, three guarantees."[a] Coordinated financial management and the active participation of all stakeholders helped.
- *"Six grasps and six determinations."* This strengthened management of the poverty alleviation fund. Since 2018, with help from the specially assigned Ministry of Finance poverty alleviation work team, Yongsheng county adopted the "six grasps and six determinations"[b] concept in managing poverty alleviation funds. The system applies rules that focus on where and how funds are used and monitoring to identify problems. The management and institutional structure of how funds are used is tightly controlled. A "horizontal to side, vertical to bottom"[c] framework ensures all are covered. Since 2018, Yongsheng county's fund management for poverty alleviation has consistently ranked among the best among PRC provinces and cities.
- *Precise monitoring to ensure poverty alleviation is effective.* Only by setting the right "prescription" can the "poor roots" be pulled out. The government used a "Ten Major Projects" approach to ensure poverty alleviation measures are effective. The projects cover an array of economic and social sectors:

Industry. CNY861 million in budget funds and CNY501 million in poverty alleviation loans were issued, with a "reward for subsidy" approach adopted to help develop 84 specific industries—including high-quality beef cattle.

Employment. A total of 38,005 poor laborers were trained, with each household involved with more than one skill; 22,467 poor laborers changed jobs, covering 1.3 people per household.

Relocation. CNY152 million was invested to build 13 centralized relocation sites (including 1 decentralized relocation area) to relocate 768 households with 2,908 people.

Education. CNY399 million went to 317 school construction projects; 41 new kindergartens; 2,272 sets of teaching equipment and living facilities; and to cover rural teacher living subsidies.

continued on next page

Box 1 *continued*

Ecology. Authorities selected 4,366 poor people registered to become ecological forest rangers and paid CNY35.7 million in wages, benefiting 4,531 poor households.

Health. Authorities invested CNY24.1 million to build 136 village clinics, equipped with 433 practicing registered village doctors, and covered 100% of the basic medical insurance and critical illness insurance for the poor.

Basic upgrading. Infrastructure investments boosted access to convenient transportation, electricity, network broadband, radio and television, which helped create a village collective economy to strengthen the grassroots level.

Safety net. Among the county's registered poor, 9,228 households with 15,582 people enjoy the minimum living allowance.

Housing. Since 2014, CNY733 million was invested to renovate 41,505 households, or 44.3% of the county total, to renovate dilapidated, thatched houses, and other houses to ensure they were safe.

Drinking water. The water conservancy project invested CNY935 million on several water conservation projects, assuring safe drinking water, and efficient use of water resources in Longkaikou and the Xiaomi Tian Reservoir.

[a] The "two assurances" are that the rural poor population will have enough food and clothing, while the "three guarantees" are that the people will have access to compulsory education, basic medical services, and safe housing (Government of Guangdong).

[b] "Six grasps" refer to (i) establishing the poverty alleviation fund system, including targets; (ii) setting rules for the management of poverty alleviation funds; (iii) focusing on the core goal of "where the poverty alleviation funds are used; (iv) determining where the system is followed up; (v) pinpointing where the problems are; and (vi) identifying where the system is "perfect."

[c] Means full coverage, no dead corner.

Sources: Zhang, Tiwei and Provincial Poverty Reduction Case Research Group of Yunnan Provincial Department of Finance. (unpublished). The Achievements and Experience of Poverty Alleviation in Yunnan Province. 2021. Wu, Jinhua, and Guangdong Provincial Department of Finance. 2021. Guangdong's Experience in Poverty Reduction. *ADB East Asia Working Paper Series.* No. 45. Manila: ADB East Asia Department.

In terms of regional distribution, the rural poor was heavily concentrated in the Western Region,[4] with more than 55% of the poor population. In contrast, only 8.8% of the rural population in the Eastern Region was classified as poor. Moreover, 10 provinces had less than 1% of their rural population classified as poor in 2019.

In contrast to rural poverty, urban poverty has received far less attention in policy making and in the academic literature. This is because most of the poor are located in the rural areas. Some authors (e.g., Xia et al. 2007), however, argue that the national poverty line designed for rural residents is too low in measuring urban poverty and has resulted in too few urban poor. According to Ravallion and Chen (2007), less than 0.5% of urban residents were below the poverty line in 2001. Therefore, urban poverty headcount using the national poverty line has limited value (Xia et al. 2007). In the absence of an official urban poverty line, urban residents receiving urban minimum living provision (*dibao*) are

[4] Eastern Region: 11 provinces including Beijing, Fujian, Guangdong, Hainan, Hebei, Jiangsu, Liaoning, Shandong, Shanghai, Tianjin, and Zhejiang. Central Region: 8 provinces including Anhui, Heilongjiang, Henan, Hubei, Hunan, Jiangxi, Jilin, and Shanxi. Western Region: 12 provinces including Chongqing, Gansu, Guangxi Zhuang Autonomous Region, Guizhou, Inner Mongolia Autonomous Region, Ningxia Hui Autonomous Region, Qinghai, Shaanxi, Sichuan, Xizang Autonomous Region (formerly known as Tibet Autonomous Region), Xinjiang Uygur Autonomous Region, and Yunnan.

frequently considered to be poor. During 2007–2017, the PRC's urban *dibao* population decreased from 22.4 million to 12.6 million and its share in total urban population dropped from 3.7% to 2.1%.[5]

The PRC officially announced the eradication of absolute poverty in rural areas in February 2021. However, reducing relative poverty further and narrowing the persistent urban–rural income disparity remain major policy issues.

3. Poverty Standards, *Dibao* Thresholds, and the Low-Income Population

The poor population in the PRC, as measured by the officially defined poverty line, had decreased to less than 1% of the population by the end of 2019. It is important to recognize that the official poverty line set by the central government, much like the commonly adopted international poverty line used by the World Bank, is defined by the per capita income level necessary for covering the most basic living expenses such as food, clothing, and shelter. In reality, merely having an income level just above the official poverty line should not be considered as making a "moderately prosperous" living. In fact, according to the PRC's own rural "minimum living provision" system (commonly known as the *dibao* system), achieving an income level above the official poverty line implies the attainment of minimum living standards only up until 2014 (as shown in Table 4). Starting from 2015, the national *dibao* standard, a maximum per capita income threshold below which residents are entitled to receive the *dibao* payments, has exceeded the poverty standard, reaching the level of CNY4,833 or about 60% higher than the poverty standard.

Table 4: Rural Poverty Standards and Rural Dibao Standards, 2010–2019

Year	Poverty Standard (CNY)	Dibao Standard (CNY)
2010	2,300	1,404
2011	2,536	1,718
2012	2,625	2,068
2013	2,736	2,434
2014	2,800	2,777
2015	2,855	3,178
2016	2,952	3,744
2017	2,952	4,302
2018	2,995	4,833
2019	3,218	5,336

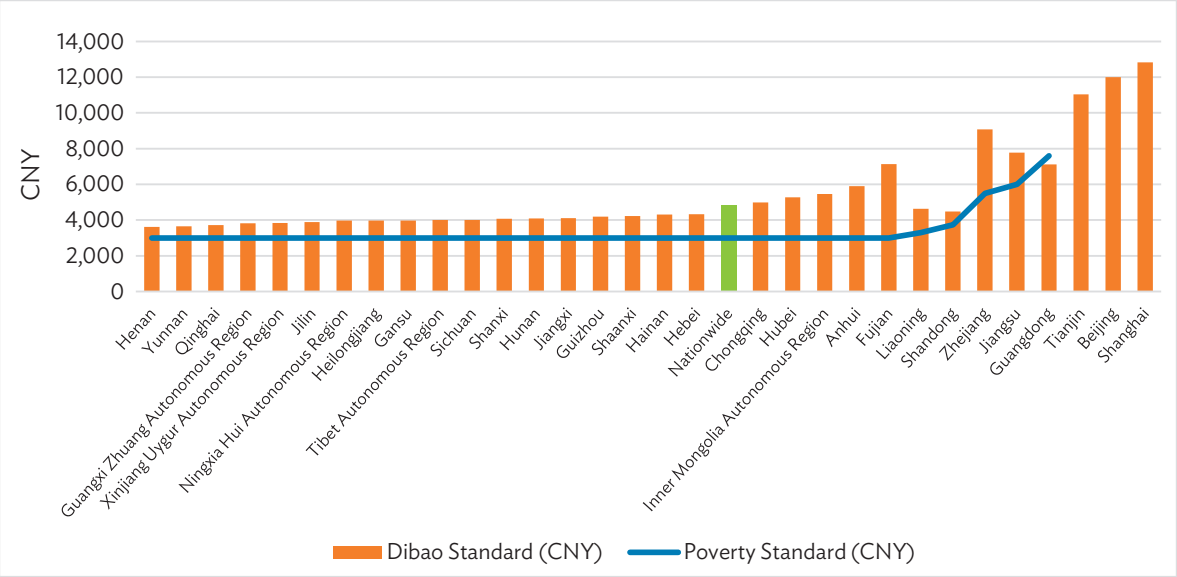
CNY = yuan.

Source: NBS. 2011-2020. Poverty Monitoring Report of Rural China, Ministry of Civil Affairs. http://www.mca.gov.cn/article/sj/tjjb/qgsj/ (accessed 18 May 2021).

Due to differences between living costs across the PRC's provinces, provincial governments are allowed to define their own poverty thresholds at or above the national threshold so as to better measure the local poor population. In 2018, 23 provinces (or autonomous regions or municipalities) used the national poverty standard while five coastal provinces adopted higher poverty standards (see Figure 8). Similarly, provincial governments are also allowed to set their own rural *dibao* standards, with 11 provinces (or autonomous regions or municipalities) having higher *dibao* standards than the national *dibao* standard. In particular, Beijing, Shanghai, and Tianjin, the three municipalities with predominantly urban

[5] Source: Ministry of Civil Affairs. 2017. *Statistical Bulletin of Social Service Development*. http://www.mca.gov.cn/article/sj/tjgb/ (accessed 13 May 2021).

Figure 8: Poverty Standards and Dibao Standards by Province, 2018



CNY = yuan.

Source: NBS. 2019. Poverty Monitoring Report of Rural China, Ministry of Civil Affairs.

populations, have *dibao* standards higher than CNY11,000. All other provinces except Guangdong have higher *dibao* thresholds than their respective poverty standards.

Higher poverty standards adopted by a number of provinces suggest that nationwide poverty headcount based on these higher provincial poverty standards is likely to be larger than the poverty headcount calculated from the national poverty standard. More importantly, as the national and provincial *dibao* thresholds have exceeded the national poverty standards by a wide margin, the size of population in the low-income bracket—including but not limited to those receiving *dibao* payments—is much larger than that of the poor population based on the much lower national poverty threshold. Therefore, it is not surprising that Premier Li Keqiang recently acknowledged that there are still 600 million Chinese in the mid- and low-income brackets, and their average monthly income are at about CNY1,000.[6] According to the income survey conducted by the NBS in 2019, the average monthly per capita income of the lowest 40% of the population is CNY965. In the rural areas, about 330 million people have an average monthly income below CNY800. These latest statistics, as well as earlier statistics presented in Tables 1 and 2, confirm the Premier's acknowledgement that a significant number of the PRC's rural population would still be considered as low-income, even though most of them have incomes higher than the official national poverty line.

C. Environmental Performance

While the PRC's agriculture achieved sustained growth in the last 4 decades, intensive use of chemical fertilizers, pesticides, and plastic mulch; untreated waste from livestock and poultry production; and

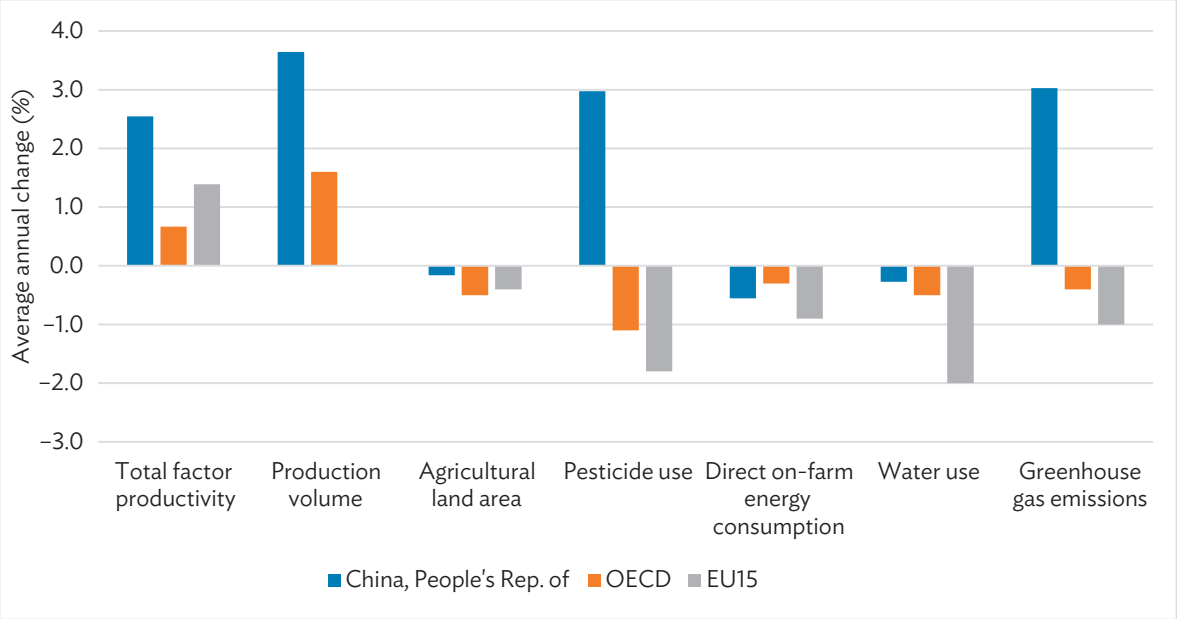
[6] CNBCTV18. 2020. "China has over 600 million poor with $140 monthly income: Premier Li Keqiang." https://www.cnbctv18.com/economy/china-has-over-600-million-poor-with-140-monthlyincome-premier-li-keqiang-6024341.htm (accessed 19 May 2021).

burning of crop residue have resulted in serious ecological and environmental damages (e.g., soil pollution and degradation, surface water and aquifer pollution, air pollution, eutrophication). Lack of treatment of domestic wastes from rural households exacerbates these damages.

1. Environmental Performance of Agricultural Production and Rural Society

The PRC's agricultural growth has consistently outperformed that of countries of the Organisation for Economic Co-operation and Development (OECD). During 2000–2002 and 2010–2012, agricultural total factor productivity increased by 2.5% annually, as compared to 0.7% average annual increase in the OECD countries and 1.4% for the European Union (EU) (Figure 9). Annualized production volume increase reached 3.6% in the same period, also comparing favorably with the OECD and EU countries. However, the environmental performance of Chinese agriculture as measured by key indicators such as land use, pesticide use, energy consumption, water use, and greenhouse gas emissions, has lagged behind the OECD countries.

Figure 9: Trends in Selected Agriculture and Environmental Indicators



EU = European Union, OECD = Organisation for Economic Co-operation and Development

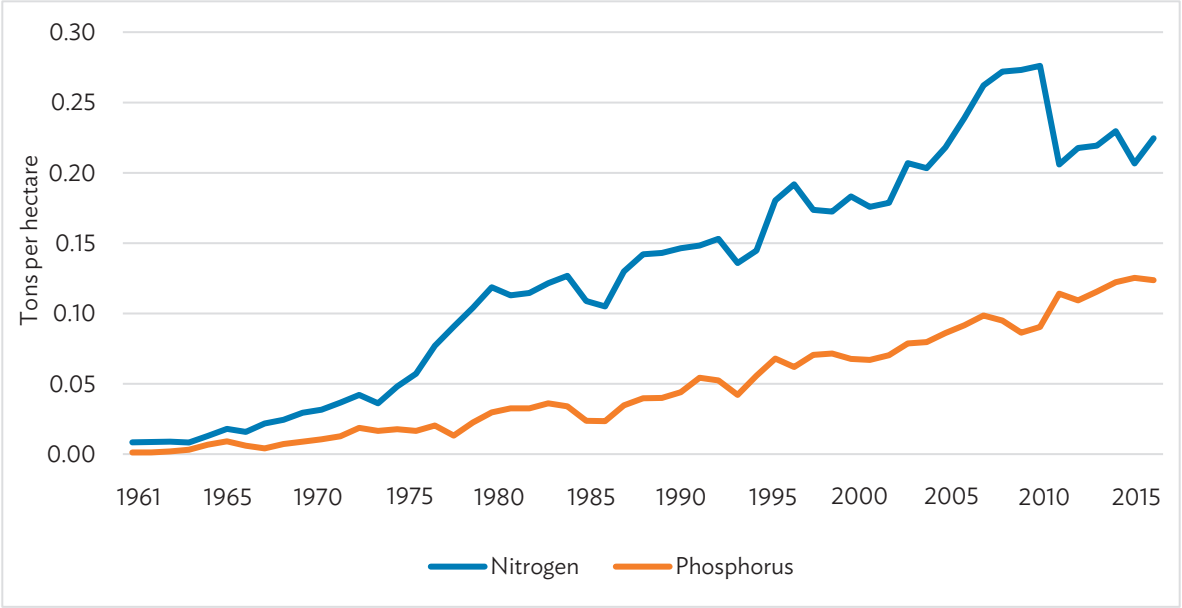
Notes: Average annual percent change between 2000–2002 and 2010–2012, or nearest available period.

The EU15 as of 2012 is composed of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom.

Sources: FAOSTAT. http://www.fao.org/faostat/en/#data (accessed 15 June 2020), NBS. 2020. China Statistical Yearbook. http://www.stats.gov.cn/tjsj/ndsj/2020/indexeh.htm (accessed 8 October 2020), and OECD.Stat. https://stats.oecd.org/ (accessed 10 June 2020).

The PRC's agricultural growth has been aided by increasing applications of chemical inputs. Nitrogen use has dramatically increased, from 105 kilograms per hectare (kg/ha) to 287.6 kg/ha, or by 174%, from 1986 to 2013. Phosphate inputs have increased from 23.3 kg/ha to 92 kg/ha, an increase of 294% over the same period (Figure 10). By 2017, fertilizer use reached 58.6 million tons, representing a rise of 41% as compared to 2000. These increased uses of nutrient inputs have in fact exceeded yield growth, possibly an indication of diminishing marginal returns from fertilizer use and low effective utilization of the nutrients. This trend greatly contrasts with the situations elsewhere, such as in the EU and the United States, where nitrogen and

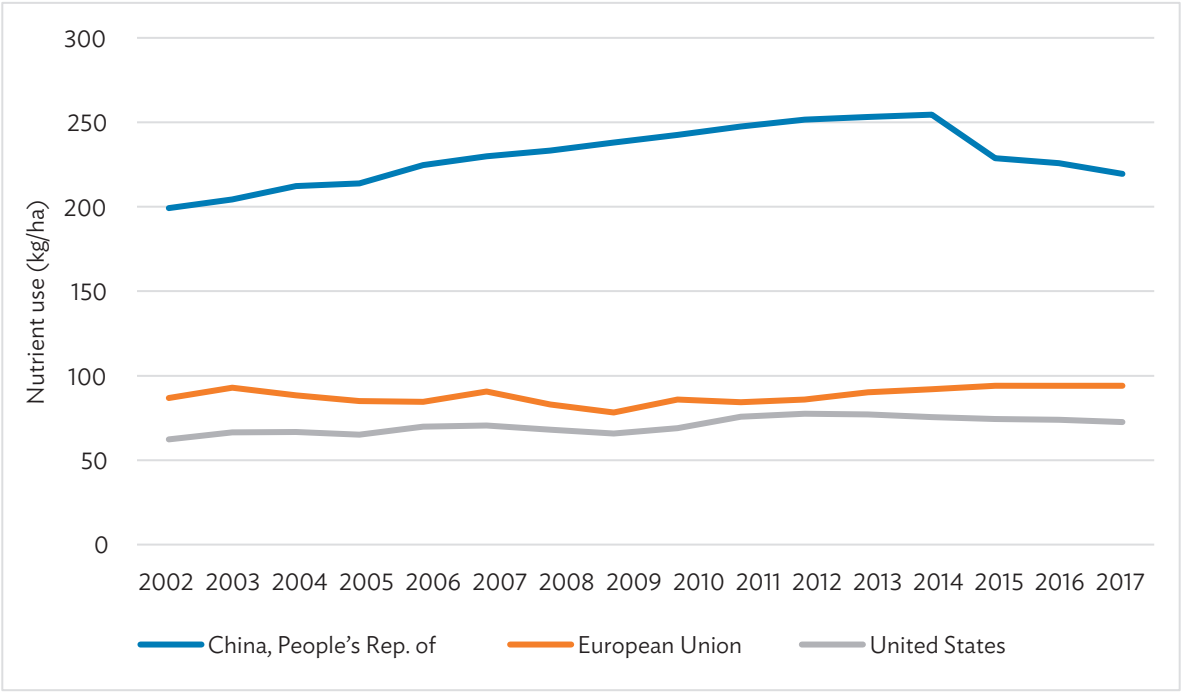
Figure 10: Nitrogen and Phosphorus Inputs, 1961–2015



Note: In tons per hectare of arable land and permanent crops.

Source: International Fertilizer Association. 2017.

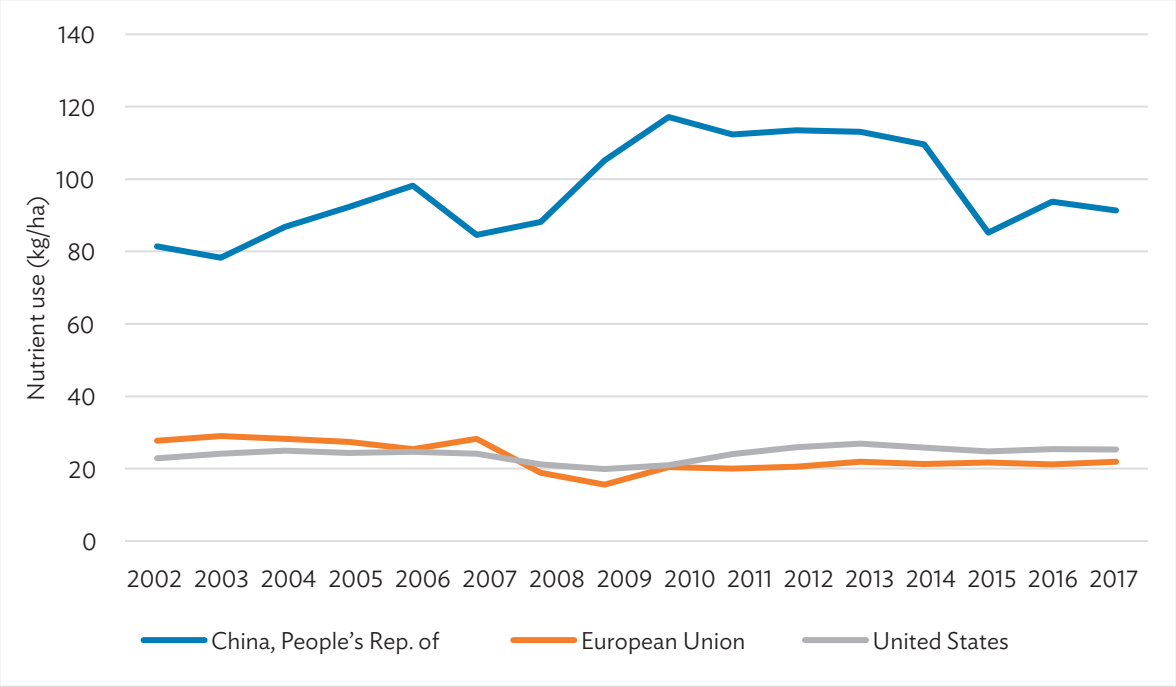
Figure 11: Nutrient Use (Total Nitrogen) per Area of Cropland



kg/ha = kilograms per hectare.

Source: FAOSTAT. http://www.fao.org/faostat/en/#data (accessed 15 June 2020).

Figure 12: Nutrient Use (Total Phosphate) per Area of Cropland



kg/ha = kilograms per hectare.

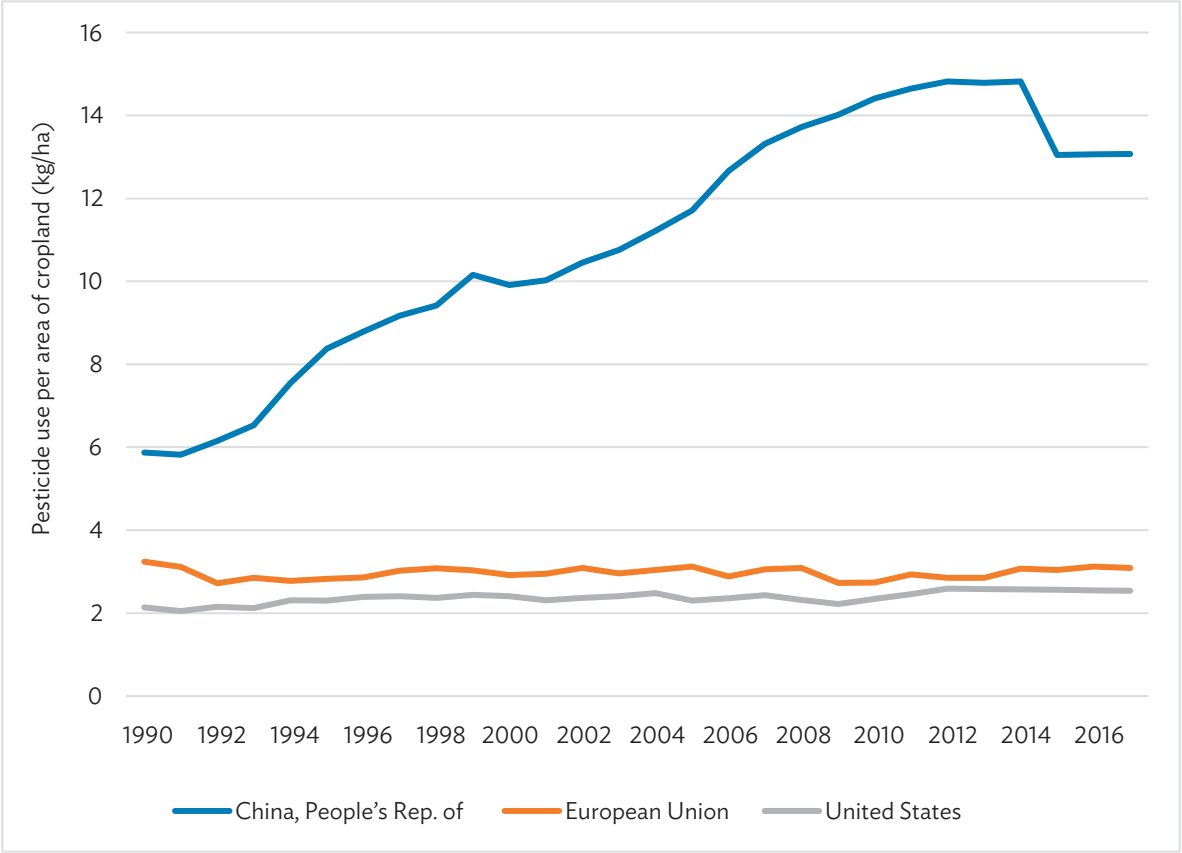
Source: FAOSTAT. http://www.fao.org/faostat/en/#data (accessed 15 June 2020).

particularly phosphorus uses have remained at much lower levels (Figures 11 and 12). In fact, the nationwide average use of fertilizers in the PRC at around 400 kg/ha (in the Eastern Region this number is about 600 kg/ha) is roughly double the amount generally considered to be acceptable in developed countries. Despite this overall rising trend, from 2007 onward, increases in the use of both nitrogen and phosphorus inputs have leveled off to some extent. With new initiatives to further curb the growth of fertilizer use, it is hoped that the overuse of nutrient inputs may be reversed in the near future.

Pesticides can boost agricultural productivity by reducing pest damage, but it can also threaten sustainability by polluting water systems and jeopardizing human and ecosystem health. The PRC's use of chemical pesticides has steadily increased since the early 1990s, rising from 775.4 thousand tons in 1990s to 458.8 thousand tons in 2016, paralleling the upward trend in crop production. The PRC's pesticide use per hectare (as measured in its active ingredients) was about 5.9 kg in 1990 and rose to 14.8 kg in 2012, before dropping to 13.1 kg in 2017. While the PRC has shifted away from high-toxicity and high-residue pesticides and has generally reduced pesticide use in recent years, the per hectare use of pesticides in the PRC has remained at about 2.5 times the world average (China Pesticide Information Network 2015). This trend is particularly worrying compared to that of other countries such as the EU15 and other OECD countries where use of pesticides is much lower. In 2014 for instance, the EU used 3.1 kg/ha and the US used 2.6 kg/ha pesticide, compared to 14.8 kg/ha in the PRC (Figure 13). Even after its large reduction in pesticide use since 2017, the PRC's per hectare use of pesticide is still about four to five times the levels reported for the EU and the US.

Increased use of chemical fertilizers and pesticides has resulted in both agricultural point pollution and nonpoint source pollution. This is the first main source of agricultural degradation. In 2017, the PRC's effective utilization ratio of fertilizers in rice, maize, and wheat production was only 37.8%, implying that

Figure 13: Pesticide Use per Unit of Cropland (kg/ha), 1990–2016



kg/ha = kilograms per hectare.

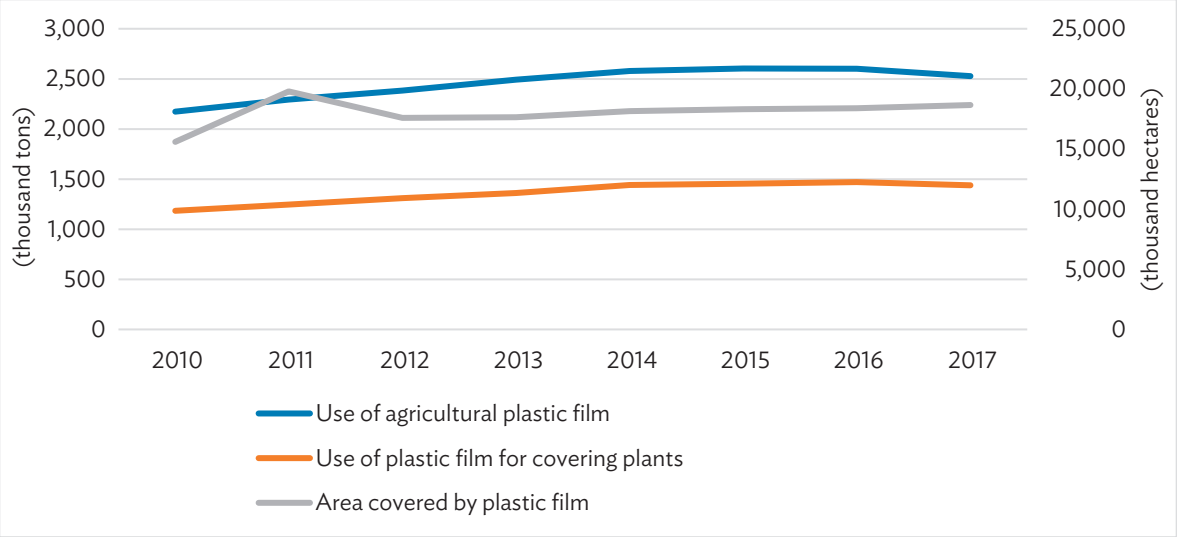
Source: FAOSTAT. http://www.fao.org/faostat/en/#data (accessed 15 June 2020).

the majority of the nutrients has been released into the soil and water, resulting in soil degradation and pollution, and eutrophication of surface water. According to the Ministry of Ecology and Environment (MEE) (MEE 2014), 16.1% of the PRC's soil has been polluted. Furthermore, chemical fertilizers and pesticides also cause water pollution including eutrophication of many of the PRC's key lakes and reservoirs, as well as air pollution.

A second major source of agricultural environment damage in the PRC is associated with the widespread use of plastic film and plastic mulch in vegetable and crop production, most of which are made of nondegradable plastics and mulch. From 1990 to 2015, the use of plastic mulch increased annually, mirroring increased land area covered by plastic films. In 2010, the annual use of plastic mulch was 2,173 thousand tons, and in 2015 it rose to 2,604 thousand tons. Finally, in 2016, plastic much use was stabilized at 2,603 thousand tons and eventually dropped to 2,528 thousand tons in 2017 (see Figure 14). Plastic films and mulch widely used in the PRC are difficult to collect and recycle. With the current technology in the PRC, it is often too costly to thoroughly collect used plastic films and mulches, resulting in uncollected plastics being left on the fields or burned together with crop residues, thereby adding to the PRC's agri-environmental woes.

The third major contributor to rural environmental decline is connected with the rising demand for animal-based food products, increased domestic livestock, and poultry production in recent decades. The PRC's poultry and livestock sector has gradually transitioned from backyard operations to a mixture

Figure 14: Use of Agricultural Plastic Film



Source: National Bureau of Statistics and Ministry of Ecology and Environment. 2018. China Statistical Yearbook on Environment. Beijing: China Statistics Press.

of backyard operations and industry-scale production. While large-scale operation is conducive to centralized treatment of farm wastes and pollutants, it nevertheless intensifies the pressure for waste control. With limited finance and environmental awareness, the installation and use of environmental treatment equipment generally lags far behind, resulting in increased rather than decreased environmental challenges. For instance, manure produced by rural livestock and poultry farms amounts to about 3.8 billion annually. A key indicator used in Chinese environment statistics to measure water pollution is chemical oxygen demand (COD), which quantifies the amount of oxidizable pollutants found in surface water or wastewater. Data compiled in the First National Pollutant Source Census Bulletin show that COD from livestock and poultry farming reached 12.7 million tons (in 2007) for about 96% of total COD generated from agriculture (MEE, NBS, and MOA 2010). Livestock and poultry production also contributed to nitrogen and phosphorus emissions, reaching one million and 161,000 tons, respectively, and accounting for 38% and 56% of the total agricultural source emissions.[7] These compound the nitrogen and phosphorus emissions from the application of chemical fertilizers.

A fourth major contributor to agricultural pollution is from crop and vegetable residues left on arable land. In the past, crop straws were used for cooking and heating and for feeding livestock, a practice that has gradually been abandoned. The large amount of crop residues in the harvest season every year is now routinely burned as a "cost-effective" way to clear the fields for the next planting season, creating potential fire hazards and causing severe air pollution. Of late, a campaign has begun to encourage returning processed straws back to the soil (State Council 2015c); however, insufficient processing of the residues and malpractice in returning them into the soil have caused serious issues for the next crop season.

Adding to the rural environmental challenges are rural household waste and the lack of treatment of such wastes. It is not uncommon in many villages to have no centralized location for delivering and storing household waste. The more than 564 million rural residents in the PRC generate about 110 million tons of household waste annually, of which 70 million tons are not treated and processed at all.

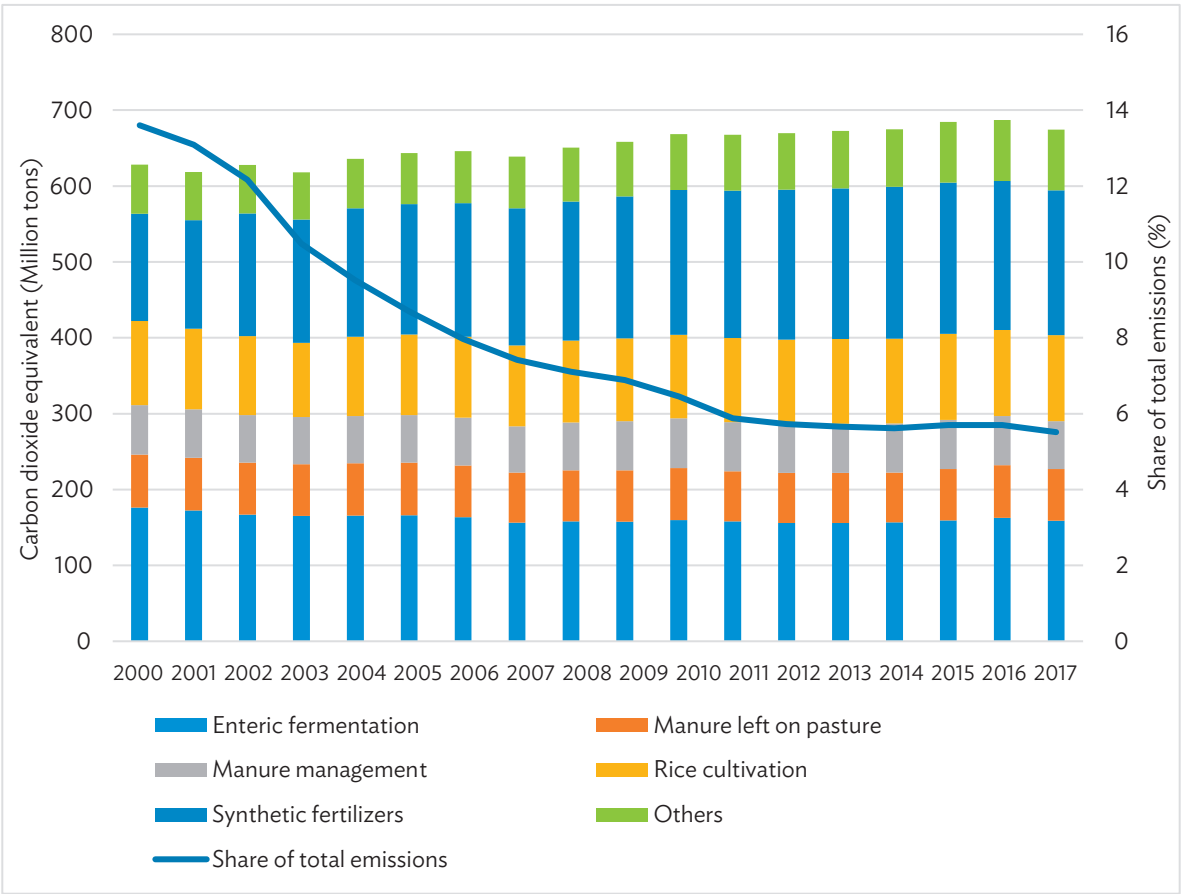
[7] Source: National Bureau of Statistics. 2010. First National Pollutant Source Census Bulletin. http://www.stats.gov.cn/tjsj/tjgb/qttjgb/qgqttjgb/201002/t20100211_30641.html.

2. Agricultural Greenhouse Gas Emissions

Climate change poses a common global challenge that also influences agricultural production. In the PRC, agriculture is a major emitter of greenhouse gases, particularly nitrous oxide (N_2O) and methane (CH_4). During 1978–2017, the PRC's annual agricultural greenhouse gas (GHG) emissions increased from 0.4 billion tons to 0.7 billion tons (measured in carbon dioxide equivalent [CO_2e]), representing an increase of about 60%, for an average annualized growth rate of 1.3%. In 2000, the share of agricultural emissions in the PRC's total GHG emissions was nearly 14%. This share has since been declining, due to the shrinking share of agriculture in gross domestic product (GDP) and the increasing use of fossil fuels in the industry sector. By 2011, the share of agricultural emissions dropped to around 6%. Since then, agricultural emissions have stabilized just below 6% (Figure 15).

Nitrous oxide emissions (e.g., due to the use of synthetic fertilizers) is a main component of agricultural GHG emissions. In the PRC, N_2O emissions increased on average by 2.3% per year for a total increase of more than 130% during 1978–2017, reaching the level of 373.3 million tons (measured in CO_2e) in 2017. Another major driver of increased agricultural emissions is rising emissions of methane (CH_4), with an increase from 246.8 million tons in 1978 to 301 million tons (CO_2e) in 2017 (see Figure 16). Methane

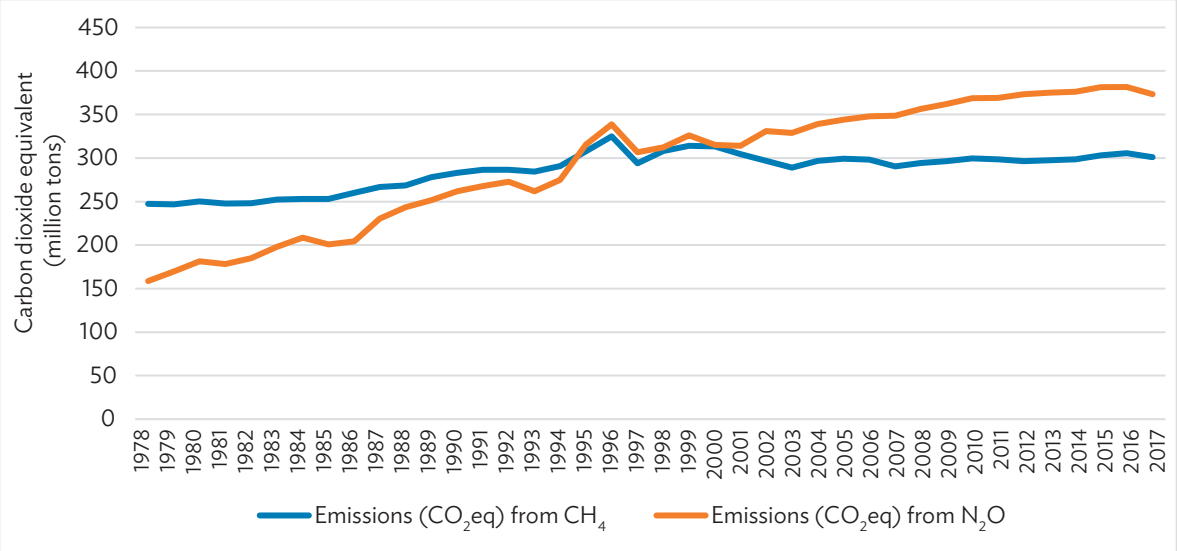
Figure 15: Agricultural Greenhouse Gas Emissions by Source



Note: Carbon dioxide equivalent in million tons.

Source: FAOSTAT. http://www.fao.org/faostat/en/#data (accessed 15 June 2020).

Figure 16: Methane and Nitrous Oxide Emissions



CH_4 = methane, CO_2eq = carbon dioxide equivalent, N_20 = nitrous oxide.

Note: Carbon dioxide equivalent in million tons.

Source: FAOSTAT. http://www.fao.org/faostat/en/#data (accessed 15 June 2020).

emissions from agriculture are connected to livestock production through enteric fermentation, manure management, and manure left on pasture (see Figure 15). From 1990 to 2017, synthetic fertilizers and enterprise fermentation on average accounted for 26.1% and 25.3% of agricultural greenhouse gas emissions (measured in CO_2e), respectively.

3. Agricultural Water Resources

The total amount of water resources in the PRC was 2,746.3 billion cubic meters (m^3) in 2018, including surface water resources at 2,632.3 billion m^3, groundwater resources at 824.7 billion m^3, and the nonoverlapped water resources between groundwater and surface water resources at 113.9 billion m^3. On a per capita basis, however, the PRC is considered a water-scarce country that faces the major water risks and major challenges to manage the spatial mismatches between water resources and water uses. According to OECD (2017), the PRC is one of three major agricultural production countries (together with India and the US) that are facing major current and future water risks in terms of water shortage, excessive water, climate variability, and water quality. Of the 118 risk observations identified in 64 studies surveyed by the OECD, the PRC leads with about 70% of both current and future severe water risk observations, covering mainly water shortage, excess, variability, and to a lesser extent, quality. The Northeastern Region in particular has high agricultural water risks in relation to cereal and cotton production, followed by the northwest and southeast regions. A more recent OECD report (OECD 2020) suggests that the PRC's water stress indicator[8] increased from 19.4 in 2000 to 21.3 in 2018 (see Table 5). In contrast, the water stress indicator for the OECD countries decreased from 9.9 to 8.9 during the same period.

[8] The water stress indicator refers to the intensity of use of freshwater resources. It is expressed as gross abstraction of freshwater as percentage of total available renewable freshwater resources. The EU is treated as a single area.

Table 5: Water Stress Indicators

	People's Republic of China		OECD Average	
Indicators	**2000**	**2018**	**2000**	**2018**
Share of agriculture in water abstraction (%)	68.8	61.4	46	49
Water stress indicator	19.4	21.3	9.9	8.9

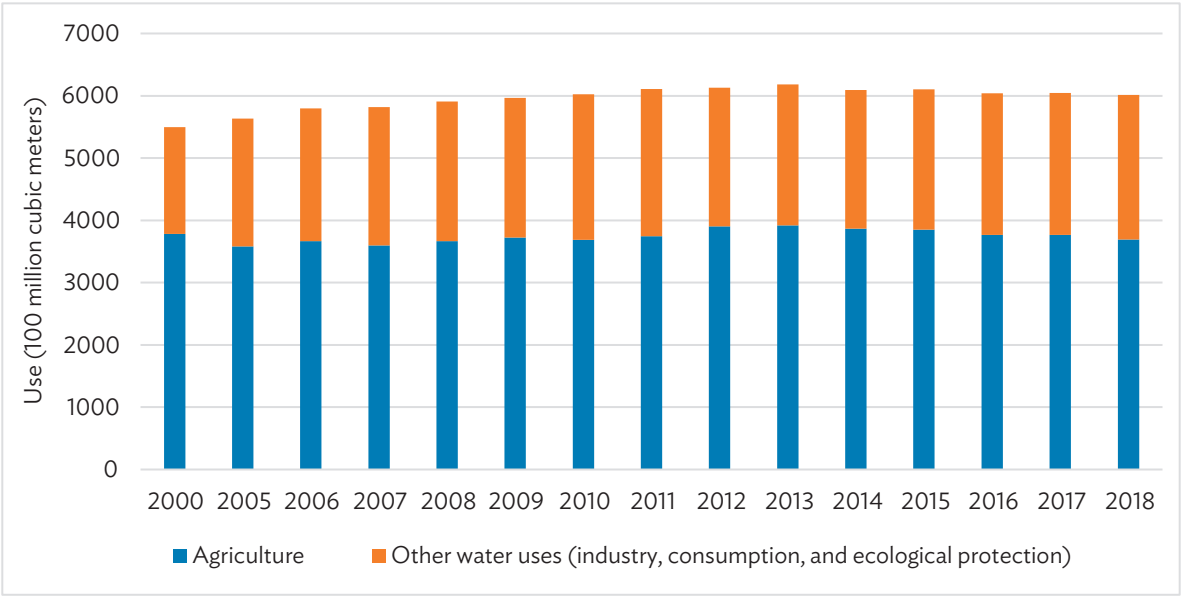
OECD = Organisation for Economic Co-operation and Development.

Source: OECD. 2020. *Agricultural Policy Monitoring and Evaluation 2020.* Paris: OECD Publishing. https://doi.org/10.1787/22217371.

Agriculture has been the dominant user of water resources in the PRC. Since 2000, water use in agriculture initially decreased and reached the lowest level in 2003 at 343.3 billion m^3. However, since then, agricultural water use has gradually increased and eventually reached 392.2 billion m^3 in 2013, before leveling off to 369.3 billion m^3 in 2018 (Figure 17). As total water use gradually increased during 2000–2013 and stabilized thereafter, the share of agriculture water use shrank from 68.8% in 2000 to 61.3% in 2011, before rebounding to 63.4% in 2013. According to the Ministry of Water Resources (MWR), in 2018, agricultural water use amounted to 369.3 billion m^3 representing 61.4% of total water use (MWR 2018)—still well above the OECD average of 49% for the same year (OECD 2020; see also Table 5). Therefore, increasing the efficiency in agricultural water use is crucial in easing the PRC's overall water pressure and in contributing to sustainable agricultural development.

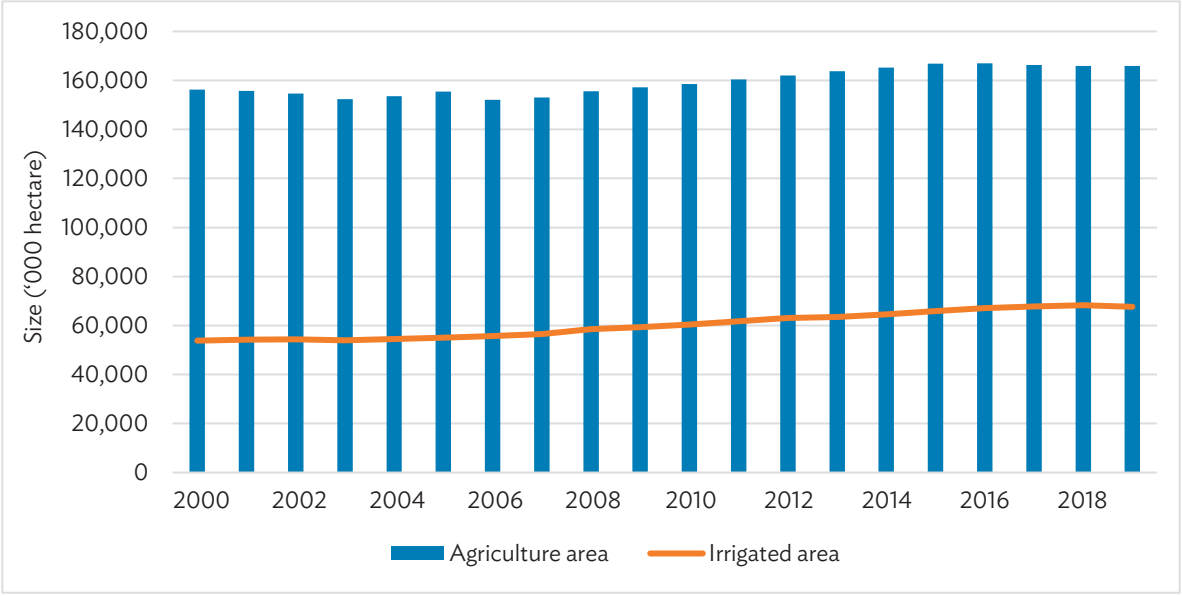
One key reason underlying agriculture's dominant share in water use is the PRC's vast irrigation areas and low effective utilization ratio of irrigation water. The PRC's irrigated land area increased from 53.8 million ha from 2000 to 67.6 million ha in 2019 (Figure 18). While total agricultural area has expanded, the proportion of irrigated land has also increased by six percentage points over the same period (from

Figure 17: People's Republic of China—Agriculture and Total Water Use, 2000–2018



Source: NBS. 2020. China Statistical Yearbook. http://www.stats.gov.cn/tjsj/ndsj/2020/indexeh.htm (accessed 8 October 2020).

Figure 18: Irrigated Land versus Total Arable Area, 2000–2019



Source: NBS. 2020. China Statistical Yearbook. http://www.stats.gov.cn/tjsj/ndsj/2020/indexeh.htm (accessed 8 October 2020).

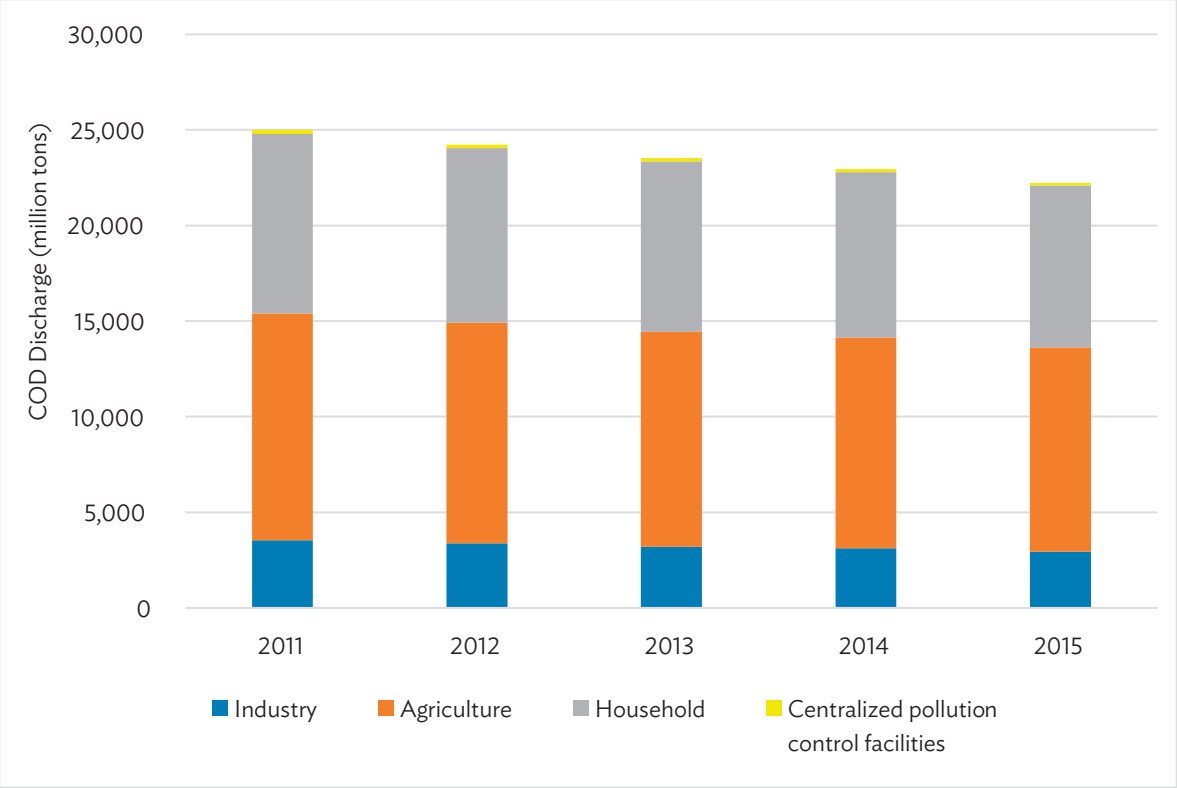
34.7% in 2000 to 40.7% in 2019). In 2013, irrigation consumed 55% of total water use, even though the PRC has managed to maintain zero growth of its irrigation water use during 2000–2013. However, only slightly over half of this irrigation water was effectively utilized. In 2018, the actual average water consumption per hectare of cultivated land was 5,475 m^3; however, the utilization ratio of water was only a little over 0.5, implying that 2,442 m^3 was wasted for each hectare of cultivated land. Therefore, without further improvement in irrigation water utilization, agricultural irrigation will continue to constrain the sustainability of Chinese agriculture.

In addition to water shortages, water pollution poses another challenge to sustainable agriculture development and rural livelihood. Agriculture has been a major source of water pollutants due to the use of chemical fertilizers, waste from livestock and poultry farming, and untreated household waste. For the period 2011–2015, agriculture released 47% to 48% of total COD, although in terms of quantity there was a small decrease from 11,861 million tons to 10,685 million tons during the period (see Figure 19).

Excessive nutrient pollution has led to persistent eutrophication in the PRC's surface water. An expanding list of "key" lakes and reservoirs has been under a national level monitoring and testing system. According to China Environmental Bulletins (see Table 6), during 2006–2011, 11 to 15 of the 26 to 28 key lakes and reservoirs—about half of these lakes—were in some state of eutrophication. Since 2012, monitoring and testing were expanded to cover up to 109 key lakes and reservoirs, a larger number of which (between 14 and 35) were again tested with various degrees of eutrophication. However, in this period, none of the lakes were judged to be in severe eutrophication. Inclusion of a larger number of lakes under national monitoring led to a reduction in the share of eutrophication since 2012.

This development has led to efforts in the PRC to increase the treatment of wastewater and other solid waste in the PRC's rural areas, as well as regulations on livestock and poultry production. For instance, in 2017, 49.4% and 17.2% of wastewater from urban and rural areas, respectively, was treated, whereas 51.2% of urban household waste and 23.6% of rural household waste was processed. In 2019, the State Council of China raised the target of treatment of livestock and poultry waste to 70% (State Council 2019a).

Figure 19: People's Republic of China—Chemical Oxygen Demand Discharges



COD=chemical oxygen demand.

Source: National Bureau of Statistics and Ministry of Ecology and Environment. 2018. China Statistical Yearbook on Environment. Beijing: China Statistics Press.

Table 6: Eutrophication in Key Lakes and Reservoirs in the People's Republic of China, 2006–2018

Number of Key Lakes and Reservoirs with Eutrophication					% of Total under National Monitoring	Total Number under National Monitoring
Year	Severe	Medium	Mild	Sum		
2006	2	4	9	15	55.6	27
2007	2	3	9	14	50.0	28
2008	1	5	6	12	42.9	28
2009	1	2	8	11	42.3	26
2010	1	2	11	14	53.8	26
2011	0	2	12	14	53.8	26
2012	0	4	11	15	21.7	69
2013	0	1	16	17	27.9	61

continued on next page

Table 6 *continued*

Number of Key Lakes and Reservoirs with Eutrophication					% of Total under National Monitoring	Total Number under National Monitoring
Year	Severe	Medium	Mild	Sum		
2014	0	2	13	15	24.6	61
2015	0	2	12	14	23.0	61
2016	0	5	20	25	23.1	108
2017	0	4	29	33	30.3	109
2018	0	6	25	31	29.0	107

Source: National Bureau of Statistics and Ministry of Ecology and Environment. 2019. China Statistical Yearbook on Environment. Beijing: China Statistics Press.

II. APPROACH TO RURAL DEVELOPMENT AND INTERNATIONAL EXPERIENCE

A. Overall Rural Development Strategy

The PRC's overall rural development strategy has been to adapt to evolving agricultural production and rural development situations over time. In the economic reform and opening up era, a series of major reforms and adjustments were conducted. For many of the years in this period, the PRC leadership, i.e., the Central Committee of the Communist Party of China (CCCPC) and the State Council, jointly released a series of five agricultural and rural development-focused guidelines outlining major policy priorities and measures. These five initial guidelines, known as "No. 1 documents," or generally referred to as the "first five No. 1 documents," provided the basic policy framework for the initial agricultural and rural reforms centered around the household responsibility system (see Appendix for the complete list of No. 1 documents between 1982 and 2020). These documents reveal the overall rural development strategies in the last 4 decades between 1982 and 2021. In what follows, we summarize key rural development strategy trends from these documents (Table 7).

Table 7: Evolution of Agriculture and Rural Development Policy in the People's Republic of China

Period	Late 1970s to Mid-1990s	Late 1990s to late 2000s	2010 to Present
Objectives	Increase food production and grain self-sufficiency	Increase farm income Competitiveness of agriculture Quality and safety of agricultural products	Sustainable development of agriculture Improvement of economic, social, and environmental welfare in rural areas Targeted poverty reduction and realization of moderately prosperous rural society
Instruments	Household responsibility system and the separation of collective land ownership and individual land use rights Marketing and procurement system reforms for grains and other crops Investment in basic infrastructure Land tax	WTO accession and agriculture trade policy reform Abolition of agricultural taxation Introduction of price-based and direct subsidy to boost production Incentives for agricultural mechanization and other measures to build "modernized agriculture"	Moderate food import Investment in R&D Increased provision of basic services and public goods Partnership with other industries such as ICT Investment in rural environmental infrastructure Rural vitalization and integrated urban–rural development strategy

ICT = information and communication technology, R&D = research and development, WTO = World Trade Organization.

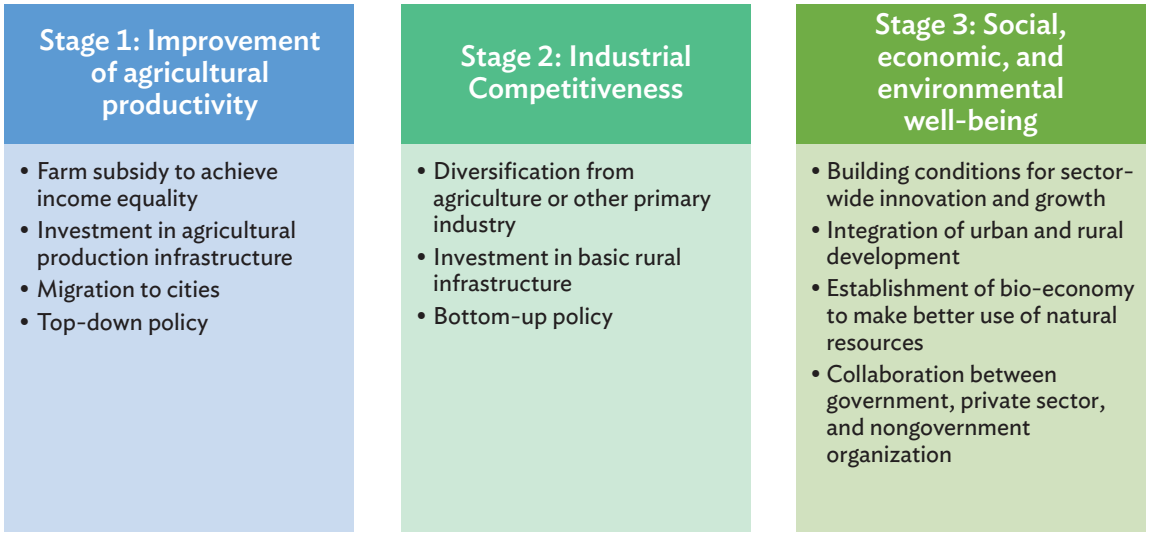
Source: Representation by the authors.

The evolution of rural development policy in the PRC is consistent with the experience in the countries of the OECD (Figure 20). The rural development policy starts with the promotion of the dominant primary industry (typically agriculture) aimed at the equalization of income of the industry with urban sectors. Support to agriculture focuses on improving food availability through increased agricultural production. The subsidization policy is often designed at the national level and uniformly applied to the regions. At the second stage, the policy focuses more on the competitiveness of the wider rural-based industries. The policy support is diversified to multiple sectors based on their competitiveness. While industrial

competitiveness continues to be a major focus of the rural development policy, rural development policy has evolved to assume a multidimensional focus, particularly on well-being.

In the latter stages, the objective of the rural development policy focused on delivering well-being to rural dwellers which is comparable to that in urban areas. In general, quality of life was seen as having (i) economic dimensions, where household income hinges on employment in firms that are productive and competitive; (ii) social dimensions, where households have access to a broad set of services (that may be delivered in different ways than in urban places) and where a local society that is cohesive and supportive is promoted; and (iii) a local environment that provides a pleasant place to live. The main policy issue addressed how the combination of environmental, social, economic, and cultural attributes blends to create a good quality of life and sense of local identity. In many cases, the natural environment was a major factor in the quality of life in rural areas. A broad range of connectivity between urban and rural areas was important to strengthen synergies between urban and rural areas including demographic linkages, economic transactions and innovation, delivery of public services, and exchange in amenities and environmental goods. More diverse stakeholders participated in rural development, including urban-based private sector institutions and nongovernment organizations. The role of the government to facilitate sector-wide innovation and entrepreneurship became more important than supporting the target industries.

Figure 20: Evolution of Rural Development Policy in Countries of the Organisation for Economic Co-operation and Development



Source: Adapted from OECD Rural Policy 3.0 Policy Note. 2018.

1. Household Responsibility Reform

Following the end of the Cultural Revolution in 1976, rural reform in the late 1970s kick-started the PRC's overall economic reform. This reform replaced the collective farming system established during the 1950s with the household responsibility system, under which the right to operate land was returned to individual farm households, while villages continued to hold collective land ownership. This system of "contracting land to farm households" and "contracting production to household" tremendously boosted agricultural production and increased farm income.

The five initial "No. 1 documents" unleashed tremendous agricultural production growth by allowing farmers to make their own production decisions, enabling the PRC to secure grain security (Box 2).

The successful rural reforms in the late 1970s and early 1980s also allowed the central government to shift its focus to the more difficult urban reforms in the ensuing years.

Box 2: Five Initial "No. 1 Documents" on Agriculture and Rural Development

- In 1982, the first "No. 1 document" was released. This document formally recognizes the household responsibility system as part of the "socialist responsibility production system" and confirms it as a component of the "socialist" agricultural economy, thereby fully legitimizing the household responsibility system.
- The second "No. 1 document" in 1983 theorized the household responsibility system as a "great invention" of Chinese farmers and considered it a new extension of the Marxist theory.
- In 1984, a third "No. 1" document was released, stipulating that the land contracts under the household responsibility system shall last at least 15 years.
- The fourth "No. 1" document in 1985 announced complementary reforms on marketing and procurement systems of grains and cash crops and recognized the role of markets in agricultural production and resource allocation.
- The fifth "No. 1" document in 1986 reconfirmed the direction of recent agricultural and rural reforms and also emphasized the role of rural industry development.

Source: Central Committee of the Communist Party of China.

2. Supporting Farm Incentives and Income: Tax Reforms and Direct Subsidies

From 2004—after a hiatus of 17 years—agriculture and rural development were again elevated to the top of the policy agenda, resulting in the resumption of the annual "No. 1" documents focusing on agricultural and rural development (see Box 3).

Box 3: "No. 1 Documents" to Support Farm Incentives and Income

- The "No. 1" document of 2004 explicitly raised the issue of increasing farm income and reducing urban–rural income gaps through direct subsidies to grain farmers, as well as direct subsidies to purchase new seed varieties and agricultural machinery. These subsidies also aim at increasing incentives to agricultural production, mainly grain production. The guidance also further reduced agricultural taxation burdens, a continuation of the efforts started in the previous year.
- In the "No. 1" document the following year, 2005, a set of additional measures were proposed to elevate the "comprehensive production capacity" through strengthened agricultural support policies, particularly for the main grain-producing provinces. Other measures included the protection of arable land, construction of irrigation facilities, agricultural research and innovation, and market development.
- In the 2006 version of the "No. 1" document with the overarching phrase of "constructing socialist new rural area," the emphasis continued to be on reducing the tax burden on agriculture and farmers, and pledging increasing transfer payments to agricultural and rural areas. The year concluded with agricultural taxation reforms and formally ended the long-standing agricultural taxations.

Source: Central Committee of the Communist Party of China.

In response to the the global economic downturn and following the world food price crisis of 2008–2009, the PRC once again emphasized the need to maintain the stable development of agriculture, including securing domestic grain supply. In the 2009 "No. 1" document, large increases in agricultural subsidies (including direct subsidies to grain production, improved seed variety subsidies, agricultural machinery purchase subsidies, and comprehensive agricultural input subsidies) were proposed and implemented (CCCPC and State Council 2009). The minimum purchase price for grains was increased, and in connection with that, public stockholding of food grains, cotton, vegetable oil, and pork were also raised. It should be noted that the minimum purchase price system for food grains as an important market price support program was strengthened in the next few years.

3. Building a "Modern Agriculture Sector"

The concept of "modern agriculture" has been raised repeatedly in agricultural policy discussions and has become a central theme of agricultural and rural development as advocated in the "No. 1" documents from 2007 onward (Box 4).

Box 4: "No. 1 Documents" on Agriculture and Rural Development to Build a Modern Agriculture Sector

Concrete measures to address agricultural and rural infrastructure can be found in the "No. 1" documents of 2007, 2008, 2009, 2011. In particular:

- The "No. 1" document of 2007 addresses cultivation of modern agricultural organizations such as cooperatives.
- The "No. 1" document of 2012 addresses agricultural technology and innovation.
- The "No. 1" document of 2013 covers institutional reforms in agricultural operations.

Source: Central Committee of the Communist Party of China.

- The "No. 1" document of 2007 integrates the concept of "modern agricultural development" into the overall *scientific development strategy*. According to this document, modern agriculture requires modern physical infrastructure, modern science and technology, modern production systems and operation methods, and new types of farmers. Major indicators of modern agriculture included presence of irrigation system, mechanization, use of information and communication technology (ICT), agricultural land and labor productivity, resource efficiency, and competitiveness. Allocations of finance, public investment in infrastructure, and research and development (R&D), development of multifunctional agriculture and rural industries, development of market systems, and upgrade of rural labor forces were considered the key drivers to realize agricultural modernization.
- Following this outline of modern agriculture development, the 2008 "No. 1" document focuses on *agricultural infrastructure*, covering small scale agricultural irrigation facilities, water saving irrigation, reinforcement of reservoirs, soil improvement, mechanization, and key ecological protection projects.
- *Water conservancy* is the focal topic of the "No. 1" document in 2011. Specifically, for agriculture, weak links have to be strengthened, including irrigation facilities for arable land, stressed small reservoirs, water shortages, flood and drought preparedness, and clean drinking water supply in rural areas. More broadly, the document also calls for actions on river management, complementary water resource projects, soil and water conservation and water ecological protection, and rational exploitation of hydrological energy. To realize these objectives, fiscal spending and financial resources are also committed. Finally, the document lays out strict targets in protecting water resource and in controlling water consumption.

- The "No. 1" document of 2012 addresses the role of *agricultural research and innovation* in enhancing sustainable agricultural supply, based on the recognition that intensive use of chemical fertilizers and pesticides is unlikely to lead to further yield growth (CCCPC and State Council 2012). Therefore, the key for further agricultural growth has to be realized through productivity improvement. Concrete action plans included increased spending on agricultural infrastructure, investment, agricultural R&D, higher education in agriculture and vocational training, and strengthened agricultural extensions and technology transfer systems.
- Cultivating *new agricultural production and operation organizations* is the headline of the 2013 "No. 1 document" (CCCPC and State Council 2013). The document recognizes the need to increase the organizational scale of agricultural production and business operations, by increasing the scale of agricultural production in "family farms" and through agricultural cooperatives; and by designing new mechanisms for promoting socialized agricultural services, allowing for various types of service providers to thrive. The document encourages and supports the usage rights of contracted land to be consolidated to allow for scale operations by large agricultural producers, family farms, and agricultural cooperatives through various types of arrangements.

4. Rural Reforms Extended to Rural Service and Public Goods Provision

From the initial reform of the household responsibility system, the scope of "rural reforms" was gradually expanded to include elements on rural development (see Box 5). Through a series of "No. 1" documents, the provision of basic rural services and public goods, establishment of rural social safety nets, and rural governance have increasingly become main elements of the PRC's rural development strategies, e.g., as discussed in the "No. 1" documents of 2007, 2008, 2015, and 2019.

Box 5: "No. 1 Documents" on Rural Service and Public Goods Provision

- The 2008 "No. 1" document calls for increased public service provision in rural areas, including rural education, basic medical services, family planning, rural culture, transportation, and rural utilities.
- In the 2015 "No. 1" document, equalized public service provisions are mentioned as part of the "new rural area" campaign, covering rural education, medical care, culture, minimum living standards, and rural pension insurance. This document also opened the door for private capital to participate in rural infrastructure and certain rural service provisions.
- The 2019 "No. 1" document once again lists areas where public service provisions are to be strengthened, ranging from rehabilitation of rural residential environment, to rural education, medical care, social security, pension, and culture and sports. The concept of "equalization" of basic service provisions between urban and rural areas is emphasized.

Source: Central Committee of the Communist Party of China.

5. Agricultural Supply-Side Reform, Rural Vitalization, and Integrated Urban–Rural Development

In responding to the new situation of excessive domestic production and high stock levels of major grains, "agricultural supply-side reform" including agricultural structural adjustments and focus on food safety and quality were proposed, in conjunction with the "rural vitalization" and "integrative urban and rural development" strategies in the "No. 1" documents of 2010, 2015, 2016, and 2017. As noted in Box 3, these new developments also covered areas such as wider application of ICT in agriculture, green agriculture, and environmental protection.

The Rural Vitalization Strategy (Box 6) was first proposed in Xi Jinping's report to the 19th CPC National Congress on 18 October 2017.[9] In the report, agriculture, rural areas, and farmers continue to be regarded as the fundamental issues of the nation and solutions to these issues should be regarded as the key issues of the CPC. Following the party congress, in September 2018, the Rural Vitalization Strategic Plan was formally released by the CCCPC and the State Council of China as "a major historic task for securing a decisive victory in building a moderately prosperous society in all respects and for fully building a modern socialist country" (CCCPC and State Council 2018).

The plan outlines key tasks for 2018–2022 toward the strategy's overall goal of building rural areas with thriving businesses, pleasant living environments, social etiquette and civility, effective governance, and prosperity. These tasks include prioritized development of agriculture and rural areas; developed mechanisms and policy frameworks for integrated urban–rural development; coordinated rural economic, political, cultural, social, and ecological development; accelerated modernization of rural governance system and capacity; and accelerated modernization of agriculture and rural areas.

The Rural Vitalization Strategy will be implemented in several stages. First, by 2020, the institutional and policy framework of rural vitalization should have been established. Detailed strategies and measures at regional and sectoral levels should have been implemented. Thereafter, the goal of a moderately prosperous rural society should be achieved. In the second step, by 2022, the institutional and policy framework should be completed. A set of rural vitalization models are to emerge as the initial indicator of success of the strategy. In the third step, a decisive progress of the strategy will be realized, achieving the modernization of the rural area and agriculture sectors. In the last step, by 2050, the PRC's rural areas will be completely vitalized, with a strong agriculture sector, gentrified villages, and well-off farm households.

Box 6: Definition of Rural Vitalization

The full realization of the "moderately prosperous society" (MPS) is one of the main goals of the Rural Vitalization Strategy. The MPS concept was first proposed by Deng Xiaoping in 1979, with the main indication being average per capita gross domestic product reaching the level of $800 by the end of the 20th century. Since then, the specific indicators of the MPS have been expanded and updated multiple times.

The Rural Vitalization Strategic Plan (CCCPC and State Council 2018) formally defines rural vitalization along five dimensions:

- *Thriving businesses.* "Solid" comprehensive agricultural production capacity, high-quality agricultural supply system, integrated development of primary, secondary, and tertiary sectors in the rural areas.
- *Pleasant living environments.* Adequate infrastructure, improving living environment, rehabilitated ecological environment, and equalization of basic public service provisions across urban and rural areas.
- *Rural civilization.* High degree of civilization, good spiritual well-being, civilized rural social interactions, good family relationships, high morality.

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[9] Source: People's Daily Online. 2017. "Xi Jinping's Report at the 19th National Congress of the Communist Party of China." http://cpc.people.com.cn/n1/2017/1028/c64094-29613660.html (accessed 12 May 2021).

Box 6 *continued*

- *Effective governance.* Party leadership, responsible government, social collaboration, public participation, and guaranteed rule of law, ensuring the rural society of vitality, harmony and order.
- *Prosperous life.* High quality employment, diversified income sources, reduced urban–rural income gaps.

For each of the five dimensions, specific goals and targets are declared with a multitude of indicators for 2020 and 2022, using 2016 as the base year. For example, in relation to the "prosperous life" dimension, specific targets during 2016–2022 are declared regarding rural Engel coefficient (a reduction from 32.2% to 29.2%), urban–rural income ratios (decreasing from 2.7 to 2.6), penetration ratio of tap water (increasing from 79% to 85%), and village level connectivity to hard-surface roads (increasing from 96.7% to 100%). Similarly, targets such as livestock waste treatment, village green space, domestic waste treatment, and modern toilets are declared along the "pleasant living environment" dimension.

Source: Central Committee of the Chinese Communist Party (CCCPC) and State Council of China. 2018. Rural Revitalization Strategic Planning (2018–2022) (in Chinese). http://www.gov.cn/xinwen/2018-09/26/content_5325534.htm (accessed 7 October 2020).

6. Targeted Poverty Reduction and Moderately Prosperous Rural Society

Poverty reduction in the PRC focuses on reducing rural poverty due to the apparent and persistent urban–rural income gap, and it has been the recurrent focus of the PRC's rural development strategy. Owing to the fact that "decisive" achievements have been made in reducing and/or eradicating rural poverty, in recent years, policy priority has been placed on targeted poverty reductions on the remaining poor population. In the most recent "No. 1" document in 2020, targeted poverty reductions were to be completed in connection with the realization of the "moderately prosperous" society (CCCPC and State Council 2020). In particular, the remaining areas with concentrations of poor populations were to receive the highest attention. Another policy priority is to design long-term mechanisms to detect and prevent returns to poverty.

B. Agricultural Modernization

1. Institutional Reform

a. Rural Land Rights Reform and Land Market Development

Land rights have always been the core issue of the PRC's rural institutions and institutional reforms. Since the founding of the PRC, four rounds of major land reforms have been carried out, transitioning from individual ownership to collective ownership initially, then from the collective ownership to the household responsibility system that separates land use rights from land ownership (Zheng et al. 2019).

The Land Reform Law of the PRC in the 1950s declared the abolition of "feudal land ownership and implementation of peasant land ownership," allowing peasants the right to own, use, transfer, and benefit from their allocated land. However, the individualized land ownership was short-lived. In 1956, the *Model Charter of Agricultural Production Cooperatives* signaled the start of the collective land ownership, implying the transition from individual land ownership to a collective land ownership by villages (NPC 1956).

Individual farmers eventually became members of "production teams" under which agricultural productions were organized on collectively owned land. Some 20 years of the collective farming system greatly damaged individual farmers' incentives and slowed down agricultural development in the PRC.

In the late 1970s, another round of major reform was started, returning the use and/or operation rights of land to individual farmers, while retaining the collective land ownership under the household responsibility system. The legal status of the separation of land ownership and land use rights has been confirmed in the "No. 1" document of 1982 (CCCPC 1982). This document also formally stipulated the length of the individual land contract as 15 years. Follow-up reforms also emphasized the long-term stability of the land contracts, allowing the contracts to be renewed by another 30 years upon the expiration of the initial contracts. Relevant policy also allows for certifications of land contracts to individual farmers, thereby opening the possibility for individual farmers to rent-in or rent-out contracted land. This has led to increased production scales as farmers can rent-in land.

During the second round of contracting period, in order to give farmers full and guaranteed land contracting rights, the 2009 "No. 1" Document (CCCPC and the State Council 2009) announced pilot projects for the registration and certification of rural land contracting (commonly referred to as "clarification of agricultural land contracts"). While this process initially aimed at maintaining the long-term stability of the land contracts, it also formally opened doors for more secure transfers of land operation rights. In 2014, the CCCPC and the State Council issued a document stating the need to adhere to the collective ownership of rural land, stabilize farmers' contracting rights, and loosen up land management rights (CCCPC and State Council 2014). This officially created another separation of land rights in the PRC, resulting in the "three rights separation" of ownership, contractual rights, and management rights among villages, farmers, and actual farmland operators.

The fourth major change in the PRC's land institutional reform was for land contracts to not only allow holders of land contracts to use contracted land as marketable assets and receive dividends, but to also use contracted land as collateral to obtain loans and credits. Compared to the past, farmers now have more land use rights, the right to derive nonagricultural income, and greater possibility of land transfer. In 2017, the "No. 1" document further proposed the implementation of the policy of stable and long-term unchanged rural land contract relations, and the implementation of the policy to extend the second round of land contracts for another 30 years (CCCPC and the State Council 2017).

The implementation of the fourth land institutional reform has led to nationwide "clarification" of land contracts, including clarified land contracts with regard to the size of the contracted land and location. The certification strengthened the legal standing of land contracts and eliminated the uncertainties associated with reallocation at the village level (Li 2020). In practice, the certificates were produced by the provincial government under the supervision of the Ministry of Agriculture and issued by county-level governments. By the end of 2016, the "clarification" process covered 492,000 villages in 2,545 counties and achieved clarifications of contracts for 0.75 billion hectares of land, representing 59% of all contracted land in the second contracting period.[10]

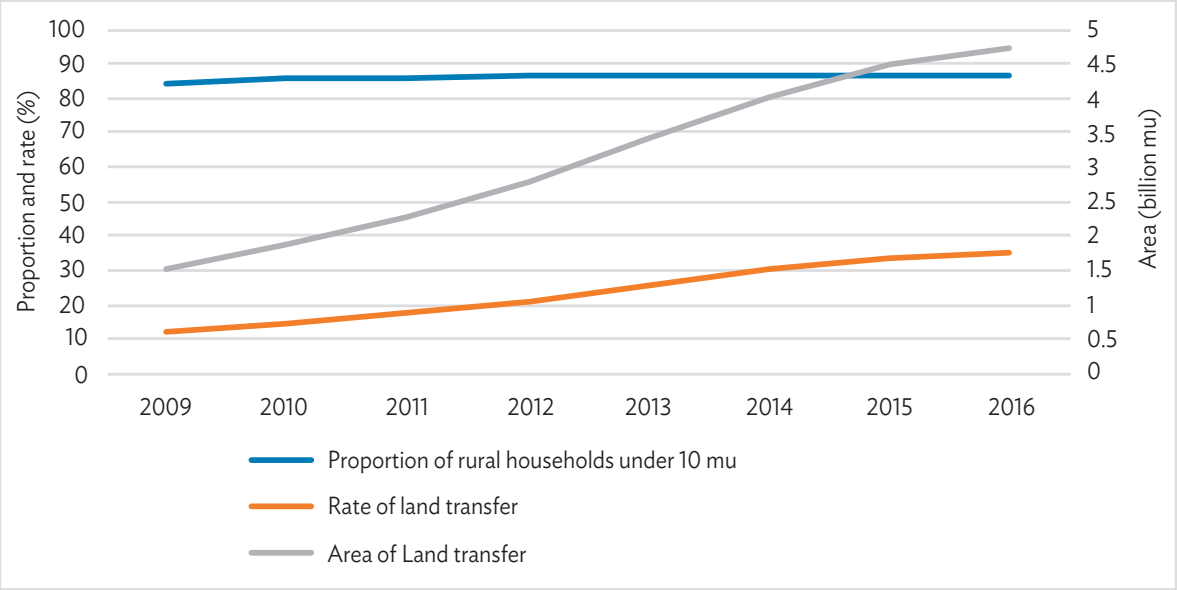
With increased security of land contracts courtesy of the government, land transfer through subcontracting, swapping, leasing, shareholding, and the like has increased dramatically. According to the Ministry of Agriculture and Rural Affairs, total "transferred" land rose from 1.5 billion *mu*[11] in 2009 to 4.7 billion *mu* in 2016 (see Figure 21). With increased land market movements, large-scale agricultural operations have emerged. According to the Third National Agricultural Census, farm operations in 2016

[10] Source: Ministry of Natural Resources of the PRC. 2016. http://www.mnr.gov.cn/dt/td/201612/t20161208_2360288.html (accessed 8 July 2020).

[11] A *mu* is a Chinese unit of measurement (1 mu = 666.67 m^2).

at scale levels (referring to farms with more than 100 *mu* in the northern PRC and more than 50 *mu* in the southern PRC) already accounted for 28.6% of total cultivated area.

Figure 21: People's Republic of China—Land Transfers, 2009–2016



Note: A mu is a Chinese unit of measurement (1 mu = 666.67 m^2).

Source: Ministry of Agriculture and Rural Affairs. 2019. *China Rural Management Statistics Annual Report.*

Another important dimension of land institutional reforms in the PRC concerns the tension between urbanization and rural land ownership. In the PRC's urban areas, land ownership belongs to the state, whereas in the rural areas, land is owned collectively by villages. With rapid urbanization, demand for land has been increasing for urban expansion, requiring additional land supply from the rural areas. However, this implies that collectively owned rural land needs to be converted into urban land, an onerous administrative process. For a long time, the conversion of arable land, rural construction land, and rural housing plots had been strictly controlled. Compounding this challenge is the fact that rural residents normally could not gain *hukou* in urban areas, nor could they be adequately compensated from the conversion of the land that they own collectively. These challenges have led to some further pilot institutional reforms in connection with urbanization and the *hukou* system reform. In the future, innovative solutions have to be made to address this issue at a national scale (Zhou et al. 2017).

b. Development of Voluntary Farmers' Cooperatives

Farmers' professional cooperatives are a new type of cooperative organization where the majority of farmers adapt to the requirements of the market economy and voluntarily choose, set up independently, and benefit themselves without changing the household contractual management. The experience of developed countries in modern agricultural development shows that the development of professional farmers cooperatives on the basis of the family management system is an effective way to cultivate market competition players, resolve the contradiction between small production and large markets, and increase the degree of organization among farmers (Wu 2010).

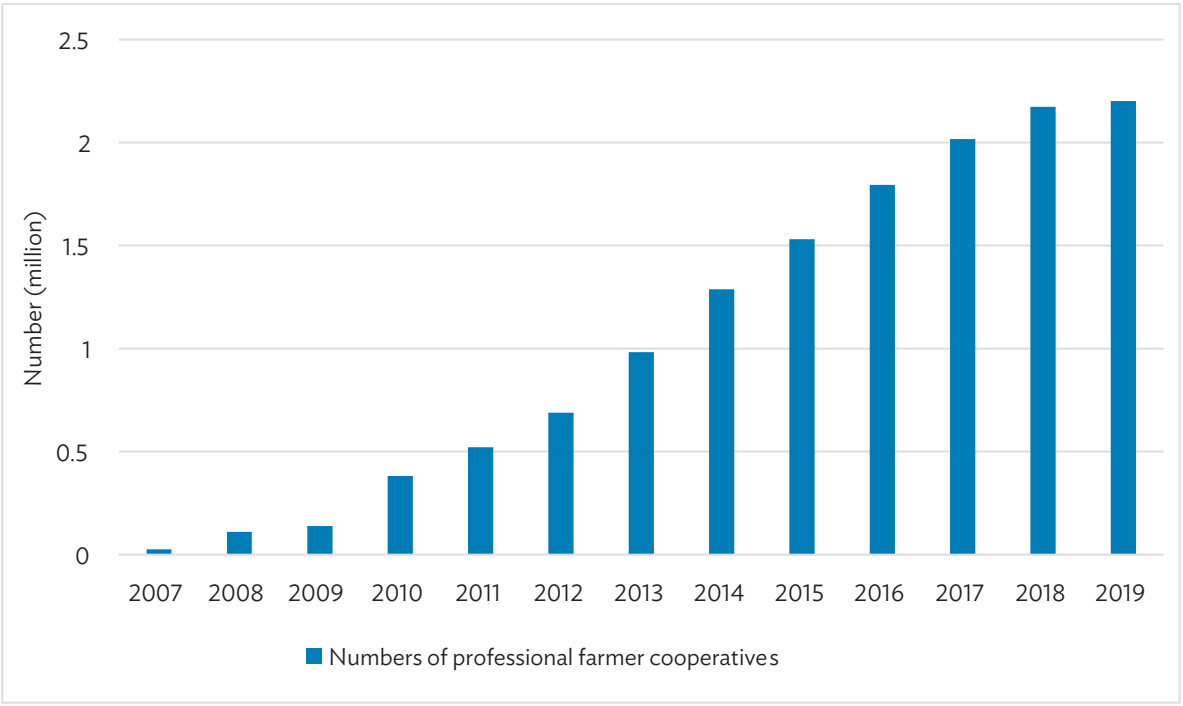
In the late 1970s and early 1980s, with the rural household responsibility system replacing the collective farm system, rural households generally became the basic entity of agricultural production and management, resulting in a large number of individual farmers having to access the markets individually. This naturally

demanded solutions to better facilitate farmers' market participation, leading to the emergence of farmers' professional technology associations and rural cooperative foundations to provide farmers with more organized access to inputs and technology, as well as markets for their outputs. Initially, these cooperatives were quite small and generally were not well functioning. Increased marketization of agriculture and an enabling policy environment led to further development of various professional cooperatives in the 1990s, including professional technical and research associations, professional cooperatives, consortia, and service companies. After 2000, farmers' professional cooperatives entered into an accelerated development stage. A large number of cooperatives and professional associations with shares owned by farmers emerged. One prominent feature of these cooperatives is that share-holding members jointly invested in economic entities engaged in the processing of agricultural products (Zhang 2009).

The institutional framework to provide a legal status to farmer professional cooperatives (FPC) was promulgated in 2007. The governance of FPC is based on the principles of "voluntary participation, free withdrawal, democratic control and return of surplus to cooperative members." Farmers are required to constitute at least 80% of the cooperative members, each having a single vote. The central policy and local governments have been trying to promote and foster FPCs since the late 1990s and increased the role of FPCs as a recipient of government financial support (Chen 2019).

Since 2007, the number of cooperatives has experienced rapid growth. According to the Ministry of Agriculture and Rural Affairs, there were 111,000 farmer cooperatives nationwide in 2008. By the end of 2019, the number of legally registered cooperatives had reached 2.2 million[12] (see Figure 22). Farmers'

Figure 22: Number of Professional Farmer Cooperatives



Source: State Administration for Industry and Commerce. 2020. The basic situation of the development of national market entities in 2019. http://www.samr.gov.cn/zhghs/tjsj/ (accessed 13 May 2021).

[12] Source: State Administration for Market Regulation. 2020. http://www.samr.gov.cn/zhghs/tjsj/202003/t20200305_312509.html (accessed 14 May 2021).

cooperatives have become a major force behind the agricultural modernization process. As a voluntary organization organized by agricultural producers, they effectively promote farmers' income and agricultural production and play an important role in realizing poverty alleviation and rural revitalization.

In addition to providing a legal status and standard operational rules for the farmers' cooperatives, the government is increasing direct support to them. For example, the government provides them with financial and technical support through preferential treatment for value-added tax and stamp duties, credit guarantees, and personnel training (Zong 2016). The cooperatives have also become a major recipient of producer subsidies.

FPC services typically include technical training, processing, marketing, and purchasing inputs. The cooperatives often function as a broker of technologies by sharing information and providing advisory and training services. In other cases, the cooperatives allow smallholder farms to obtain more competitive prices in input and output markets through their bargaining power. While retailers and food processors often face high transaction costs when contracting directly with small-scale farms, the cooperatives facilitate contract farming and the integration of smallholder farms to value chains.

After a period of rapid growth, the PRC's FPC have evolved into six major categories (Kong and Pian 2019):

(i) *"Typical" farmers' professional cooperatives.* These cooperatives organize procurement, production decisions and standards, sales and marketing, and distributions of profits among members.
(ii) *Share-holding cooperatives.* Farmers transfer the operation rights of their land contracts in exchange for shares in the cooperative. This arrangement allows members to participate in the allocation of the dividends from the cooperatives.
(iii) *Professional agricultural machinery cooperative, focusing on providing agricultural machinery services.* Members are typically agricultural machinery operators who provide agricultural machinery services to farmers, especially for the cross-regional harvesting of rice, wheat, corn, and other crops.
(iv) *Marketing service-oriented farmers' cooperative.* The focus is on providing agricultural market information services for all stages of farm activities.
(v) *Farmers' finance cooperatives.* These act as informal financial institutions by pooling funds together to provide credit among members themselves. These cooperatives are an attempt to alleviate farmers' credit constraints, as obtaining credit from formal financial institutions are typically difficult for small producers.
(vi) *Cooperative of farmers' professional cooperatives.* This is a more advanced organization built upon existing cooperatives.

c. Agricultural Mechanization Services

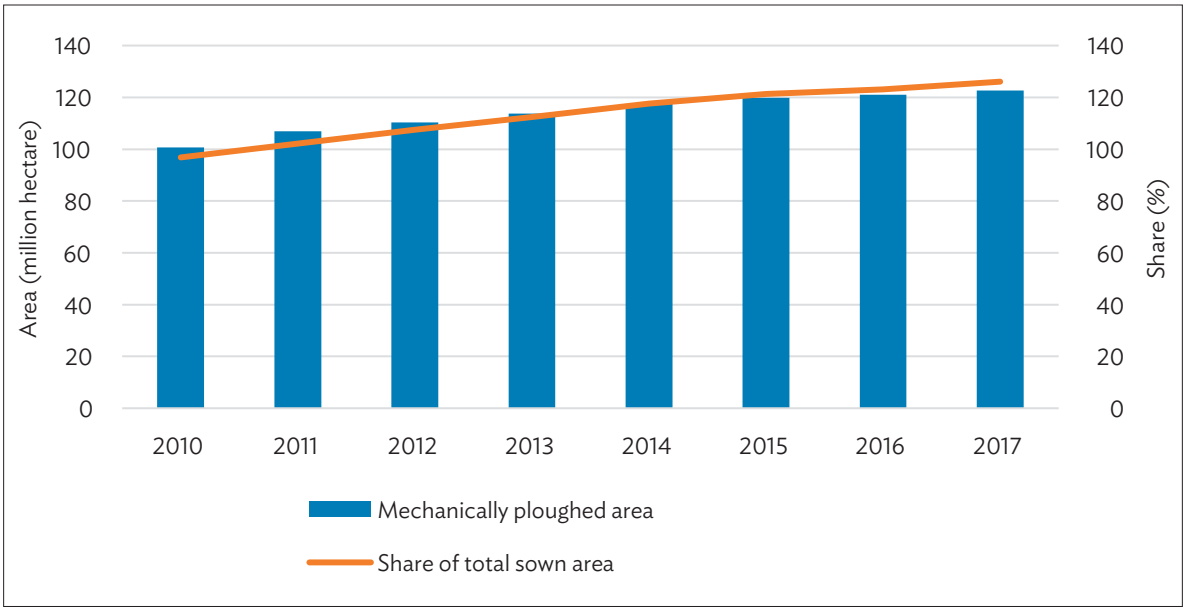
Rapid industrialization and urbanization have created ample employment opportunities in the urban areas, resulting in sustained urban–rural migration that has fundamentally changed the PRC's rural labor market. With a reduced and aging rural labor force, it is only natural that demand for mechanization services—as substitutes for manual labor—has been on the rise. Recognizing this important development, the PRC government has proactively promoted agricultural mechanization. In 2004, the Agricultural Mechanization Promotion Law was enacted to support the development of agricultural machinery social service (NPC 2004). More concrete policy measures include encouraging cross-regional operations of large machineries such as large combine harvesters, certifying professional mechanization service providers, and providing financial incentives such agricultural machinery subsidies. These subsidies significantly reduce the purchase and replacement costs to machinery buyers and owners, allowing them to offer professional mechanization services that at times can cover geographical areas extending the boundaries of counties or even provinces. It also allows small producers to access mechanization services without having to buy machineries themselves.

While urban–rural migration and structural changes in the rural labor market created demand for agricultural mechanization services, the great expansion of such services also allows farmers greater flexibilities to seek off-farm employment opportunities, thereby aiding the migration process itself.

Generally, two types of mechanization services exist in the PRC. One is mechanical services provided by Specialized Custom Plowers, Planters, and Harvesters (SCPPH) teams, which own large machines. The other is machine rental markets, where households operate rented machines. There has been a rapid rise in SCPPH teams' activities. Most typically, SCPPH teams provide mechanical operation services from ploughing to harvesting to smallholders. The rapid mechanization in agriculture through professional service provision (also known as "socialized service provision" in the PRC) represents an important institutional innovation. Broadly speaking, socialized agricultural machinery services are provided by individual agricultural machinery service providers, or organizations such as agricultural machinery cooperatives and other agricultural machinery service organizations, covering a wide range of farm mechanization activities such as agricultural machinery technical services; maintenance; technical guidance and promotion of agricultural machineries; and various mechanized operation services such as field preparation, planting, harvesting, transportation, storage, etc. The provision of such services allows farmers operating on small farms to access timely mechanization services during the period when demand for such services is concentrated. By purchasing such services rather than purchasing their own machines, farmers can also avoid unnecessary and costly machinery capacities (Guo et al. 2020).

According to official data from the Ministry of Agriculture and Rural Affairs, in 1978, there were only 560,000 large and medium-sized tractors and less than 20,000 combine harvesters nationwide. By 2017, there were 6.7 million large and medium-sized tractors nationwide, and 2.0 million combine harvesters. In 2017, the combined power of agricultural machinery in the country reached 978.8 million kilowatts, providing mechanization services to 122.7 million hectares of the PRC's arable land[13] (see Figure 23).

Figure 23: Agricultural Mechanization



Source: China Machinery Industry Information Research Institute. 2018. China Agricultural Machinery Industry Yearbook Beijing: China Machinery Industry Press.

[13] Source: Ministry of Agriculture and Rural Affairs (MOA). 2018. Rural reform writes a glorious history. http://www.moa.gov.cn/ztzl/zgnmfsj/xdnycj/201809/t20180923_6157910.htm (accessed 13 May 2021).

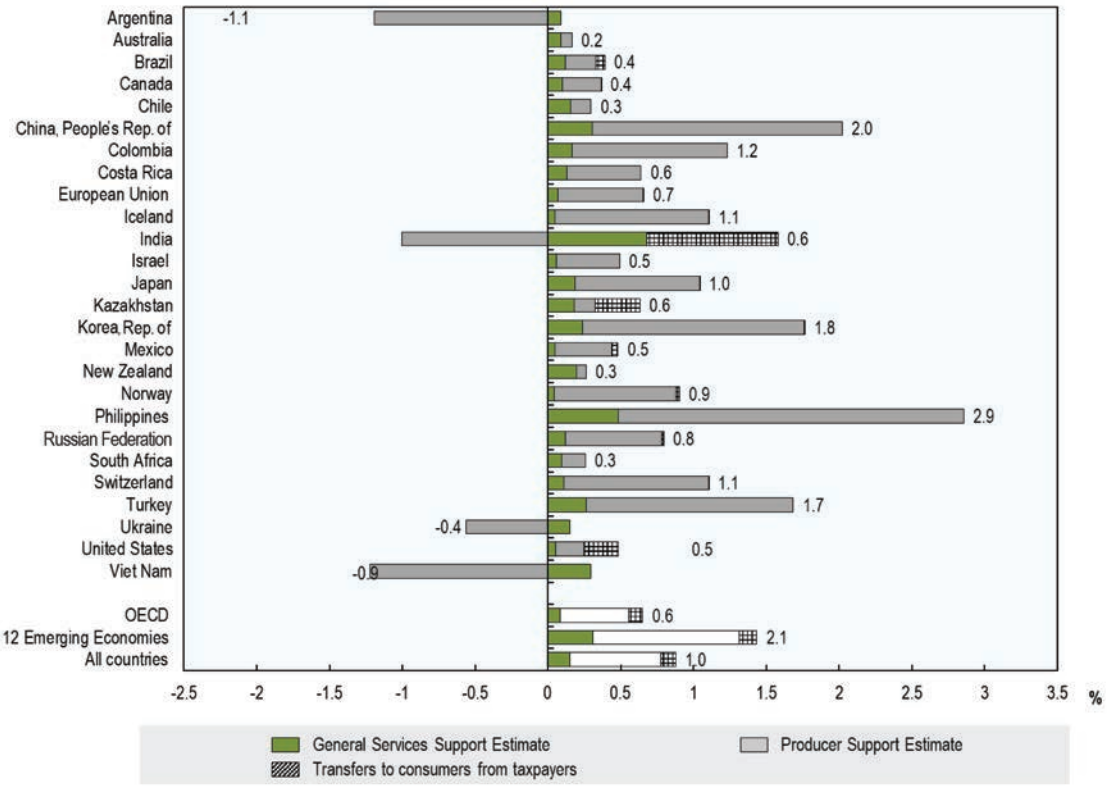
2. Agricultural Support Policy

According to OECD estimates, total support to agriculture in the PRC is equivalent to 2% of GDP, which is much higher than the OECD average (Figure 24). The support to agriculture in the PRC is largely dominated by support to producers, including budgetary payments and market price support. The budgetary expenditure for agriculture was 0.8% of GDP in 2017–2019, which was higher than the average of 0.6% in OECD countries.

Since the early 2000s, the PRC quickly shifted from taxing farmers through land tax to supporting farmers through border measures and subsidy programs. The PRC's agricultural support policy evolved quickly from maintaining 95% of grain self-sufficiency to wider socio-economic objectives including environmental conservation. The support has been gradually decoupled from commodity production; however, the cost associated with public stockholding still comprises the major part of the expenditure to agriculture. Shifting resources to more forward-looking investments would benefit the sustainable growth of agriculture in the country.

The Producer Support Estimate (PSE) published by OECD shows an increase in the level of producer support in the last 2 decades (Figure 25). Between 1996 and 1999, the Market Price Support was negative, and the budgetary payments were dominated by input payments such as fertilizer subsidy. Market Price Support became positive in 2000–2001, but the payments based on agricultural inputs still dominated the producer support. Since 2002, Market Price Support has increased at a faster pace than budgetary payments and has

Figure 24: Composition of Support to Agriculture (%)



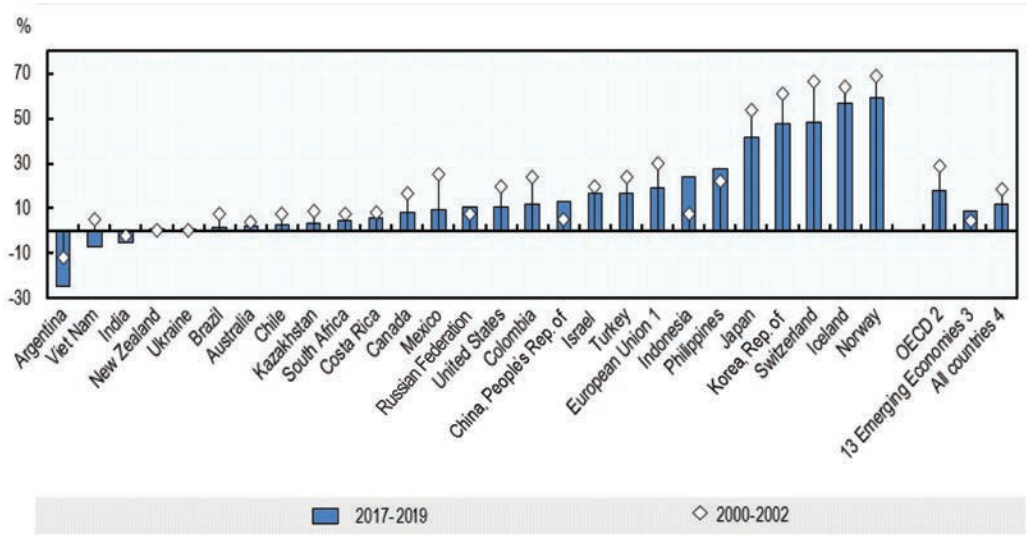
OECD = Organisation for Economic Co-operation and Development.

Source: OECD PSE/CSE/GSSE database. 2019. https://doi.org/10.1787/22217371 (accessed 12 August 2020).

become the main instrument for supporting agricultural producers. In 2008, domestic prices in the PRC remained stable in spite of a price spike in agricultural products in international markets, leading to negative market price support. From 2007 to 2019, the level of producer support was 13.3% of the gross farm revenue, which was below the average in OECD area and close to that of the European Union.

From 2017 to 2019, budgetary expenditure to support general services in agriculture such as R&D, infrastructure, and public stockholding accounted for 15.9% of total support to agriculture (Figure 26). In the PRC, more than

Figure 25: Evolution of Producer Support (%)

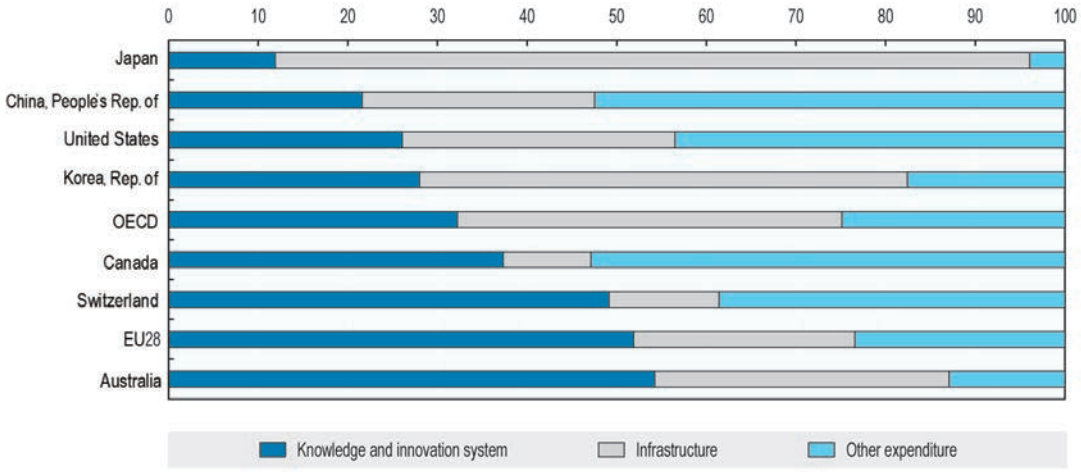


OECD = Organisation for Economic Co-operation and Development.

Note: Percentages are shares of gross farm revenue.

Source: OECD PSE/CSE/GSSE database, 2020. https://doi.org/10.1787/22217371 (accessed 12 August 2020).

Figure 26: Composition of General Services Support Estimate (%)



OECD = Organisation for Economic Co-operation and Development.

Source: OECD PSE/CSE/GSSE database. 2020. https://doi.org/10.1787/22217371 (accessed 12 August 2020).

half of such expenditure is directed to the cost of public stockholding. The agriculture sector would benefit more from reallocating the budgetary expenditure toward policy areas that support more long-term productivity and sustainability of agriculture such as investment in agriculture R&D and human capital development.

C. Transformation of Rural Industry

1. Investments in Basic Infrastructure

The PRC has invested heavily in the basic services – including rural infrastructure, roads and transport, energy, access to finance, and agriculture-associated logistics services. This section describes how these investments in basic services contributed to the industrial transformation of rural areas in the PRC (Miu 2019).

Investment in basic rural infrastructure has increasingly been emphasized by the PRC government and has been included in several "No. 1" documents (e.g., CCCPC and the State Council 2007). Initially, rural infrastructure was more narrowly understood as agricultural infrastructure, mainly in the areas of arable land, agricultural irrigation facilities, and more generally, water conservancy. This narrow focus has gradually been expanded during the reform and opening-up era to rural infrastructure that serves not only agricultural production but also more diversified rural economic activities, such as roads and transport, telecommunication, electricity and energy supply, as well as infrastructure that improves rural residents' livelihood such as rural education, public health and medical care, and social safety nets.

Among the basic agricultural infrastructure, the focus on agricultural land and irrigation facilities has continued for purposes of increasing productivity and resilience to drought and other disasters. This includes efforts on improving many of the small-scale agricultural irrigation installations and the construction of large water conservancy projects, which greatly improve agricultural irrigation infrastructure. According to the Ministry of Water Resources (MWR 2018), during 1979–2018, irrigated arable land increased from 700 million *mu* (46.7 million hectares) to 1,020 million *mu* (68 million hectares), an increase of 45.7%. At the same time, the Ministry of Agriculture and Rural Affairs (2018) reports "high-standard" arable land nationwide reached the level of 640 million *mu* (42.7 million hectares). The PRC also invested heavily to upgrade irrigation technologies, for example by adopting micro sprinkler irrigation and drip irrigation, with the former technology widely adopted in crop agriculture and the latter used in high-value agriculture. In addition, under-mulch drip irrigation is also used in arid and semiarid areas in the Northwest Region.

Aside from agricultural infrastructure, the PRC has increased spending on rural infrastructure, resulting in significant upgraded rural water supply, electricity and gas distribution, roads, and housing, as part of the overall strategy to construct "beautiful and livable rural areas." According to the Third National Agricultural Census[14] (as reported in Tables 8 and 9), by the end of 2016, the number of villages (including village committees and rural residents' committees) having access to public roads accounted for 99.3% of all villages nationwide. This is an increase of 3.8 percentage points as compared to the situation in 2006, as reported in the Second National Agricultural Census. Among the different regions, although the ratios of road connectivity were different in both 2006 and 2016, these differences appear to be quite minor, suggesting that road connectivity improves universally across the PRC, including the remote Western Region. The "quality" of the roads, as measured by the surfaces of the roads leading to the villages (e.g., cement pavement, asphalt, or gravel), improved more between 2006 and 2016. In 2006, about one-quarter of the rural roads nationwide were gravel roads, and 42.7% of the road in the Western

[14] Source: NBS. 2017. http://www.stats.gov.cn/tjsj/tjgb/nypcgb/(accessed 15 October 2020).

Region were gravel roads. By 2016, gravel roads decreased to only 2.3%; for the Western Region, the share of gravel roads also shrank to 5.3%. Another indicator that measures the shares of main roads within villages by surface type also points to dramatic improvement of road quality in the PRC's villages during the same period. Finally, village roads with streetlights also rose from 21.8% to 61.9% during 2006–2016, another piece of evidence indicating improved road connectivity in rural areas.

Table 8: Rural Transportation Facilities (%)

	Nationwide		Eastern Region		Central Region		Western Region		Northeast Region	
Indicators	**2016**	**2006**	**2016**	**2006**	**2016**	**2006**	**2016**	**2006**	**2016**	**2006**
Village with highway	99.3	95.5	99.9	98.2	99.5	96.1	98.3	91.2	99.7	98.1
Villages by road type leading to the village										
Cement pavement	76.4	35.2	76.4	51.8	86.1	37.2	70.2	14.1	59.3	25.1
Asphalt road	20.2	26.3	22.2	32.8	12.3	26.7	22.5	16.4	35.1	34.7
Gravel road	2.3	25.7	0.6	10.8	1.0	26.3	5.3	42.7	3.5	32.7
Villages by type of main roads in the village										
Cement pavement	80.9	27.7	84.0	44.0	89.7	26.4	72.7	10.6	60.0	15.6
Asphalt road	8.6	11.1	11.1	16.5	3.4	11.0	9.0	4.3	15.9	13.0
Gravel road	6.7	35.7	2.4	24.1	4.7	38.9	11.7	43.5	18.9	57.0
Villages with streetlights on the main roads	61.9	21.8	85.9	44.5	59.8	13.0	35.5	4.0	54.1	10.9

Source: NBS. 2017.The Third National Agricultural Census. http://www.stats.gov.cn/tjsj/tjgb/nypcgb (accessed 15 October 2020).

In terms of rural energy supply (Table 9), the share of villages with electricity supply increased by 1.9 percentage points from 2006, reaching the level of 99.7% in 2016. In terms of ICT, the proportion of villages with cable TVs installed was 82.8% in 2016, an increase of 25.4 percentage points compared to 10 years ago. In addition, nearly 90% of the villages across the country have already connected to the internet. This increased access to ICT also gives farmers the opportunity to conduct e-commerce. In 2016, about one-quarter of the villages in the country had e-commerce distribution sites, allowing farmers to act as sellers on the PRC's major e-commerce platforms, and also to make purchases that can be collected at the distribution sites. The proliferation of e-commerce in some of the PRC's villages have led to a large number of villagers engaging in e-commerce activities, earning these villages the nickname of "Taobao Villages."

Table 9: Rural Energy and Communication Facilities (%)

	Nationwide		Eastern Region		Central Region		Western Region		Northeast Region	
Indicators	**2016**	**2006**	**2016**	**2006**	**2016**	**2006**	**2016**	**2006**	**2016**	**2006**
Electrified village	99.7	98.7	100.0	99.8	99.9	99.8	99.2	96.0	100.0	99.9
Village on the phone	99.5	97.6	100.0	99.6	99.7	98.6	98.7	93.8	100.0	99.9
Village with cable TV	82.8	57.4	94.7	73.6	82.9	48.2	65.5	43.4	95.7	74.5
Villages with broadband internet	89.9	–	97.1	–	92.7	–	77.3	–	96.5	–
Village with natural gas	11.9	–	10.3	–	8.4	–	18.3	–	4.7	–
Villages with e-commerce distribution sites	25.1	–	29.4	–	22.9	–	21.9	–	24.1	–

– = data not available.

Source: NBS. 2017. The Third National Agricultural Census. http://www.stats.gov.cn/tjsj/tjgb/nypcgb (accessed 15 October 2020).

The domestic living conditions in the PRC's rural areas also improved during 2006–2016 and accelerated thereafter. In 2018, the per capita housing area of rural residents was 47.3 square meters, and the proportion of rural households living in reinforced concrete houses or brick-concrete materials houses was 71.2%. Rural "toilet revolution" resulted in improved and/or upgraded sanitary facilities with running water for many households (Table 10). Improvement in drinking water supply has provided clean drinking water to more than 90% of the PRC's rural residents, an increase of 8.7% over 2017; the proportion of rural households without bathing facilities was 28.4%, a decrease of 5.9% over 2017. Durable consumer goods for rural households have increased steadily, also with significant quality and functionality upgrading. In 2016, every 100 households in rural areas owned 89.5 refrigerators, 84.0 washing machines, and 118.8 color TVs (see Table 11), nearing the levels of their urban counterparts. Ownership of nontraditional durable goods also increased.

Table 10: Rural Household Sanitary Facilities (%)

	Nationwide		Eastern Region		Central Region		Western Region		Northeast Region	
Indicators	**2016**	**2006**	**2016**	**2006**	**2016**	**2006**	**2016**	**2006**	**2016**	**2006**
Villages that have completed or partially completed toilet changes	53.5	20.6	64.5	28.5	49.1	15.7	49.1	16.9	23.7	1.2
Tap water after purification treatment	47.7	24.5	62.3	47.4	43.9	9.4	38.2	11.7	36.1	20.3
Villages with centralized or partially concentrated domestic waste collection stations	73.9	15.8	90.9	29.9	69.7	7.9	60.3	6.2	53.1	14.5

Source: NBS. 2017. The Third National Agricultural Census. http://www.stats.gov.cn/tjsj/tjgb/nypcgb (accessed 15 October 2020).

Table 11: Main Durable Goods Owned per 100 Rural Households

	Nationwide		Eastern Region		Central Region		Western Region		Northeast Region	
Index	**2016**	**2006**	**2016**	**2006**	**2016**	**2006**	**2016**	**2006**	**2016**	**2006**
Automobile (unit)	17.4	–	25.6	–	12.9	–	16.9	–	15.7	–
Motorcycle (unit)	65.1	44.6	55.7	68.4	63.7	43.0	72.8	37.1	63.1	45.0
Washing Machine (set)	84.0	43.0	82.8	60.3	76.7	39.8	85.4	35.9	89.0	67.1
Refrigerator (set)	89.5	22.5	94.1	45.6	87.4	18.0	83.1	13.4	94.1	23.1
Color TV (set)	118.8	89.4	135.2	114.2	118.0	89.6	109.0	83.9	108.8	102.5

– = data not available.

Source: NBS. 2019. *Chinese Statistical Yearbook*. http://www.stats.gov.cn/tjsj/ndsj/2020/indexeh.htm (accessed 8 October 2020).

3. Integrated Development of Rural and Urban Areas

The PRC has been shifting gradually toward more integrated development connecting rural and urban areas. On one hand, economic activities in rural areas have been diversified from primary agricultural production to processing and service sectors. Development of rural tourism also contributed to the expansion of economic linkages between rural and urban areas. On the other hand, such integrated development also implies more equitable provision of public services to allow rural residents to have more access to such services. Additionally, the PRC's household registration system, the *hukou* system and its attached social security system, also evolved over time, which is an important institutional framework determining rural and urban linkages.

Integrated development of rural and urban areas: concept and objectives

The guiding principles of integrated rural and urban development were included in the political report at the 19th National Congress of the CPC. The aim is to allow production factors including labor to freely flow between urban and rural areas, particularly with regard to the flow of capital, knowledge, information, and entrepreneurship from urban areas to rural areas; as well as the free movement of rural labor and land to the urban sector. The market will play the decisive role in allocation of these different factors. With the free movement of production factors, a new urban–rural relationship will emerge, featuring "urban pulling rural, and industry promoting agriculture."

These guiding principles were further expanded in a policy document on 15 April 2019 (CCCPC and State Council 2019). This document states that the imbalance between urban and rural areas and the underdevelopment of rural areas are the main "contradiction" of Chinese society. The long-established dual household registration system (*hukou*) and the dual welfare system attached to the *hukou* system have caused hundreds of millions of migrant workers to hover between urban and rural areas. They not only affect the healthy development of urbanization, but also limit the expansion of the scale of agricultural operations, and hinder the improvement of agricultural labor productivity, ultimately holding back comparative advantages of agriculture and suppressing rural vitality.

The *hukou* system has long been recognized as a major bottleneck in integrated urban–rural development and a series of measures have been taken gradually to relax the *hukou* restrictions. The first relaxation of the *hukou* system is connected to the implementation of the national resident identification card system during the 1980s and 1990s, which gradually opened up the possibility for rural residents to gain *hukou* in small towns and cities. In 2001, the planned quota system for *hukou* in small towns and cities was formally abolished. In 2011, the central government issued an official notice allowing the "orderly" settlement of rural residents in small and medium-sized cities as well as townships (State Council 2011). In 2013, the CCCPC (2013) decided that *hukou* in townships and small cities are to be opened completely, restrictions on *hukou* in medium-sized cities are to be orderly lifted, conditions for gaining *hukou* in large cities are to be rationally determined, and the population size of mega cities is to be strictly controlled. A year later, the State Council (2014) issued a detailed plan on *hukou* reform, including lifting restrictions on changing *hukou* status, integrated urban and rural *hukou* registration, and implementation of a new residence permit ("居住证") system that has much lower eligibility requirements. The new residence permit system also opens up the possibility for migrated workers to finally gain *hukou* in the cities.

At the same time, the 2014 plan also calls for the universal provision of basic public services (e.g., education, employment opportunities, basic old age care, basic medical care, and housing) to all permanent residents (with or without *hukou*) within urban areas. In 2019, the National Development and Reform Commission (NDRC 2019) further loosened the restrictions on gaining *hukou* in large cities: for large cities with fewer than 3 million urban residents, all *hukou* restrictions shall be abolished, while for cities with between three and five million urban residents, the eligibility requirements should be opened up and loosened. Since then, all 31 provinces (or autonomous regions or municipalities) have announced *hukou* reform goals.[15]

In connection with the rural vitalization strategy, the integrated urban rural development strategy will be implemented in three stages (CCCPC and State Council 2019):

(i) *By 2022, the mechanisms of integrated urban and rural development strategy will be established.* This includes opening up the channels of urban and rural factor movement,

[15] Source: Zhang. 2019. https://m.chinanews.com/wap/detail/zw/gn/2019/11-11/9003702.shtml (accessed 3 May 2021).

which requires the barriers for migrant workers to gain *hukou* in cities; integrated urban and rural land use market; rural financial services supporting rural vitalization; protection of rural property and property transaction; equitable distribution of public service provision between rural and urban areas; and improved rural governance.

(ii) *By 2035, the system and mechanism for the integrated urban and rural development will be improved.* Urbanization shall enter a mature stage where the gap between urban and rural development and the living standards of residents will have narrowed significantly. The urban–rural orderly migration system will be basically established, the urban–rural unified construction land market has been fully formed, the urban–rural inclusive financial service system has been fully established, the basic public services have been basically equalized, the rural governance system has been improved, and the agricultural and rural modernization has been basically achieved.

(iii) *By the middle of this century, the system and mechanism for the integration of urban and rural development will be mature and finalized.* The comprehensive integration of urban and rural areas, the comprehensive revitalization of rural areas, and the common prosperity of all people shall have basically been achieved.

3. Rural Public Service Provisions: Mechanisms and Current State

Rural public service provisions are currently offered through the social security nets consisting of three main systems: the social assistance system, the new rural cooperative medical care system, and the new rural social pension insurance system. The goal of these systems is to expand and improve rural public service provisions, focusing on basic universal medical care, old age care, and assistance to lower-income rural residents (Cui 2020).

Through several major initiatives, the PRC has made major strides in improving the provision of a range of public services as part of its rural development strategy. According to the results of the Third National Agricultural Census (Table 12), by 2016, villages with kindergartens and nurseries accounted for 32.3% of all villages, an increase of 2.2% from the results of the Second National Agricultural Census in 2006. Some 89.6% of rural households could access health stations in their own natural villages, while 99.9% of townships had medical and health facilities, of which 98.4% of townships had licensed (assistant) doctors. Meanwhile, 66.8% of townships had social welfare adoption units that provided care for people with special needs (e.g., orphans, handicapped, seniors without children, etc.), and 56.4% of townships had public old-age care homes run by the local governments. Among the villages, 81.9% had clinics, and 54.9% of villages had licensed (assistant) doctors. Villages with sports and fitness facilities in the country accounted for 59.2% of all villages, an increase of 48.5% since 2006. The proportion of villages with amateur cultural organizations in the country accounted for 41.3%, an increase of 26.2% compared to 2006.

Table 12: Rural Cultural and Educational Facilities (%)

	Nationwide		Eastern Region		Central Region		Western Region		Northeast Region	
Indicators	**2016**	**2006**	**2016**	**2006**	**2016**	**2006**	**2016**	**2006**	**2016**	**2006**
Villages with kindergartens and nurseries	32.3	30.2	29.6	25.1	36.5	31.1	33.0	22.0	25.8	17.3
Village with sports and fitness facilities	59.2	10.7	72.2	19.0	55.5	6.7	46.0	4.8	62.8	7.6
Villages with farmer amateur cultural organizations	41.3	15.1	44.4	19.4	40.8	12.8	36.7	12.0	47.1	15.4

Source: NBS. 2017. The Third National Agricultural Census. http://www.stats.gov.cn/tjsj/tjgb/nypcgb (accessed 15 October 2020).

a. The Rural Minimum Living Security System

Since the mid-1990s, the government has established a relief system for rural households under extreme poverty and a rural minimum living security system. In 2007, the Central Committee of the CPC and the State Council issued the "Notice on the Establishment of a Rural Minimum Living Security System in the Country" (State Council 2007), a social security system providing targeted cash transfers to rural residents whose annual net per capita income is lower than the local minimum living security standard. The targeted recipients are mainly rural residents who have been living in perennial difficulty due to reasons such as sickness, old age, frailty, incapacity, and poor living conditions. The minimum living standard in the countryside is determined by the local government at or above the county level in accordance with the expenses necessary to maintain basic life, including food, clothing, water, and electricity. The rural minimum living standard is adjusted in a timely manner as the prices of local necessities change and people's living standards improve. According to the Ministry of Civil Affairs, the national average annual minimum standard of rural minimum living security in 2007 was CNY840 per person, which was raised to CNY5,336 per person in 2019. In 2007, the system provided cash transfers to 16.1 million households across the country, covering a total of 35.7 million people receiving rural minimum living allowances. In 2017, the coverage expanded to 22.5 million households and 40.5 million rural residents, representing 7% of the total rural population (MCA 2017).

b. The New Rural Cooperative Medical Care System

Starting in the second half of 2003, various regions have launched pilot projects to establish a new rural cooperative medical care system. Compared to the previous rural cooperative medical system, funding for the new rural cooperative medical system is shared between the central government, local government, and farmers. The new system focuses on providing coverage for serious or critical illnesses that require hospitalization. As serious and critical illnesses pose a major threat to rural households' income and savings, providing coverage for these illnesses is a major step in strengthening the PRC's social safety nets. Medical funds under the new system are to be allocated in a centralized manner within each county, allowing rural residents to access various medical care within their administrative areas. In 2007, 85.5% of counties across the country adopted the new rural cooperative medical system, with 730 million farmers participating, a participation rate of 83% (Cui 2020). In 2016, the State Council integrated the new rural cooperative medical care system and the existing basic medical insurance for urban residents into the basic medical insurance for urban and rural residents. As of 2018, participants in the basic medical insurance for urban and rural residents reached 1.3 billion, thus providing coverage for 95% of the PRC's vast population.[16] For the rural residents, the coverage rate is even higher at 99%. With increased government funding, the per capita government medical expense reached CNY520,[17] allowing in particular better coverage for serious illnesses.

c. The New Rural Social Pension Insurance System

In 2009, the PRC began to reform the rural pension insurance system by implementing a pilot project of "new rural social pension insurance" that is backed by a combined funding scheme consisting of "individual contributions, collective aids, and government subsidies." It aims at protecting the basic living conditions of rural residents in old age and is operated by the government. On a voluntary participation basis, residents with rural *hukou* aged 16 and above who are not participating in the urban pension insurance

[16] Source: State Council. 2019b. "The Number of Medical Insurance Participants Exceeds 1.34 Billion." http://www.gov.cn/shuju/2019-03/02/content_5369865.htm (accessed 16 October 2020).

[17] Source: Ganzhou Medical Security Bureau. 2019. "The state promulgated policies to further improve the basic medical security work for urban and rural residents in 2019 ---In 2019, the per capita financial subsidy standard for urban and rural residents' medical insurance was increased by 30 yuan." https://www.sohu.com/a/314185576_120156282 (accessed 11 May 2021).

are eligible for enrollment. In order to encourage more people to participate, rural residents aged 60 and above can receive pension payments without paying fees, whereas those under 60 have to pay to join the scheme. Participants in the scheme can choose to contribute at one of the five payment levels from CNY100 to CNY500 as set by the central government (with possibility to make supplementary payment as determined by local governments). The central government fully subsidizes the contributions for residents in the central and western regions according to the basic pension standards determined by the central government, and subsidizes CNY50 per person to residents residing in the Eastern Region. The local governments are required to provide further subsidies (Cui 2020).

d. Rural Tourism

As part of the integrated urban rural development strategy and the rural vitalization strategy, rural areas must generate more economic activities that support the diversification of incomes of rural residents and that improve rural infrastructure, landscape, and general living conditions. In this connection, the government proposes to explore the economic, ecological, cultural, and social functions of agriculture by integrating agriculture with tourism, education, culture, and old-age care. Rural tourism holds a particularly meaningful role in this context. In recent years, various ecological agriculture, sightseeing, leisure agriculture, and creative agriculture have emerged, complemented by numerous farm guesthouses, and bed and breakfasts. Visitors in rural areas can experience agriculture through activities such as fruits and cherry picking and gathering, fishing, catering, accommodation, and other agricultural activities.

The PRC's rural tourism has gradually become more diversified, transitioning from sightseeing tourism to vacation-style "experience" tourism. The range of rural tourism activities includes sightseeing rural tourism; farm tours including leisure farms, sightseeing orchards, tea gardens, flower gardens, leisure fishing grounds, agriculture educational parks, and agricultural science demonstration parks; rural cultural tourism focusing on rural folk customs, rural ethnic customs, and traditional culture; and recreational emphasizing health, wellness, fitness, and entertainment.

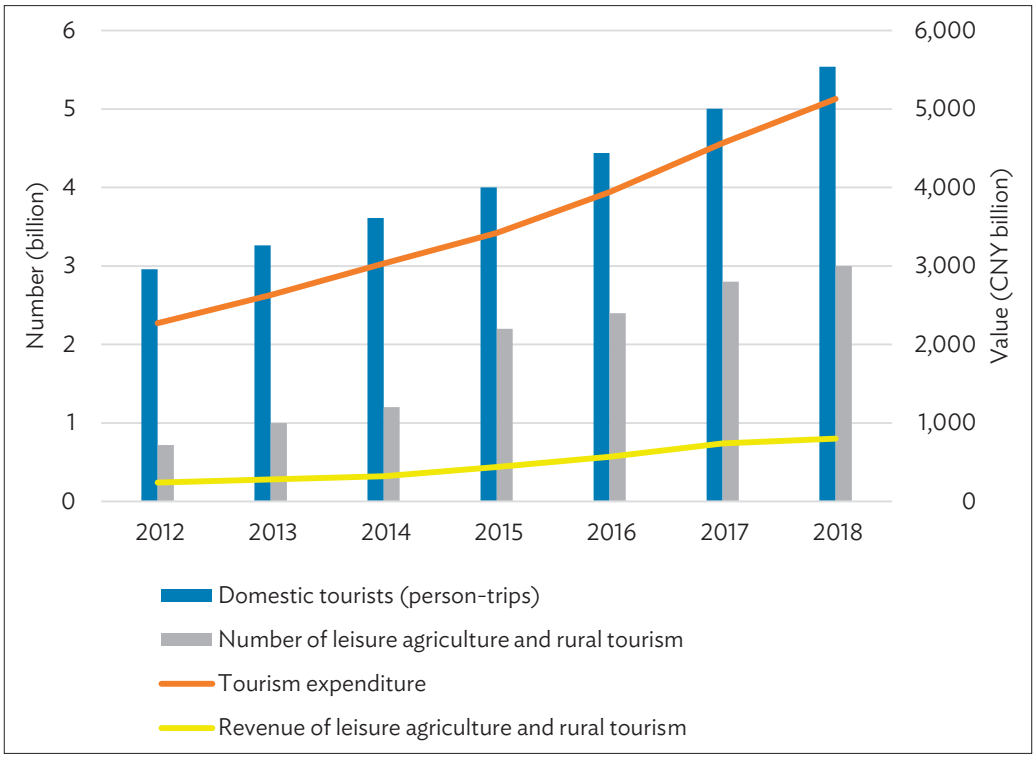
The integration of agriculture and tourism has diversified farmers' income sources and created additional income and employment opportunities. According to the Third National Agricultural Census (NBS 2017), in 2016 a total of 353,000 agricultural operators and agricultural operating units at scale level carried out new business activities such as catering, accommodation, fruit picking, fishing, and agricultural experience, accounting for 5.9% of all scale-level agricultural operating households and agricultural operating units.

From Figure 27, it can be seen that in 2018, the number of rural tourism trips reached 3 billion (as compared to 720 million trips only in 2012), accounting for almost half of all the domestic trips in the PRC, with revenue reaching CNY800 billion, compared to CNY240 billion in 2012 (State Council 2019). According to the development plan laid out in the policy document *Further Promotion of Tourism Investment and Consumption,*[18] by 2020, the PRC's rural tourism model villages will reach 6,000; "featured" leisure agriculture and rural tourism villages will exceed 100,000; and rural tourism farmhouses will reach 3 million. These developments will result in the participation of 50 million farmers in rural tourism.

While rural tourism has achieved major growth in recent years, judging from the shares of rural tourism revenue in total domestic tour revenue (Figure 28), it can be seen that the value added created from rural tourism still lags behind that from other forms of tourism. In 2012, rural tourism accounted for 10.6% of domestic tourism revenue, whereas in 2018, rural tourism's revenue share only rose to 15.6%. Therefore, there seems to be significant room for further development and upgrading of rural tourism.

[18] Source: State Council. 2015b. Several Opinions of the State Council of the People's Republic of China, on Further Promoting Tourism Investment and Consumption. http://www.gov.cn/zhengce/content/2015-08/11/content_10075.htm (accessed 15 October 2020).

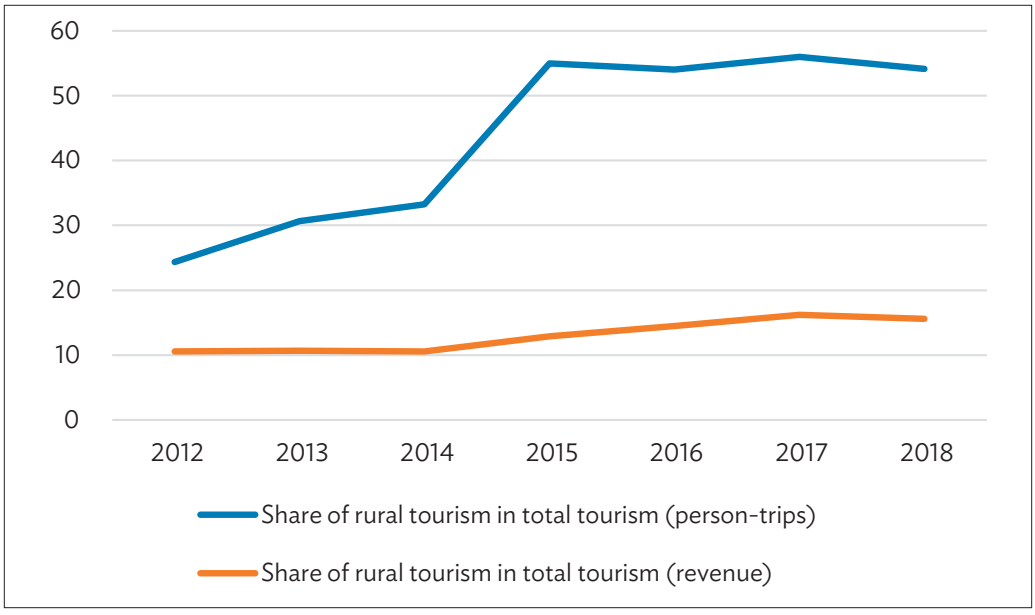
Figure 27: Rural Tourism and Domestic Tourism, 2012–2018



CNY = yuan.

Source: NBS. 2020. China Statistical Yearbook. http://www.stats.gov.cn/tjsj/ndsj/2020/indexeh.htm (accessed 8 October 2020).

Figure 28: Share of Rural Tourism in Total Tourism (%)



Source: NBS. 2020. China Statistical Yearbook. http://www.stats.gov.cn/tjsj/ndsj/2020/indexeh.htm (accessed 8 October 2020).

D. Protection of the Rural Environment

1. Development of Basic Institutional Frameworks for Environmental Protection

The PRC has established a basic framework of environmental regulations–improving permits, standards, and management structures. Institutional frameworks and policy measures have been established and formulated in recent years to improve agriculture and the rural environment, including the protection and rehabilitation of agricultural land resources; regulations on the use of chemical fertilizers, pesticides and other chemicals; and the protection of agricultural water resources. It also introduced economic mechanisms such as use of subsidizing policies and sustainable cost recovery models in rural sanitation and wastewater financing. Community engagement has been enhanced by engaging local ownership, delineating roles and responsibilities, and meeting technical capacity development requirements.

2. Land Protection: The Outline of the National Overall Planning on Land Use (2006–2020)

Protection of agricultural land resources and their sustainable exploitation has received ample attention in Chinese policy making. In the Outline of the National Overall Planning on Land Use (2006–2020) (State Council 2006a), compiled by the Ministry of Land and Resources (MLR) and approved by the State Council on 6 October 2008, the overall planning targets, main implementation tasks, and specific regulations on protecting and utilizing agricultural land are specified. It is stated that the red line of 1.8 billion *mu* (120 million hectares) cultivated land is to be preserved with specific targets of 1.8 billion *mu* in 2010 and 1.8 billion *mu* in 2020.

In addition, 1.6 billion *mu* basic agricultural land will be maintained with increasing quality. To attain this target, conversion of cultivated land to construction land has to be limited to 45 million *mu* by 2020. To reduce the conversion of cultivated land due to ecological reasons, such conversions can only happen if they are covered in relevant national plans. Also, land consolidation, rehabilitation, and development should be implemented in order to provide at least 55 million *mu* additional cultivated land. For the protection of basic cultivated land, only under exceptional circumstances allowed by relevant laws could conversions of basic cultivated land be carried out; however, in such situations, an equivalent amount of basic cultivated land should be found as compensation. Quality upgrading of existing and reclaimed cultivated land is also envisioned through various programs and measures.

Alongside the protection of cultivated land, "basic ecological land" is also to be strictly protected to ensure that cultivated land, grazing and grassland, water areas, and certain unutilized land that have ecological functions must exceed 75% of total national land areas. Land ecological environment improvement is to be strengthened under the 2006–2020 Outline, including maintenance of the ecological retirement of certain cultivated land, the ecological rehabilitation and reclamation of waste land from industry and mining activities, and the prevention and treatment of degraded land. These improvements are to be conducted in a differentiated manner according to the local characteristics; for example, a country is divided into nine land utilization zones, with each zone having its own land management emphasis.

The PRC's efforts in protecting agricultural and ecological land resources do not only target the quantity of such resources, but also extend to the quality and long-term sustainability of these resources. In the "No. 1" document of 2015 (CCCPC and State Council 2015b), an action plan on implementing the protection and upgrading of arable land quality was mentioned. In the *Opinions on Speeding up the Construction of Ecological Civilization* (CCCPC and State Council 2015), strengthening farmland ecological protection, implementing farmland quality protection and improvement actions, increasing improvement and restoration efforts on degraded, polluted, and damaged farmland, and strengthening farmland quality survey monitoring and evaluation are mentioned as key tasks.

Following these guiding principles, the Ministry of Agriculture and Rural Affairs (MOA) issued the *Action Plan for the Protection and Improvement of Cultivated Land Quality* in 2015 (MOA 2015d). First, continuous improvement of the quality of cultivated land is to be achieved. By 2020, the country's cultivated land fertility will increase by an average of 0.5 grade. Among them, the newly built 800 million *mu* high-standard cultivated land fertility has to be increased on average by more than one grade. The soil organic matter content of cultivated land nationwide is to be increased by an average of 0.2 percentage points, and the thickness of the cultivated layer must reach an average of more than 25 centimeters. Second, utilization of organic fertilizer resources continues to increase. By 2020, the rate of returning livestock manure nutrients to the field will reach 60%, an increase of 10 percentage points; and the rate of returning crop straw nutrients to the field will exceed 60%, an increase of more than 25 percentage points. Third, the level of scientific fertilization continues to increase. By 2020, the coverage rate of soil testing fertilization technology will reach more than 90%; the fertilizer utilization rate will reach more than 40%, an increase of more than seven percentage points; and the use of chemical fertilizers on major crops will achieve zero growth.

More recently, soil pollution prevention and control has also received attention. The Soil Pollution Prevention and Control Law (MEE 2018b) entered into force in January 2019. This Law establishes systems for agricultural land classification management according to pollution levels and identified risks. The law requires the relevant ministries to establish a soil environmental information platform to include soil pollution prevention and control in their economic development and environmental protection plans, and to establish a soil environmental monitoring system. Local governments bear the enforcement responsibility in controlling and regulating soil pollution, while land use rights holders must investigate and assess soil conditions upon the transfer of management rights or in the incidence of a pollution event. Central and provincial governments are to establish funds to finance the clean-up of soil pollution when the responsible party of the pollution cannot be identified (OECD 2020).

a. Reduction in Chemical Fertilizers and Pesticides: The 2020 Zero-Growth Action Plan for Chemical Fertilizers and Pesticides

To reduce the use of chemical fertilizers and pesticides, the PRC initiated the *2020 Zero-Growth Action Plan for Chemical Fertilizers and Pesticides* (MOA 2015a). In the Action Plan for chemical fertilizers, four issues related to current practices are highlighted: excess application of fertilizer per unit of land, currently at 21.9 kg/*mu* compared to the worldwide average of 8 kg/*mu*; uneven fertilizer use across regions and products, with excessive use observed in the Eastern Region, the lower Yangtze River area, as well as for cash and horticulture products; low utilization rate of organic fertilizers at around 40% of the estimated 70 million tons that are available; and the unbalanced structure of fertilizer uses.

The goal of the 2020 Zero-Growth Action Plan for Chemical Fertilizers and Pesticides is to restrict the annual growth of chemical fertilizer use to below 1% for the 2015–2019 period. Likewise, for major agricultural crops, there will be zero-growth by 2020 compared to the actual annualized growth rates during 2000–2013 of 3.9% for nitrogen use and 2.5% for phosphorus use (International Fertilizer Association 2019). Implementation details will vary across the regions due to uneven regional application of fertilizers. For instance, in regions where fertilizers are currently used excessively, such as the Northeastern Region, the Northern Plain, and the mid and lower Yangtze River area, nitrogen and phosphorus inputs are either to be controlled or reduced, whereas the use of potassium is to be stabilized. In the Southwestern Region, nitrogen use is to be stabilized, use of phosphorus fertilizers is to be adjusted, and potassium use is to be increased; in the Northwestern Region, the focus is to match the use of fertilizers and water resources, with the use of both nitrogen and phosphorus to be stabilized (MOA 2015b).

As with fertilizers, the action plan noted that the use of pesticides has been on the rise, for instance by a total of 9.2% during 2012–2014 compared to 2009–2011. The excessive use of pesticides not only increases production costs but also influences food safety and damages the ecological system. The objective of the action plan is therefore to limit the use of pesticides so that the average use per unit of land falls below that in the past 3 years (since 2017), thereby realizing the target of zero-growth by 2020. This action plan emphasizes the role of green pest prevention and control, professional pest control, and scientific application of pesticide.

The initial steps of the action plan include several pilot projects (MOA 2015a). In 2014, the central government started to support the high efficiency slow-release fertilization demonstration pilot project on maize production in five provinces. Another pilot project that started in 2011 provides subsidies to lower farmers' costs when applying low-toxicity biological pesticides. In 2014, this project was expanded to 42 major vegetable, fruit, and tea production counties in 17 provinces. A third project, which is currently on a much larger scale, is the government support for soil testing formula fertilization. In 2015, the government committed CNY700 million aiming to provide technical service on soil testing formula fertilization for 190 million farm households, covering 1.5 billion *mu* of agricultural land.

Goals declared in the Zero-Growth Action Plan were achieved ahead of schedule. In 2017, the utilization rate of chemical fertilizers in rice, maize, and wheat production reached 37.8%, a 2.6 percentage points improvement compared to 2015. Total use of chemical fertilizers already achieved zero annual growth in 2017, 3 years ahead of schedule. In particular, in 2016, nationwide use of chemical fertilizers fell to 59.8 million tons, a reduction of 380 thousand tons as compared to the year before. This year-on-year reduction of fertilizer use is the first such reduction since 1974. Improved utilization rate of chemical fertilizers also reduced energy use and carbon emission—the 2.6 percentage points improvement is equivalent to reduced use of coal by 1.3 million tons.[19] Similarly, pesticide use also decreased for three consecutive years since 2015 (MEE 2018a). To complement the actions on reducing chemical fertilizer uses, the Ministry of Agriculture and Rural Affairs also initiated an action plan (MOA 2017) to increase the use of organic fertilizers in vegetable, fruit, and tea production. In 2017, the central government provided funding for pilot projects in 100 major vegetable, fruit, and tea production counties to promote the use of organic fertilizers in place of chemical fertilizers.

b. Control of Water Pollution

Protecting the PRC's water resources is the responsibility of the Ministry of Water Resources (MWR) and Ministry of Environmental Protection (MEP, now Ministry of Ecology and Environment). In collaboration with the National Development and Reform Commission, Ministry of Industry and Information Technology, and MOA, the MWR and MEP had developed a *Water Pollution Prevention and Control Action Plan*, which was issued by the State Council (2015a). In this plan, various references and measures have been made related to water pollution sourced from agricultural activities.

First, livestock and poultry production pose particular challenges in terms of water pollution. In 2014, the Regulations on Prevention and Control of Pollution by Scaled Livestock and Poultry Breeding and Production (State Council 2013) was promulgated as the first national regulation on preventing and controlling pollution from livestock and poultry production. This regulation lays out the regulatory requirements regarding environmental carrying capacity, pollution prevention and control, zoning requirements, and incentives and penalties.

[19] Source: Farmer's Daily. 2017. 'Memorabilia of the Fertilizer Industry in 2017: The Realization of Zero Increase in Chemical Fertilizers has a "road."' http://www.chinacoop.gov.cn/HTML/2017/12/28/128524.html (accessed 12 May 2021).

In 2015, the new Environmental Protection Law (NPC 2014) specifically required the exit of livestock and poultry production facilities that do not need the environmental regulations. Also in 2015, the State Council released the "Water Ten Articles," declaring certain areas free from livestock and poultry production and existing operations at scale level, and specialized farm households to be closed or relocated by the end of 2017 (State Council 2015a). This measure was to be first implemented in the Beijing–Hebei–Tianjin area, the Yangtze River Delta, and the Pearl River Delta. Permitted large-scale operations must build complementary manure and wastewater storage, processing, and reutilization facilities, whereas areas with intensive backyard livestock and poultry activities need to implement a system of individual manure and wastewater collection and collective treatment and reutilization.

From 2016 onward, newly built, expanded, and remodeled large-scale livestock and poultry farms must implement separate treatments of rain and wastewater and provide processing and utilization of manure and wastewater. These requirements are to be coordinated by the MOA with the participation of MEP. Together with the "Soil Ten Articles" (State Council 2016), the *Water Pollution Prevention Action Plan* (State Council 2015a), and the MOA's guiding opinions on the rationalization of swine production in the Southern "water network areas," reallocations of livestock (mainly swine) and poultry production from the designated nonproduction areas to places with higher environmental carrying capacities have been carried out. As a side effect, production capacities in swine production have dropped considerably, contributing to shortages in pork supply.

Second, concrete measures have been initiated to control agricultural nonpoint pollution from the use of fertilizers and pesticides. Aside from government programs supporting the use of low-toxicity pesticides and the application of soil testing formula fertilization, environmental requirements are also imposed on the construction of high-standard farmland and on land consolidation and exploitation. In particular, in sensitive areas and large- and medium-scaled irrigation areas, existing ditches and ponds are to be utilized for growing water biomes and for installing permeable dams and other installations, for purposes of purifying farmland drainage and surface runoff. These measures are to be implemented by the MOA, with the participation of the National Development and Reform Commission, MLR, MEP, MWR, and others.

Third, adjustments are to be made to the nationwide structure and spatial distribution of the crop sectors. In water-short regions, pilot projects are to be implemented on retirement of land for reduction of water uses. In areas where groundwater is susceptible to pollution, priorities should be given to the cultivation of crops requiring less fertilizer and pesticide. In areas where surface water and underground water has already been overdrafted and where agricultural water withdrawal is high, such as Gansu, Hebei, Henan, Shandong, and Xinjiang Uygur Autonomous Region, appropriate adjustments are to be made on reducing the cultivated areas of crops that are water use-intensive. By the end of 2018, it was planned that comprehensive adjustments were to be made on 33 million *mu* (2.2 million hectares) irrigated farmland to achieve water savings of more than 3.7 billion cubic meters. These projects were to be led by MOA and MWR, with participation from the National Development and Reform Commission and MLR.

Other measures relevant for the agriculture sector in the Water Pollution Prevention and Control Action Plan are the development of water-saving technology and construction of water conservancy infrastructure to meet the targets of having 700 million *mu* of farm land covered by water-saving irrigation technology; the implementation of comprehensive reforms of the agricultural water pricing schemes; and the inclusion of agricultural pollutants in the national survey and monitoring system of pollutants, especially via the inclusion of nitrogen and phosphorus in the binding targets of total pollutant discharges.

In connection with the new zoning regulations discussed above on livestock and poultry production, to support large-scale livestock and poultry production and to combat the associated manure and waste problems, the *Rural Biogas Support Policy* was also established (MOA 2015b). Under this policy, the government is to promote and prioritize the construction of large-scale biogas facilities with daily capacity exceeding 10,000 cubic meters per facility. These biogas facilities are to be matched with large-scale livestock and poultry farming facilities and mainly use the latter's manure and wastes as raw materials. Small- and medium-sized biogas facilities, on the other hand, are to be built in areas with mass population and plentiful supply of raw materials. Biogas produced from these facilities will serve as community gas supply in the rural areas.

3. Preventing Nonpoint Source Pollution from Agriculture

Agricultural nonpoint source pollution policies in the PRC consist of both economic incentive and guidelines and more importantly direct control policies. The promulgation of the *Agricultural Environment Management Regulations* in 1988 kicked off systematic monitoring of agricultural pollution and regulation of agricultural production activities in relation to environmental protection. In July 2004, the prevention and control of nonpoint source pollution in the PRC was officially launched. At that stage, the pursuit of nonpoint source pollution prevention had to be balanced against the goals of increasing agricultural production and farmers' income, under the principle of reduce, reuse, and recycle.

With food security goals already assured but perceived and actual pollution intensifying, a set of more strict pollution control measures emerged. The promulgation and implementation of the *Regulations on the Prevention and Control of Pollution Caused by Livestock and Poultry Farming* (State Council 2013) and the *Regulations on Pesticide Management* (State Council 2017) have become the prelude to the targeted treatment of nonpoint source pollution. With the Regulations on the Prevention and Control of Pollution Caused by Livestock and Poultry Farming (State Council 2013) and the *Implementation Opinions on the Prevention and Control of Agricultural Non-point Source Pollution* (MOA 2015b) entering into force, a systematic policy framework on the prevention and control of nonpoint source pollution was formally established.

The policy framework defines the goals of nonpoint source pollution prevention as "one control"—to control the total agricultural water use and agricultural water environment pollution; "two reductions"—to reduce the use of chemical fertilizers and pesticides; and "three basics"— referring to basic resource utilization; comprehensive recycling; and harmless treatment of livestock and poultry manure, agricultural film, and crop straw.

The MOA further issued the *Zero Growth in Fertilizer Use by 2020 Action Plan* and the *Zero Growth in Pesticide Use by 2020 Action Plan*, which had more specific goals. The MEP and MOA jointly issued the *Proposal on Cultivation and Development of Agricultural Non-point Source Pollution Control and Rural Sewage and Waste Disposal Market Main Body* (MEE, MOA, and MOHURD 2016), as well as subsequent policies, reflecting that the PRC has officially put nonpoint source pollution prevention on the policy agenda.

While the establishment of the above guiding principles, action plans, regulations and implementation documents suggests a strong policy framework being put in place, it should also be realized that economic incentives also need to be put into force such that farmers can adopt more sustainable agricultural production practices (Box 7).

Box 7: Development of Agri-Environmental Policy in Countries of the Organisation for Economic Co-operation and Development

The fundamental purpose of agri-environmental policy instruments is to achieve environmental policy objectives that would not otherwise be achieved given the absence or poor functioning of markets for environmental goods and services. Achieving those objectives requires either controlling or managing environmental stress, such as polluting emissions; or inducing pro-environmental activities to increase the flow of ecological services, such as management of agricultural practices and land to enhance desired wildlife habitat. In either case, achieving the desired end requires changes in producer decisions consistent with the achievement of the agri-environmental policy objectives.

Studies in countries of the Organisation for Economic Co-operation and Development (OECD) find that defining how to address the environmental impacts of agriculture requires a case-by-case response in relation to the settings of the environmental targets and definition of environmental reference levels based on the identification of existing property rights defining who can ask for remuneration and who is liable for charges. Environmental reference levels are defined as the minimum level of environmental quality that farmers are obliged to provide at their own expense. Environmental targets are defined as desired (voluntary) levels of environmental quality that go beyond the minimum requirements or minimum (mandatory) levels of environmental quality for the agriculture sector in a country (OECD 2001 and 2010).

Although regulatory measures (e.g., pesticide management law) set environmental standards, regulations often control at the product level (e.g., maximum residue) rather than production process. Regulatory measures as well as monitoring system should be applied at the farm level, clarifying the minimum (mandatory) levels of environmental quality that farmers need to comply with. While cross-compliance conditions increase the coherence of direct payment programs with environmental policy objectives, the experience in OECD countries shows that such conditionality would not be effective unless it was adapted to the diversity of local farming practices and conditions. Moreover, some of the literature finds that the set of production practices may not guarantee that farmers will adopt cost-effective means to improve their environmental performance as opposed to the performance-based policies in which producers can choose the most cost-effective way in their operation (DeBoe 2020).

The European Union's direct payments under the Common Agricultural Policy are typically conditional on mandatory cross-compliance. The regulation foresees that if the conditions are not fulfilled, the payment is disrupted and penalties may apply. Cross-compliance refers to environment, climate change, and good agricultural condition of land as well as public, animal and plant health, and animal welfare. It applies to direct payments and environmental rural development program payments. Cross-compliance applies to all agricultural land including land that is left fallow and is no longer used for production purposes.

Sources: Organisation for Economic Co-operation and Development (OECD). 2001. Improving the Environmental Performance of Agriculture: Policy Options and Market Approaches. Paris: OECD Publishing; 2010. Environmental Cross Compliance in Agriculture. Paris: OECD Publishing. https://www.oecd.org/agriculture/topics/agriculture-and-the-environment/documents/environmental-crosscompliance-in-agriculture.pdf.

DeBoe 2020. Economic and Environmental Sustainability Performance of Environmental Policies in Agriculture. OECD Food, Agriculture and Fisheries Papers. No. 140. Paris: OECD Publishing. https://doi.org/10.1787/3d459f91-en (accessed 17 June 2020).

4. Promoting a Circular Economy and Environmental Business

The mechanism to recover the additional cost associated with environmental action includes the engagement of the private sector. The effort to establish a circular economy by increasing the utilization of unused resources and wastes has been enhanced in the PRC. Efforts such as eco-labelling and ecotourism also allow rural areas to internalize the cost of additional environmental action.

Protection of the agricultural environment and resources has increasingly become an issue. Along with strengthened environmental protection regulations, the circular economy concept (Box 8) has received increasing attention in the PRC for prevention of further deterioration of the agricultural environment while maintaining sustainable agricultural development.

In 2003, the concept of circular economy was initially integrated into the Scientific Development View (which was the overall development strategy under the central leadership of Hu Jintao and Wen Jia Bao), focusing on reducing energy use in the economy. In 2004, this scope was expanded to a comprehensive development of a circular economy. The Fifth Plenum of the 16th Central Committee of the CPC clearly stated that it is necessary to build a resource-saving and environment-friendly society nationwide, and to increase efforts to promote the development of a circular economy. Following these political decisions, both the *National Medium- and Long-term Scientific and Technological Development Plan 2006–2020* (State Council 2006c) and the *National Economic and Social Development Eleventh Five-Year Plan Outline 2006–2010* (NPC 2006) indicate that the focus of the PRC's economic development in the future should be on circular economy development. Accordingly, the Ministry of Agriculture and Rural Affairs issued the *Circular Agriculture Promotion Action Implementation Plan* in 2007 (MOA 2007). In 2015, the MOA proposed to basically realize the recycling of agricultural resources in the main grain production areas by 2020 and to achieve zero release of agricultural wastes by 2030. In order to encourage the development of green agriculture, the General Office of the Central Committee of the CPC and the General Office of the State Council issued the *Opinions on Innovative System and Mechanism to Promote Green Development of Agriculture* in 2017, providing further policy support for agricultural circular economy development (CCCPC and State Council 2017).

An agricultural circular economy involves the cultivation of crops, animal husbandry, the reprocessing of agriculture waste, as well as other farm management and marketing activities. In the PRC, the main practice in the development of circular agriculture is to combine human waste, animal waste, and agricultural wastes into organic resources to generate biogas, materials, and fertilizers. By solving the problems of rural waste and rural energy, a "courtyard circular agriculture" model has gained wide popularity and participation among rural residents. This model combines integrated designs of sanitary facilities, backyard animal husbandry operations, and biogas production by rural households. Some 42 million farmers nationwide are participants in this model (Lv 2019). This model is particularly important in addressing the rural energy demand in the Western Region where the ecosystem tends to be fragile (e.g., loess plateau).

Despite the development of circular agriculture at the household level, the scale of rural circular economy remains quite small and involves relatively few cross-sectoral and cross-regional partners. In particular, even with the blessing of the government in various government documents, relatively few examples emerged with the participation of private businesses that can leverage the underutilized resources into much larger and more efficient circular agricultural activities. Future development therefore, should focus on generating incentives for attracting public and private investment and innovation for agricultural circular economy development.

Box 8: Circular Economy Approach to Rural Development

The circular economy can be defined as the transition from a consumption and disposal-based linear economic model to an economy in which raw materials and products remain in a closed cycle. The circular approach represents the circular flow and efficient use of resources, materials, and products. Circular crop and livestock production systems would lead to reductions of greenhouse gas emissions due to lower product emission intensity, as more products are produced out of the same crop, and an increase in carbon sequestration (due to manure organic matter).

The bioeconomy is often considered as an important element of the circular economy in food and the agriculture sector (e.g., the European Union's Bioeconomy Strategy). Both concepts promote the idea of increased resource efficiency by generating less waste and increasing waste recycling. The (circular) bioeconomy can be defined as an economy that relies on renewable natural resources to produce food, energy, products, and services. The main idea of the bioeconomy is to make full use of all the biomass generated along the agro-food chain (e.g., forest and crop residues, animal manure). For example, heat generated from unused resources such as livestock manure or forestry by-products can support greenhouse agricultural production and aquaculture. The use of biomass as a renewable feedstock for the production of electricity, heating, or biofuels is a largely untapped opportunity for rural development.

While maximizing the overall production of nutritious food for human consumption, this approach can minimize the environmental impact and enhance carbon sequestration in the soil. The transition to bioeconomy is, therefore, increasingly seen as an opportunity to generate environmental, climate, social and economic benefits in rural areas. However, the transition to a bioeconomy does not necessarily boost the rural economy, and its net overall economic, environmental, and social impacts need careful assessment. The potential risks could arise, particularly if policies are developed and implemented in a partial and nonintegrated way. These include the competition between food supply and nonfood biomass production, overexploitation of renewable natural resources, overuse of soil and water resources, competition between food and fuel, impact of new crop varieties on soil fertility, and unsustainability of bioenergy production.

The elements of a circular economy such as reduced intensity of resources, sustainable land use and rehabilitation, ecosystem protection, resource use efficiency, and renewable energy sources help preserve natural capital and enhance climate change mitigation (EIB 2019). The European Investment Bank (EIB) is increasing its support to a new circular business model through awareness raising, advisory support, and financing, recognizing the social and environmental benefits from an accelerated transition to a circular economy. It has developed criteria for project eligibility, screening, and assessment.

Source: European Investment Bank. 2019. The EIB Circular Economy Guide – Supporting the circular transition. https://www.eib.org/en/publications/the-eib-in-the-circular-economy-guide# (accessed 13 May 2021).

III. REMAINING CHALLENGES AND POLICY IMPLICATIONS

The People's Republic of China achieved the eradication of absolute poverty in rural areas, but sustaining poverty eradication in rural areas and reducing urban–rural income disparity remain major policy issues.

In February 2021, the People's Republic of China announced the eradication of absolute poverty nationwide at end of 2020. Rapid economic growth has lifted more than 850 million people out of absolute poverty since the beginning of economic reforms in the late 1970s, contributing to about 70% of worldwide poverty reduction. The national poverty line is set at around CNY3,000 per year per capita and is only applied to the rural population. This national poverty line is more than 40% below the threshold income to receive the minimum living standard guarantee payments (*dibao*). Once applied to the median poverty line among upper middle income countries, the PRC's poverty rate increases to 24% in 2016. Average per capita income in the urban areas was 2.7 times that in rural areas in 2016. With the coronavirus disease (COVID-19) pandemic impacting off-farm employment opportunities for migrant workers in particular, reducing rural poverty through vitalizing the rural economy remains a high priority on the policy agenda of the PRC.

The People's Republic of China has strategically adjusted rural development policies.

The country has placed agriculture, farmers, and rural areas (*three nong*) at the core of its policy agenda to achieve the goal of a moderately prosperous society (*xiao kang*). The PRC successfully adjusted rural development policy strategies to fit rapidly evolving socioeconomic conditions. The initial policy reforms in the late 1970s focused on boosting food production and maintaining grain self-sufficiency. The policy evolved in the mid-1990s to increase competitiveness of the rural economy through agricultural modernization and diversification of economic activities. In the 2010s, rural policy shifted to a more integrated and balanced approach to improve economic, social, and environmental welfare in rural areas. Support to agriculture was also gradually refocused from maintaining grain self-sufficiency to ensuring long-term food security through sustainable use of natural resources.

Innovative institutions supporting agricultural modernization.

Innovations have been introduced in rural land use and the reorganization of small-scale farms. A Household Responsibility System that originated in the late 1970s allocated land contract rights to individual households. Since the 2000s, a variety of institutional innovations consolidated small-scale operations into larger units. The holders of land contract rights were allowed to lease out their land operational rights, further separating land operation rights from land contract rights and land ownership. The emergence of farm mechanization service providers enabled small-scale farmers to quickly mechanize their cultivation activities without heavy capital investment. Voluntary cooperative organizations provided a range of services to connect small-scale farmers to markets and the latest technologies through training, and collective marketing and inputs supply. All these institutional innovations are highly relevant for other countries with small and fragmented farm structures.

Strong investment in network infrastructure facilitated industrialization in rural areas.

Modernization of agriculture allowed farmers to spend more time in off-farm activities. Off-farm income now accounts for more than 70% of rural household income. Moreover, the PRC invested strongly in the network infrastructure in rural areas including roads, the telephone system, and internet. These connected farmers to markets and enabled manufacturing and service industries to develop in

rural areas. High penetration of internet and mobile networks in rural areas accelerated the application of information and communications technology. E-commerce platforms such as Taobao have been essential in connecting farmers to end-consumers and oriented agriculture to be more demand-driven. Beyond providing a platform for transactions, e-commerce platforms invested in logistics and marketing infrastructure and provided training for farmers to adopt new technologies. Growing engagement of tech companies in rural development is providing a new model of development led by the private sector.

Integrated urban–rural development ultimately requires reforms in the hukou system and attached institutions.

The PRC has shifted gradually toward more integrated development connecting rural and urban areas. Integrated development also implies more equitable provision of public services between rural and urban residents. The PRC's household registration system, the *hukou* system and its attached social security system, is an important institutional framework determining the rural and urban linkages. Although the disparity in social security system between urban and rural areas has been reduced overtime, there are still a number of restrictions related to the location of *hukou* registration. The PRC is moving toward universal provisions of basic public services (e.g., education, employment opportunities, basic old-age care, basic medical care, and housing) to all permanent residents (with or without *hukou*) within urban areas. Allowing production factors including labor to freely flow between urban and rural areas would bring both human and human capital to rural areas and contribute to vitalizing rural areas.

Rural tourism offers great potential for both economic growth and environmental protection in rural areas.

In recent years, rural tourism in the PRC has gradually transitioned from sightseeing tourism to vacation-style "experience" tourism. The integration of agriculture and tourism has diversified farmers' income sources and created additional income and employment opportunities in rural areas. There is still untapped potential to boost rural tourism. Promotion of ecotourism also provides market solutions to the PRC's agenda to protect the rural environment as the revenue could cover the extra costs associated with environmental protection.

Despite recent progress, the People's Republic of China faces challenges in environmental protection.

While the PRC has achieved remarkable growth in agricultural productivity in the last 4 decades, intensive use of chemical fertilizers, pesticides, plastic mulch, untreated waste from livestock and poultry production, and burning of crop residue have resulted in serious ecological and environmental damages. Going forward, enhancing environmental welfare is key for rural areas to be attractive places to live, visit, and launch entrepreneurial activities. In addition to basic environmental regulation, more comprehensive agri-environmental policy should be developed to enhance the incentive for more sustainable agricultural production at the farm level. This has to be complemented by more investments in rural environmental infrastructure, such as waste management, landscape, and ecotourism facilities. The public and private sectors can work together to make better use of underutilized rural resources including organic waste and by-products to generate new economic activities and improve environmental management. With continuing reforms, the PRC is positioned to play a leading role in establishing a model of sustainable rural development in Asia and the Pacific.

The multidimensional evolution of rural development policy in the PRC provides important policy implications for ADB's developing member countries.

In many countries, the rural development policy starts with the promotion of the dominant primary industry (typically agriculture) aimed at the equalization of income of the industry with urban sectors. At a later stage of economic development, rural development policy is required to focus more on the

competitiveness of the wider rural-based industries. The policy support is diversified to multiple sectors based on their competitiveness. As countries enter into middle-income stage, the rural development policy is increasingly required to have a multidimensional focus, particularly on environmental and social well-being in rural areas. The experience of the PRC in developing integrated rural development policy provides valuable insights for policy makers in ADB's developing member countries. This report can serve as a resource for South-South knowledge sharing in rural development policy.

APPENDIX
PEOPLE'S REPUBLIC OF CHINA'S AGRICULTURE AND RURAL DEVELOPMENT FOCUSED "NO. 1" DOCUMENTS (IN CHINESE AND ENGLISH)

年份	内容
1982	《全国农村工作会议纪要》是中国改革开放后的第一个中央一号文件，聚焦"包干到户、包产到户"，肯定多种形式的责任制。
1983	《当前农村经济政策的若干问题》促进农业从自给半自给经济向较大规模的商品生产转化，从传统农业向现代农业转化。
1984	《关于1984年农村工作的通知》"在稳定和完善生产责任制的基础上，提高生产力水平，疏理流通渠道，发展商品生产"。
1985	《关于进一步活跃农村经济的十项政策》30年来的农副产品统购统销制度被取消。
1986	《关于1986年农村工作的部署》"摆正农业在国民经济中的地位"，调整工农城乡关系。
从1987年开始到2003年连续17年没有出台"三农"一号文件，是中国改革的重心全面向城市和工业转移的阶段。	
2004	《关于促进农民增加收入若干政策的意见》提出对种粮农民的直接补贴、良种补贴、农机补贴"三项补贴"，深化粮食流通体制改革，降低农业税负等措施。
2005	《关于进一步加强农村工作提高农业综合生产能力若干政策的意见》"提高农业综合生产能力"，完善支持粮食生产的有关政策，继续实行最低收购价政策。
2006	《关于推进社会主义新农村建设的若干意见"社会主义新农村建设"，提出全面取消农业税。
2007	《关于积极发展现代农业扎实推进社会主义新农村建设的若干意见》明确了现代农业的概念，把基础设施建设和社会事业发展的重点转向农村，开发农业的多种功能，培育现代农业经营主体，发展农民专业合作组织，在全国建立农村最低生活保障制度。
2008	《关于切实加强农业基础设施建设进一步促进农业发展农民增收的若干意见》聚焦"农业基础设施建设"，提出建立新型农村社会养老保险制度，强调保障农民土地权益。
2009	《关于2009年促进农业稳定发展农民持续增收的若干意见》要求较大幅度增加农业补贴，提高政府对粮食最低收购价格的水平，增加政府农产品的储备，加强农产品进出口调控，加大力度解决农民工就业问题，将农村民生建设重点投向农村电网、乡村道路、饮水安全、沼气、危房改造等领域。
2010	《关于加大统筹城乡发展力度进一步夯实农业农村发展基础的若干意见》聚焦"统筹城乡发展"。
2011	《关于加快水利改革发展的决定》强调"水利改革发展"。
2012	《关于加快推进农业科技创新持续增强农产品供给保障能力的若干意见》聚焦"农业科技创新"。
2013	《关于加快发展现代农业进一步增强农村发展活力的若干意见》聚焦"现代农业"，核心是创新农业经营体系。
2014	《关于全面深化农村改革加快推进农业现代化的若干意见》聚焦"农村改革"，系统提出农村土地产权改革的要求，确定了开展村庄人居环境整治、推进城乡基本公共服务均等化等重点工作。
2015	《关于加大改革创新力度加快农业现代化建设的若干意见》"农业现代化"，提出推进农村一二三产业融合发展，明确推进农村集体产权制度改革与农村土地制度改革试点，提出完善农产品价格形成机制，加强农村法治建设。
2016	《关于落实发展新理念加快农业现代化实现全面小康目标的若干意见》聚焦"农业现代化"，提出推进农业供给侧结构性改革，推进"互联网+"现代农业、推动农业绿色发展、培育壮大农村新产业新业态等创新措施。
2017	《关于深入推进农业供给侧结构性改革加快培育农业农村发展新动能的若干意见》"农业供给侧结构性改革"，优化产品产业结构、推行绿色生产方式。
2018	《关于实施乡村振兴战略的意见》实施乡村振兴战略，坚持不懈推进农村"厕所革命"。
2019	《关于坚持农业农村优先发展做好"三农"工作的若干意见》实施村庄基础设施建设工程；完善县乡村物流基础设施网络；统筹推进山水林田湖草系统治理；加快推进城乡基本公共服务均等化。
2020	《关于抓好"三农"领域重点工作确保如期实现全面小康的意见》全面完成脱贫任务。

1. Five Initial "No. 1 Documents" on Agriculture and Rural Development

The first five "No. 1" documents are as follows:

Central Committee of the Communist Party of China (CCCPC). 1982. Minutes of the National Rural Work Conference (in Chinese). http://www.ce.cn/cysc/ztpd/08/ncgg/ngr/200809/24/t20080924_16903498.shtml.
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Central Committee of the Communist Party of China and State Council of China. 1985. Ten Policies on Further Revitalizing the Rural Economy (in Chinese). http://finance.people.com.cn/GB/8215/135583/8145899.html.
———. 1986. On Deployment of Rural Work in 1986 (in Chinese). http://finance.people.com.cn/GB/8215/135583/8145917.html.

2. The "No. 1" documents on tax reforms and direct subsidies are as follows:

Central Committee of the Communist Party of China and State Council of China. 2004. Boosting Farmers' Incomes (in Chinese). http://www.gov.cn/test/2006-02/22/content_207415.htm.
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3. The "No. 1" documents that aim to build a modern agriculture sector are as follows:

Central Committee of the Communist Party of China and State Council of China. 2007. Developing Modern Agriculture and Steadily Promoting the Construction of a New Socialist Countryside (in Chinese). http://www.farmer.com.cn/zt2018/1hao/ljwj/201802/t20180205_1355147.htm.
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———. 2013. Speeding up the Modernization of Agriculture and Further Strengthening the Vitality of Rural Growth (in Chinese). http://www.moa.gov.cn/ztzl/yhwj2013/zywj/201302/t20130201_3213480.htm.

4. The "No. 1" documents pertaining to rural reforms extended to rural service and public good provision, as well as to information and communication technology in agriculture, green agriculture, and environmental protection, are as follows:

Central Committee of the Communist Party of China and State Council of China. 2014. Opinions on Strengthening Reform and Innovation to Accelerate Agricultural Modernization (in Chinese). http://www.moa.gov.cn/ztzl/yhwj2014/zywj/201401/t20140120_3742567.htm.
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This report provides an overview of the evolution and profile of rural areas in the People's Republic of China, in comparison with the trends in benchmark countries. It covers the People's Republic of China's rural demographic structure; rural socioeconomic trends, including the prevalence of rural poverty; and environmental performance of the agriculture sector.

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