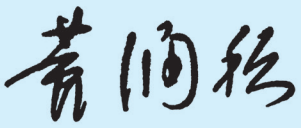
2021

Report on the State of the Ecology and Environment in China

Ministry of Ecology and Environment,
the People's Republic of China

The 2021 Report on the State of the Ecology and Environment in China is hereby announced in accordance with the Environmental Protection Law of the People's Republic of China.

Minister of Ministry of Ecology and Environment,
the People's Republic of China



May 26, 2022

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Summary

The year 2021 was a landmark in the history of the Communist Party of China (CPC) and the People's Republic of China. Under the strong leadership of the CPC Central Committee with Comrade Xi Jinping as the core and guided by Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, the Ministry of Ecology and Environment, together with relevant departments and various localities, have fully implemented the guiding principles of the 19th National Congress of the CPC and the 19th Plenary Sessions, thoroughly studied and acted on Xi Jinping Thought on Ecological Civilization, and earnestly implemented the decisions and deployment of the CPC Central Committee and the State Council. Various tasks of ecological and environmental protection were steadily advanced by proceeding from a new development stage, implementing new development philosophy, building new development dynamic and promoting high-quality development. In 2021, eight binding targets on ecology and environment set in the national economic and social development plan have been successfully accomplished, and the ecological and environmental protection outlined in the 14th Five-Year Plan has achieved a good start.

Complete the top-level design in the eco-environmental sector in a systematic manner. The CPC Central Committee and the State Council issued *the Working Guidance for Carbon Dioxide Peaking and Carbon Neutrality in Full and Faithful Implementation of the New Development Philosophy* and *the Opinions on Deepening Efforts to Win the Battle of Pollution Prevention and Control*; the State Council issued *the Action Plan for Carbon Dioxide Peaking Before 2030* and *the Integrated Work Plan for Energy Conservation and Emission Reduction in the 14th Five Year Plan*; and the Ministry of Ecology and Environment, together with other relevant departments drafted *the 14th Five-Year Plan for Ecological Environment Protection*, nine special plans for key areas and 9 special action plans for pollution prevention and control to draw up the complete and systematic road map and blueprint.

Make solid progress in winning the campaign of "Beat Air Pollution". We continued to carry out comprehensive control actions against air pollution in autumn and winter in key regions. The ozone control campaign in summer was conducted, which effectively curbed the rising ozone concentration in the atmosphere. The supervision and assistance efforts to improve air quality in key areas were advanced, with more than 16,000 air-related environmental problems having been identified and consequently resolved. A total of 52 expert teams were organized to conduct on-site tracking, research and technical guidance in 54 cities in key regions such as Beijing-Tianjin-Hebei and surrounding areas. Localities launched clean heating renovation based on the specific conditions, and around 4.2 million households employing heating by raw coal was renovated in 2021. A total of 145 million tons of steel production capacity had been converted to whole-process ultra-low emission in accumulation. Efforts were also made to ensure good air quality during major national events such as the 100th Anniversary of the Founding of the CPC and the Fourth China International Import Expo.

Enhance efforts to promote the campaign on "Beat Water Pollution". Efforts were made in

researching and establishing the water ecology assessment system for the Yangtze River Basin. The monitoring of sewage outlets into the Yangtze River has been basically completed with a traceability rate of over 80%, and more than 7,000 sewage outlets have been rectified in different localities for in-situ and reckless discharge of sewage. A special campaign was launched to re-examine sewage treatment facilities in the industrial parks along the Yangtze River Economic Belt, and all problems that had been identified were rectified. The investigation of sewage outlets was completed across 18 cities of 5 provinces and autonomous regions along the 7,827-kilometer shoreline of the upper and middle reaches of the mainstream of the Yellow River, with 4,434 sewage outlets registered. A total number of 19,132 township-level centralized drinking water source protection zones nationwide had been delineated in accumulation. We further promoted the treatment of black and odorous water bodies, and continued to improve the effectiveness of urban black and odorous water treatment. A more stringent management of sewage outlets into the sea was put in place, the supervision of the marine aquaculture ecological environment and the prevention and control of marine litter pollution were advanced. A system of regulations was established governing the marine engineering and marine waste dumping and the special law enforcement campaign "Blue Sea 2021" was conducted to improve the marine ecological environment.

Promote the campaign on "Beat Soil Pollution" steadily. The survey on soil pollution of land used by enterprises in key industries was completed. The investigation and rectification of potential risks of soil pollution was conducted among key facilities under supervision and key industries and enterprises involving cadmium pollution of farmland. Efforts were enhanced to strengthen the risk control as well as treatment and remediation of vacated plots from hazardous chemical producing enterprises in key areas. Steady progress was made in building "Zero Waste Cities", and special joint actions for plastic pollution control were organized. *The Implementation Plan for Agricultural Non-point Source Pollution Control and Supervision and Guidance (Trial)* was issued and implemented. We consolidated the effectiveness assessment mechanism for rural environmental renovation, and the environmental renovation of 16,000 more administrative villages and rehabilitation of over 400 large-area black and odorous water bodies in rural areas were completed. We carried out surveys and assessments of groundwater environmental conditions in 68 national chemical parks and 9 key lead-zinc mining areas, and identified 21 cities including Tangshan, Hebei as pilot zones for groundwater pollution prevention and control.

Contribute to the stability on the six fronts (employment, the financial sector, foreign trade, foreign investment, domestic investment and expectations) and security in six areas (job, basic living needs, operations of market entities, food and energy security, stable industrial and supply chains, and the normal functioning of primary-level governments) actively. The reform of "streamlining administration and delegating power, improving regulation and upgrading services" has been deepened, as a result of which the Environment Impact Assessment (EIA) categories of 51 secondary industries were degraded, and the previously required filling of registration forms for 40 secondary industries were canceled. EIA review and approval was improved for major projects such

as the Sichuan-Tibet Railway and 140 million tons/year of legitimate coal mine productivity was consequently unleashed. *The Guiding Opinions on Strengthening the Positive List of Management of Ecological Environment Supervision and Law Enforcement to Promote Differentiated Law Enforcement Supervision* was issued. A questionnaire survey on green and low-carbon development was carried out among nearly 10,000 private enterprises to gain an in-depth understanding of their actual difficulties and policy needs.

Promote green and low-carbon development vigorously. Policies in the "l+N" policy framework aiming at achieving carbon peak and carbon neutrality were released in succession. The national carbon emission trading market was initiated, and a total of 2,162 key emitters in the power generation industry were included in the first implementation cycle, having achieved a cumulative trading volume of carbon emission allowances of 179 million tons and transaction value of 7.661 billion yuan. Supervision and inspection over the quality of carbon emission report were conducted on 401 emission controlled enterprises in the power industry and 35 key service providing organizations. The low-carbon pilot program was continuously further advanced, and the carbon intensity of the pilot provinces and cities decreased faster than that of the whole country. *The Guiding Opinions on Strengthening the Prevention and Control of Ecological Environment Sources for High Energy Consumption and Highly-Emitting Construction Projects* was issued for strict oversight of ecological and environmental access. *The Guiding Opinions on Implementing the "Three Lines and One List" (ecological protection red lines, environmental quality baselines, resource utilization limits and ecological environment access list) Ecological Environment Zoning Management and Control (Trial)* was staged, resulting in quickened application of the "Three Lines and One List" outcomes. The outcomes of the "Three Lines and One List" at the provincial and municipal levels across the country were reviewed and released by the government, and 40,737 environmental management and control units were designated. We continued to promote major national strategic ecological and environmental protection efforts, strengthened the coordinated development of Beijing-Tianjin-Hebei region for joint prevention, control and treatment of the ecological environment, promoted the treatment of the ecological environment in the Xiongan New Area and Baiyangdian Lake, integrated the joint prevention and control mechanism for air and water pollution in the Yangtze River Delta Region, and formed a new paradigm of joint protection and joint governance.

Strengthen the ecosystem protection and supervision of restoration. The General Office of CPC Central Committee and the General Office of the State Council jointly issued *the Opinions on Further Strengthening Biodiversity Conservation*, and the Information Office of the State Council issued *the Biodiversity Conservation in China*. We carried out "Green Shield 2021" to intensify supervision of nature reserves, and completed on-the-spot verification and investigation of 1,767 problematic sites in 148 nature reserves across 28 provinces. Pilot projects for the supervision of the ecological conservation red lines were carried out. A total of 100 national demonstration zones for building ecological civilization and 49 practice and innovation bases of "lucid waters and lush

mountains are invaluable assets" were unveiled.

Carry out in-depth central-level inspection of ecological and environmental protection. 17 provinces (autonomous regions) and 2 central enterprises were inspected for ecological and environmental protection in 3 separate operations, and a total of about 65,600 cases of reports from the mass were handled or transferred. About 62,500 cases were completed or tentatively completed, and 91 typical cases were exposed. A string of outstanding environmental problems of strong public complaint were solved. The central-level inspection has become truly effective means to mobilize localities to deliver their responsibilities for environmental protection. A documentary on ecological environment in the Yangtze River Economic Belt and the Yellow River Basin was produced, and 314 acute ecological and environmental issues were assigned to further consolidate the political responsibility for ecological and environmental protection.

Elevate the eco-environmental law enforcement efficacy greatly. We established the remote supervision system centered on automatic monitoring, and conducted real-time supervision on 1,495 incinerators in 678 incineration plants across the country. *The Implementation Opinions on Strengthening the Building of Comprehensive Administrative Law Enforcement Teams for Ecological Environmental Protection* was issued, and all law enforcement personnel for environmental protection was formally incorporated into the national comprehensive administrative law enforcement staffing with their uniforms harmonized. Throughout the year, ecological and environmental departments at all levels issued a total of 132,800 penalty decisions, with a total amount of 11.687 billion yuan in fines and confiscations; more than 7,000 new ecological and environmental damage compensation cases were initiated, involving a total amount of 3.9 billion yuan.

Handle ecological and environmental risk prevention and control and related emergency response properly. We strengthened the environmental supervision of hazardous waste, tailing ponds and chemicals, further advanced the three-year action of hazardous waste remediation, carried out hazardous waste environmental risk investigations of more than 60,000 enterprises across the country, and identified and resolved 25,000 problems. The treatment of 1,641 tailing ponds along the Yangtze River Economic Belt was basically completed. Efforts were made in meeting the requirements on prevention and control of Covid-19 pandemic related medical waste and wastewater collection and treatment. We continued to reform and improve the mechanism for handling public complaints, and received and handled 440,000 complaints throughout the year. A total number of 199 cases of environmental emergencies were properly dealt with, which dropped by 4.3% compared with that of 2020. In specific, 2 cases were classified as serious, 9 as moderately serious and 188 as moderate.

Conduct strict nuclear and radiation safety supervision. The nationwide 3-year safety risk investigation on nuclear and radiation was advanced with continuous efforts. The validity period of the operation license for Qinshan Nuclear Power Plant Unit 1 was extended with approval, and *the Administrative Provisions on the Qualification of Civil Nuclear Facilities Operators* were

issued. The ever-first centralized waste disposal site of nuclear power plants was approved to start construction. Proper actions were out in place to respond to polluted water from Fukushima nuclear power plant of Japan. 53 operating nuclear power units and 18 in-service civil research reactors maintained good safety records, and the quality of 18 nuclear power units and 1 research reactor under construction was under good control. The incidence of radiation accidents from radioactive sources remained at a historically low level of less than 1 per 10,000 radioactive sources per year.

Deepen the reform in the field of ecology and environment. The Reform Plan for Legal Disclosure of Environmental Information and the Implementation Plan for the Reform on the Capacity over the Supervision, Utilization and Disposal of Hazardous Wastes were released, and the Regulation on the Compensation for Ecological and Environmental Damage, the Guiding Opinions on Strengthening the Law Enforcement and Supervision of Pollution Discharge Permits and the Opinions on the Implementation of Strengthening the Supervision and Management of Sewage Outlets into Rivers and Seas were formulated. We continued to consolidate the full coverage of pollutant discharge permits, incorporated 3,042,400 fixed pollution sources into the scope of pollutant discharge management in accumulation, issued 352,600 pollutant discharge permits, and conducted pollutant discharge registration for 2,680,000 fixed pollution sources with small volume of pollutant discharge. We organized and carried out "Two 100%" (review rate of performance report being 100% and quality verification rate of pollutant discharge permit being 100%) inspections on the quality of pollutant discharge permits and performance reports. In 2020, the submission rate of the performance reports increased from 27% to 99.4%, and the quality verification of 144,200 pollutant discharge permits and the normative review of the content of 59,700 performance reports were completed.

Strengthen support and safeguarding capabilities. The Research Center on Xi Jinping Thought on Ecological Civilization was inaugurated upon the approval of the CPC Central Committee. *The Law of the People's Republic of China on Prevention and Control of Pollution From Environmental Noise* was amended, and *the Regulation on the Administration of Pollution Discharge Permits* was issued. Six department-level regulations of the Ministry of Ecology and Environment were promulgated and revised, and 117 national ecological environment standards were issued. We organized 339 cities at the prefecture level and above to carry out coordinated monitoring of fine particulate matter and ozone, released *the Work Plan on Pilot Carbon Monitoring and Assessment* and issued *the Regional Ecological Quality Assessment Measures (Trial)*. The Ministry of Finance allocated 57.2 billion yuan as central-level funding for ecological and environmental protection in 2021. The first batch of 36 Eco-environment-oriented development (EOD) model pilots was launched. The information platform for comprehensive management of the ecological environment had been continuously expanded and upgraded, enabling online handling of all the administrative and approval items at the ministerial level. The initiative of "Acting up to build a beautiful China" aiming to improve public awareness of ecological civilization was launched, and the national event commemorating the June 5th Environment Day and the series of

national low-carbon day activities were held successfully.

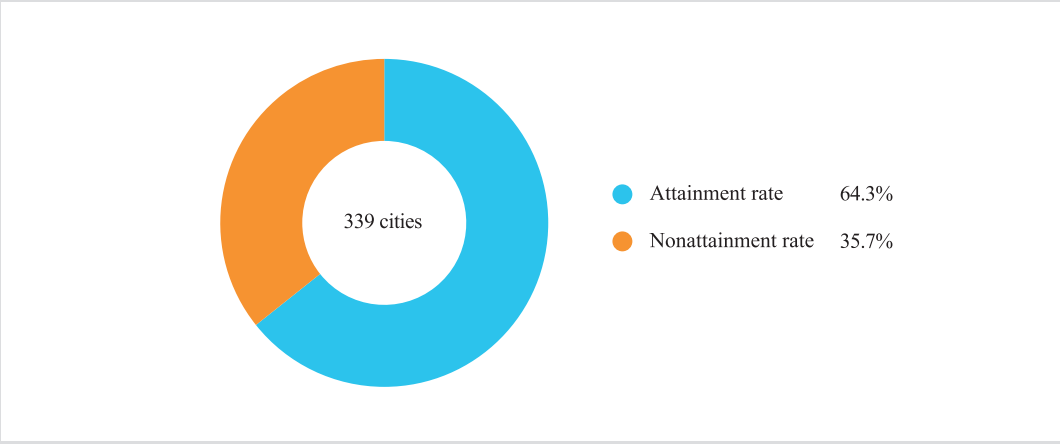
Participate in global environmental governance actively. The first part of the 15th meeting of the Conference of the Parties to the Convention on Biological Diversity (COP15) was successfully held. President Xi Jinping attended the Leaders' Summit and delivered a keynote speech, announcing the establishment of the Kunming Biodiversity Fund and other measures as the host country, and *the Kunming Declaration* was pronounced at the Summit. We attended the 26th meeting of the Conference of the Parties to *the United Nations Framework Convention on Climate Change* (UNFCCC COP26) constructively, and the white paper on *Coping with Climate Change: China's Policies and Actions* was released by the State Council Information Office. *China's Achievements, New Goals and New Measures for Nationally Determined Contributions* and *China's Mid-Century Long-Term Low Greenhouse Gas Emission Development Strategy* were officially submitted to the secretariat of the United Nations Framework Convention on Climate Change. *The China-US Joint Glasgow Declaration on Enhancing Climate Action in the 2020's* and *the Joint Press Communique of the Second China-EU High Level Dialogue on Environment and Climate* were issued. China officially accepted *the Kigali Amendment to the Montreal Protocol*. *The List of Controlled Ozone-Depleting Substances (ODSs) in China* and *the List of Imported and Exported Controlled Ozone-Depleting Substances (ODSs)* were published. We fully realized the 2021 annual targets for implementing the Stockholm Convention on Persistent Organic Pollutants and promoted the building of the BRI International Green Development Coalition. The 2021 China Council for International Cooperation on Environment and Development (CCICED) Annual Meeting was held and preparations for the 7th CCICED were advanced.

In 2021, the discharge volume of all pollutants witnessed continuous decrease, the overall quality of the ecological environment was significantly improved, as manifested by the increasingly stable ecosystem, the consolidated ecological security and the synergistic reduction of pollution and carbon emission. The comprehensive green transformation of economic and social development was making big strides forward, the ecological and environmental risks has been effectively prevented and resolved, and nuclear and radiation safety has been solidly guaranteed. The national governance system and governance capacity in the field of ecological environment has been modernized at a quicker pace, and solid steps have been taken towards the goal of building a beautiful China.

Atmospheric Environment

Air quality across China

Overall status In 2021, out of all the 339 cities at and above prefecture-level (APL cities)* (hereinafter referred to as the 339 cities) across the country, 218 cities met national air quality standard**, accounting for 64.3% of the total, an increase of 3.5 percentage points from that of 2020; 121 cities failed to meet national air quality standard, taking up 35.7%***, a decrease of 3.5 percentage points from 2020. If the impact of sand and dust was not excluded, among the 339 cities, 56.9% cities met national air quality standard, while 43.1% cities failed to meet national air quality standard.

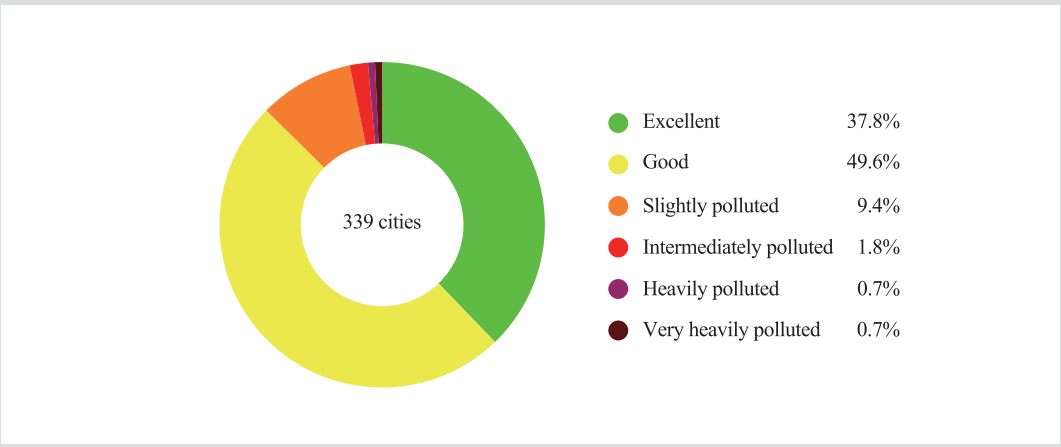


Air Quality of 339 Cities in 2021

*According to *the 14th Five-Year Plan National Urban Ambient Air Quality Monitoring Network Site Setting Plan*, during the 14th Five-Year Plan period, the national air quality monitoring scope includes a total of 1,734 national urban ambient air quality monitoring sites in 339 cities at and above prefecture-level (including municipalities, prefecture-level cities, regions, autonomous prefectures and leagues), and the assessment adopts real-time (reference state) data. The sites identified in the 14th Five-Year Plan for assessment were adopted when 2020 was used for comparison.

**When the concentrations of the six pollutants involved in the assessment all meet the standards, the ambient air quality is deemed to meet the standards. $PM_{2.5}$, PM_{10}, SO_2 and NO_2 were evaluated according to the annual average concentration, and O_3 and CO were evaluated according to the percentile concentration. According to *the Technical Regulation for Ambient Air Quality Assessment (on Trial) (HJ 663-2013)*, effective daily maximum 8-hour average concentration of O_3 and 24-hour average concentration of CO in the calendar year are ranked from low to high, then the 90th percentile of the daily maximum 8-hour average concentration of O_3 is compared with the national standard daily maximum 8-hour average concentration limit of O_3 to judge if O_3 concentration meets the standard; and the 95th percentile of the 24-hour average concentration of CO is compared to the standard 24-hour CO concentration limit to judge if CO concentration meets the standard.

***Percentages presented throughout this report are calculated by dividing the number of the subcategory by the total number. The results are revised according to *the Representation and Judgment of Numerical Rounding Rules and Limit Values (GB/T 8170-2008)*, consequently there may arise the situation where the overall percentage of two or more categories does not equal the adding up of the respective percentage of various categories, or the case where the percentages of all categories do not sum to 100% or the sum of the percentage changes from the same period does not equal 0, the same below.



The percentage of days of various air quality standards of 339 cities in 2021

In 2021, the average percentage of days of the 339 cities meeting air quality standard* was 87.5%, an increase of 0.5 percentage point from 2020. In specific, the attainment rate reached 100% for 12 cities, ranged between 80%~100% for 254 cities, 50%~80% for 71 cities and less than 50% for 2 cities. The ratio of average number of days failing to meet the standard** took up 12.5%, among which, the number of days with $PM_{2.5}$, O_3, PM_{10}, NO_2 and CO as the primary pollutant*** took up 39.7%, 34.7%, 25.2%, 0.6% and less than 0.1% respectively. There was no occurrence of nonattainment days with SO_2 as the primary pollutant.

Six major pollutants In 2021, the concentration of $PM_{2.5}$, PM_{10}, O_3, SO_2, NO_2 and CO were 30 μg/m^3, 54 μg/m^3, 137 μg/m^3, 9 μg/m^3, 23 μg/m^3 and 1.1 mg/m^3 respectively. Compared

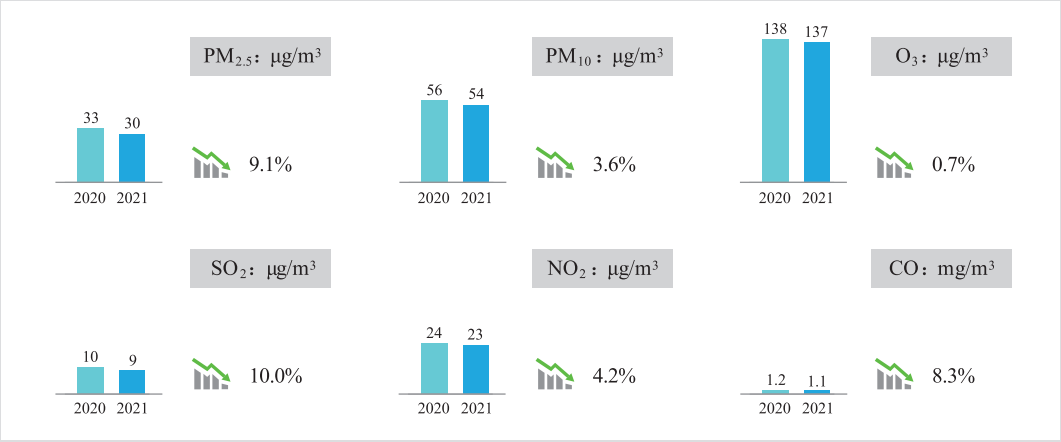
Percentage of 339 cities of various standards of six major pollutants in 2021

Indicator	Standard Ⅰ (%)	Standard Ⅱ (%)	Exceeding Standard Ⅱ (%)
$PM_{2.5}$	6.2	64.0	29.8
PM_{10}	23.9	58.1	18.0
O_3	2.7	82.6	14.7
SO_2	98.2	1.8	0
NO_2	99.7 (same for Standard Ⅰ & Standard Ⅱ)		0.3
CO	100.0 (same for Standard Ⅰ & Standard Ⅱ)		0

*It refers to the number of days with air quality index (AQI) ranging from 0~100, also referred to as attainment days. The impact of sand and dust is not excluded when calculating the number of attainment days.

**The amount of nonattainment days refers to the number of days with AQI>100. Among them, AQI within the range of 101~150 indicates slight pollution, 151~200 indicates intermediate pollution, 201~300 indicates heavy pollution and >300 very heavy pollution. The impact of sand and dust is not excluded when calculating the number of nonattainment days.

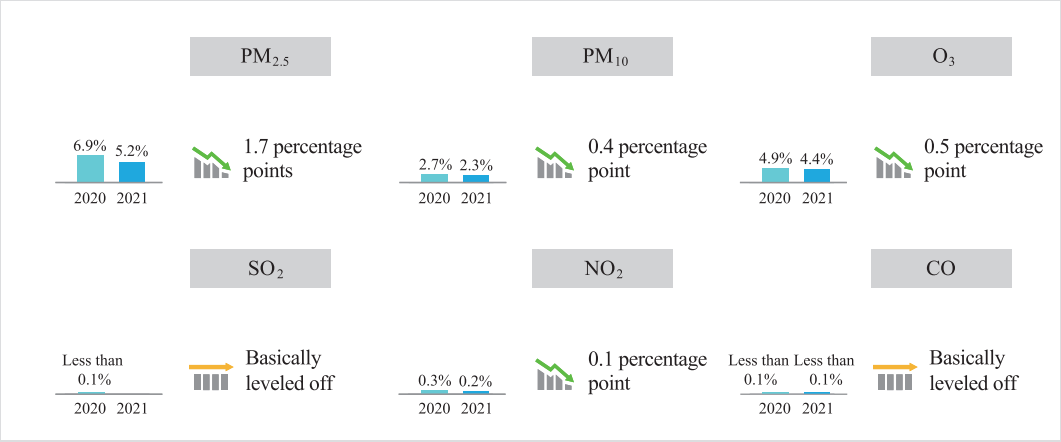
***When AQI >50, the pollutant with the biggest individual AQI is the primary pollutant. The primary pollutants may contain two or more pollutants at the same time, thus the sum of the percentage of days may exceed 100%.



Concentrations of six major pollutants in 339 cities in 2021 and interannual comparison

with that of 2020, the concentration of six major pollutants all decreased. If the impact of sand and dust was not excluded, the average concentrations of $PM_{2.5}$ and PM_{10} were 31 μg/m^3 and 63 μg/m^3, a decrease of 6.1% and an increase of 6.8% from 2020 respectively.

The percentage of nonattainment days for $PM_{2.5}$, O_3, PM_{10}, NO_2 and CO were 5.2%, 4.4%, 2.3%, 0.2% and less than 0.1% respectively. There was no occurrence of nonattainment days for SO_2. Compared with that of 2020, the ratio of nonattainment days for SO_2 and CO basically leveled off, and that for other pollutants all decreased.



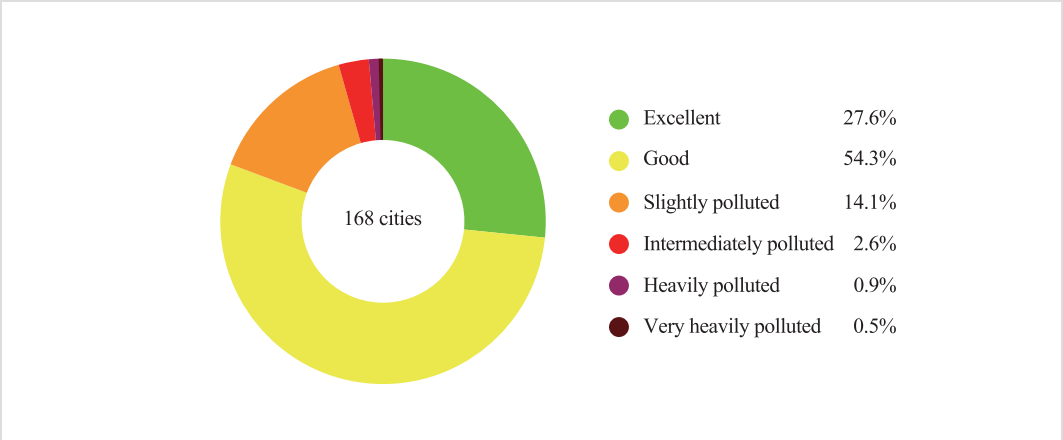
Percentage of nonattainment days of six major pollutants in 339 cities in 2021 and interannual comparison

168 APL Cities

Overall status In 2021, the average percentage of days meeting air quality standard of the 168 cities at or above prefecture level* (hereinafter referred to as 168 cities) was 81.9%, an increase of 1.4 percentage points from that of 2020. In specific, the attainment rate reached 100% for 2 cities, ranged between 80%~100% for 103 cities and 50%~80% for 63 cities. The average ratio of days failing to meet air quality standard was 18.1%, and the nonattainment days with O_3, $PM_{2.5}$, PM_{10}, NO_2 as the primary pollutant accounted for 41.6%, 41.1%, 16.5%, 0.9% out of the total number of days exceeding the standard respectively. There was no occurrence of nonattainment days with SO_2 and CO as the primary pollutants.

Six major pollutants In 2021, the average concentration of $PM_{2.5}$, PM_{10}, O_3, SO_2, NO_2 and CO were 35 μg/m^3, 61 μg/m^3, 150 μg/m^3, 9 μg/m^3, 28 μg/m^3 and 1.2 mg/m^3 respectively. Compared with that of 2020, the concentration of six major pollutants all decreased. If the impact of sand and dust was not excluded, the average concentrations of $PM_{2.5}$ and PM_{10} were 36 μg/m^3 and 69 μg/m^3, a decrease of 7.7% and an increase of 4.5% from 2020 respectively.

The percentage of nonattainment days for $PM_{2.5}$, O_3, PM_{10}, NO_2 and CO were 7.8%, 7.6%, 3.4%, 0.3% and less than 0.1% respectively. There was no nonattainment day for SO_2. Compared with that of 2020, the nonattainment days for SO_2 and CO kept the same, and that for other pollutants all decreased.

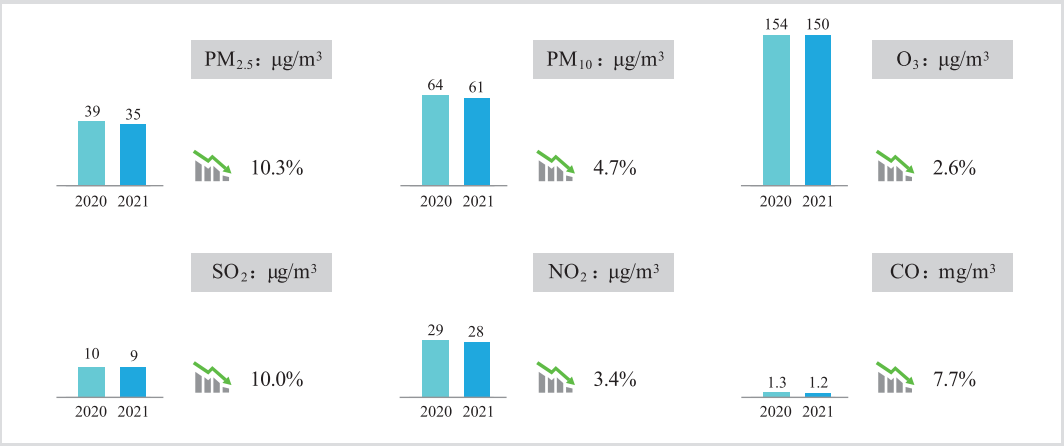


The percentage of days of various air quality standards of 168 cities in 2021

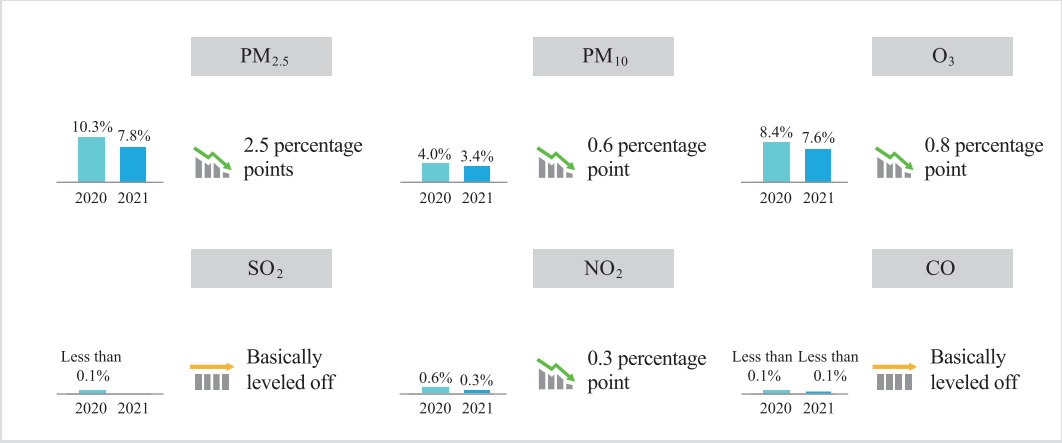
*Including key regions such as Beijing-Tianjin-Hebei and surrounding areas, the Yangtze River delta region, the Fenwei Plain, Chengdu-Chongqing region, the middle reaches of the Yangtze River, the Pearl River Delta region, and provincial capital cities and municipalities with independent planning status.

Percentage of 168 cities meeting various standards of six major pollutants in 2021

Indicator	Standard Ⅰ (%)	Standard Ⅱ (%)	Exceeding Standard Ⅱ (%)
$PM_{2.5}$	1.8	46.4	51.8
PM_{10}	8.3	62.5	29.2
O_3	0.6	69.6	29.8
SO_2	98.8	1.2	0
NO_2	99.4 (same for Standard Ⅰ & Standard Ⅱ)		0.6
CO	100.0 (same for Standard Ⅰ & Standard Ⅱ)		0



Concentrations of six major pollutants in 168 cities in 2021 and interannual comparison



Percentage of nonattainment days of six major pollutants in 168 cities in 2021 and interannual comparison

Key Regions

Beijing-Tianjin-Hebei and surrounding areas* In 2021, the percentage of days meeting air quality standard in "2+26" cities in Beijing-Tianjin-Hebei and surrounding areas fell within the range of 60.3%~79.2% with the average rate of 67.2%, up by 4.7 percentage points compared with that of 2020. In specific, the share of attainment days took up 50%~80% for 28 cities. On average, the number of nonattainment days accounted for 32.8%, among which, 24.0%, 5.7%, 2.0% and 1.2% was of slight pollution, intermediate pollution, heavy pollution and very heavy pollution respectively. The number of days with heavy pollution and worse conditions decreased by 0.7 percentage point from 2020. Among the nonattainment days, the number of days with O_3, $PM_{2.5}$ and PM_{10} as the primary pollutant took up 41.8%, 38.9% and 19.3% respectively. There was no occurrence of nonattainment days with NO_2, SO_2 and CO as the primary pollutants.

The percentage of attainment days was 78.9% for Beijing, up by 2.1 percentage points compared with that of 2020. There were 6 days of very heavy pollution and 2 days of heavy pollution. The number of days with heavy pollution and worse conditions was 2 days less than that of 2020.

The Yangtze River delta** In 2021, 41 cities witnessed various proportions of attainment days ranging from 74.8%~99.7%, with the average ratio of 86.7%, up by 1.6 percentage points compared with that of 2020. In specific, the attainment days took up 80%~100% for 32 cities and 50%~80% for 9 cities. On average, the nonattainment days accounted for 13.3%, among which, 11.3%, 1.6%, 0.2% and 0.2% was of slight pollution, intermediate pollution, heavy pollution and very heavy pollution respectively. The number of days with heavy pollution and worse conditions was down by 0.1 percentage point compared with that of 2020. Among the nonattainment days, the number of days with O_3, $PM_{2.5}$, PM_{10} and NO_2 as the primary pollutant took up 55.4%, 30.7%, 12.3% and 1.7% respectively. There was no occurrence of nonattainment days with SO_2 and CO as the primary pollutant.

The percentage of attainment days was 91.8% for Shanghai around the year, up by 3.8 percentage points compared with that of 2020. There was no occurrence of days with heavy pollution and worse conditions, 1 day less than that of 2020.

Fenwei Plain*** In 2021, the percentage of attainment days of 11 cities in Fenwei Plain was within the range of 53.2%~80.8% with the average rate of 70.2%, up by 0.4 percentage point compared with that of 2020. In specific, the attainment rate was within the range of 80%~100% for 1 city, and 50%~80% for 10 cities. The average ratio of nonattainment days was 29.8%, 21.8% of which were of slight pollution, 5.0% of intermediate pollution, 1.6% of heavy pollution and 1.4% of very heavy pollution, and the number of days with heavy pollution and worse conditions was up by 0.2 percentage point compared with that of 2020. Among the nonattainment days, the number of days with O_3, $PM_{2.5}$, PM_{10} as the primary pollutant took up 39.3%, 38.0% and 22.7% respectively. There was no occurrence of nonattainment days with NO_2, CO and SO_2 as the primary pollutant.

*Including Beijing, Tianjin, Shijiazhuang, Tangshan, Handan, Xingtai, Baoding, Cangzhou, Langfang and Hengshui in Hebei province, Taiyuan, Yangquan, Changzhi and Jincheng in Shanxi Province, Jinan, Zibo, Jining, Dezhou, Liaocheng, Binzhou and Heze in Shandong Province, Zhengzhou, Kaifeng, Anyang, Hebi, Xinxiang, Jiaozuo and Puyang in Henan Province, collectively referred to as the "2+26" cities.

**Including Shanghai municipality, Jiangsu, Zhejiang and Anhui province.

***Including Jinzhong, Yuncheng, Linfen and Lvliang in Shanxi Province, Luoyang and Sanmenxia in Henan Province, and Xi'an, Tongchuan, Baoji, Xianyang, and Weinan in Shaanxi Province.

The concentration of six major pollutants in Beijing–Tianjin–Hebei and surrounding areas in 2021

Region	Indicator	Concentration Unit	Concentration	Change compared with that of 2020 (%)
Beijing-Tianjin-Hebei and surrounding areas	$PM_{2.5}$	$\mu g/m^3$	43	-18.9
	PM_{10}	$\mu g/m^3$	78	-11.4
	O_3	$\mu g/m^3$	171	-5.0
	SO_2	$\mu g/m^3$	11	-15.4
	NO_2	$\mu g/m^3$	31	-11.4
	CO	mg/m^3	1.4	-22.2
Beijing	$PM_{2.5}$	$\mu g/m^3$	33	-5.7
	PM_{10}	$\mu g/m^3$	55	-1.8
	O_3	$\mu g/m^3$	149	-13.9
	SO_2	$\mu g/m^3$	3	0.0
	NO_2	$\mu g/m^3$	26	0.0
	CO	mg/m^3	1.1	-8.3

The concentration of six major pollutants in the Yangtze River Delta region in 2021

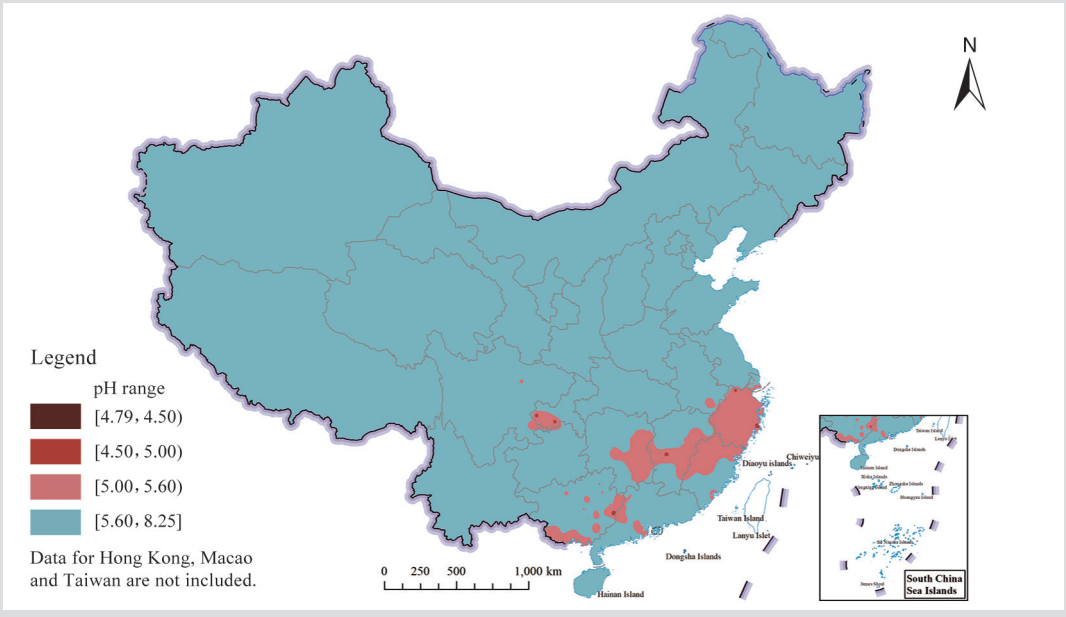
Region	Indicator	Concentration Unit	Concentration	Change compared with that of 2020 (%)
The Yangtze River delta region	$PM_{2.5}$	$\mu g/m^3$	31	-11.4
	PM_{10}	$\mu g/m^3$	56	0.0
	O_3	$\mu g/m^3$	151	-0.7
	SO_2	$\mu g/m^3$	7	0.0
	NO_2	$\mu g/m^3$	28	-3.4
	CO	mg/m^3	1.0	-9.1
Shanghai	$PM_{2.5}$	$\mu g/m^3$	27	-12.9
	PM_{10}	$\mu g/m^3$	43	7.5
	O_3	$\mu g/m^3$	145	-3.3
	SO_2	$\mu g/m^3$	6	0.0
	NO_2	$\mu g/m^3$	35	2.9
	CO	mg/m^3	0.9	-10.0

The concentration of six major pollutants in Fenwei Plain in 2021

Region	Indicator	Concentration Unit	Concentration	Change compared with that of 2020 (%)
Fenwei Plain	$PM_{2.5}$	$\mu g/m^3$	42	-16.0
	PM_{10}	$\mu g/m^3$	76	-8.4
	O_3	$\mu g/m^3$	165	3.1
	SO_2	$\mu g/m^3$	10	-16.7
	NO_2	$\mu g/m^3$	33	-2.9
	CO	mg/m^3	1.3	-13.3

Acid Rain

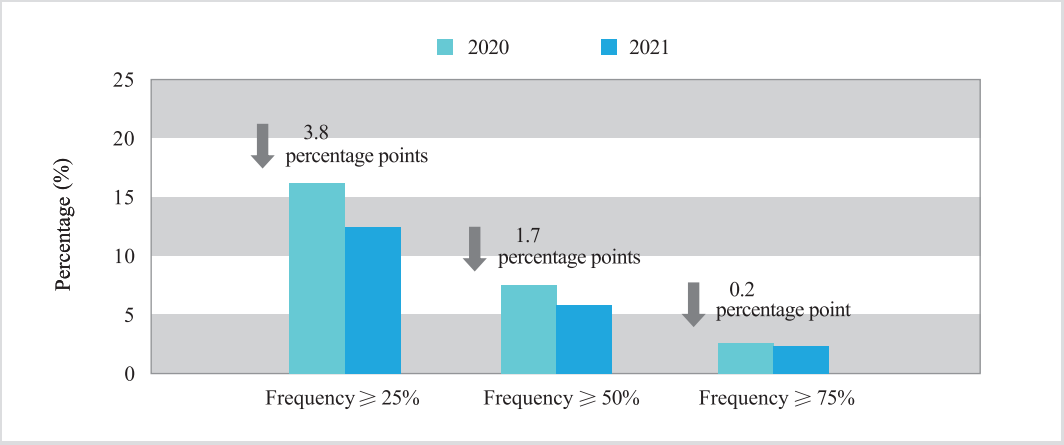
Acid rain distribution In 2021, the total area affected by acid rain was around 369,000 km^2, taking up 3.8% of total land area of China, down by 1.0 percentage point compared with that of 2020. Among them, the percentage of land area with relatively serious acid rain was 0.04%, with no serious acid rain area*. Acid rain was mainly distributed in the region south to the Yangtze River and east to Yunnan-Guizhou Plateau, mainly including Zhejiang, most parts of Shanghai, northern part of Fujian, central part of Jiangxi, central and eastern part of Hunan, southern part of Chongqing, southern part of Guangxi and parts of Guangdong.



The isoline of annual pH value of precipitation in China in 2021

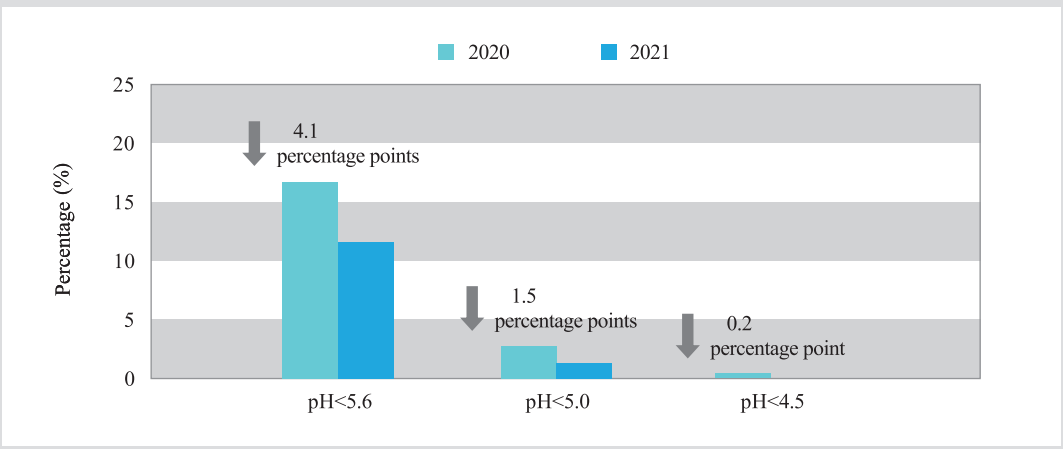
*The acid rain is defined when the precipitation pH value is below 5.6; relatively serious acid rain is defined when the pH value is below 5.0; serious acid rain is defined when the pH value is below 4.5.

Acid rain frequency In 2021, the average acid rain frequency rate of 465 cities (districts or counties) under precipitation monitoring was 8.5%, down by 1.8 percentage points compared with that of 2020. The rate of cities with acid rain occurrence was 30.8%, down by 3.2 percentage points compared with that of 2020. The percentage of cities with acid rain frequency rate of over 25%, 50% and 75% was 12.5%, 5.8% and 2.6% respectively.



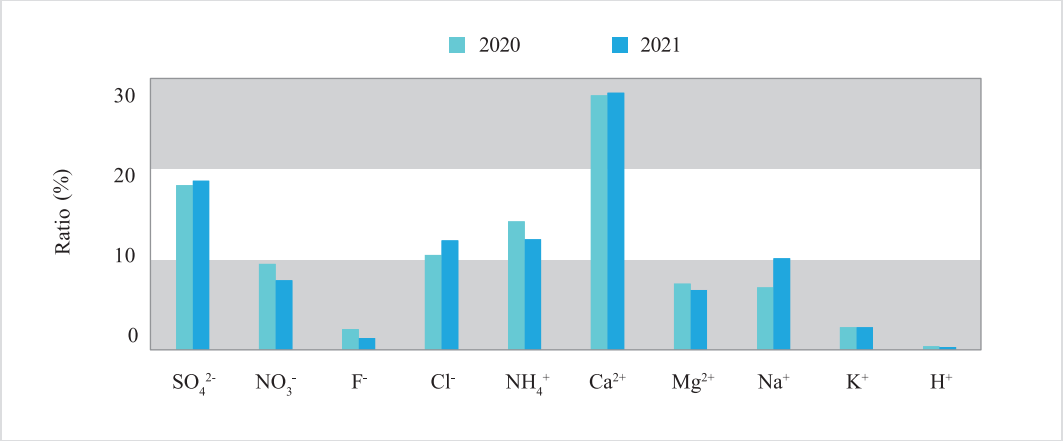
Percentage of cities with different acid rain frequency in 2021 and interannual comparison

Precipitation acidity In 2021, the annual average pH value of precipitation across the country ranged from 4.79 to 8.25 with the average value of 5.73. The rate of cities with acid rain and relatively serious acid rain was 11.6% and 1.3% respectively, and there was no city with serious acid rain.



Percentage of cities with different annual pH value of precipitation in 2021 and interannual comparison

Chemical composition In 2021, the main cations in precipitation nationwide were calcium ion and ammonium, with an equivalent concentration ratio of 28.4% and 12.2% respectively. The main anion was sulfate radical with an equivalent concentration ratio of 18.7%, and the equivalent concentration ratio of nitrate radical was 7.7%. In general, the type of acid rain can still be classified as sulfuric acid. Compared with that of 2020, the ratio of concentration of nitrate radical, fluoride ion, ammonium ion and magnesium ion went down slightly, while the ratio of concentration of chloride ion and sodium ion went up a bit, and the percentage of concentration of other ions were kept at a stable level.



Main ion equivalent concentration ratio of precipitation in 2021 and interannual comparison

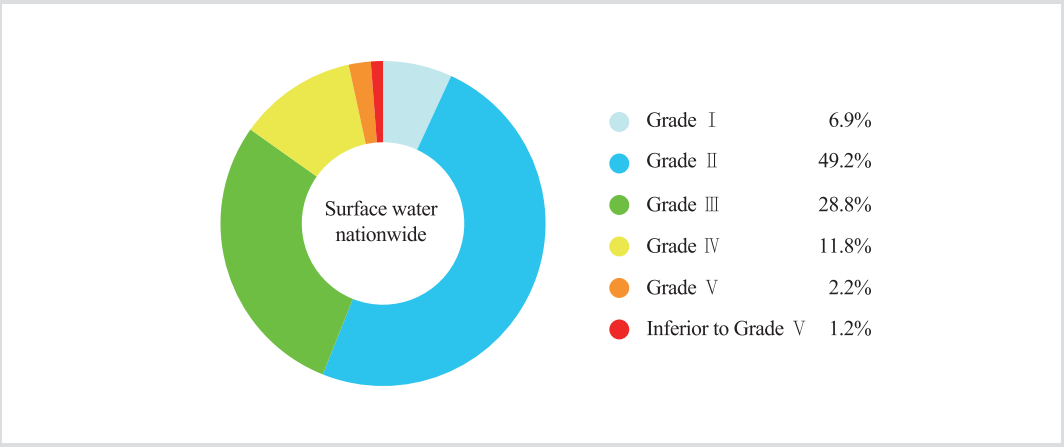
Straw burning

In 2021, satellite remote sensing monitored a total of 7,729 straw burning points in the country (excluding fire point information under cloud cover), mainly distributed in Jilin, Heilongjiang, Inner Mongolia, Guangxi, Shanxi, Hebei, Liaoning, Henan, Shandong and other provinces (autonomous regions).

Freshwater Environment

Surface waters

In 2021, of the 3,632 surface water sections monitored by the state*, 84.9% met Grade I to III water quality standards, up by 1.5 percentage points from 2020; 1.2% were inferior to Grade V standard, all meeting the 2021 water quality target requirements. The major pollution indicators were chemical oxygen demand (COD), permanganate index and total phosphorus (TP).



General surface water quality of China in 2021

Rivers

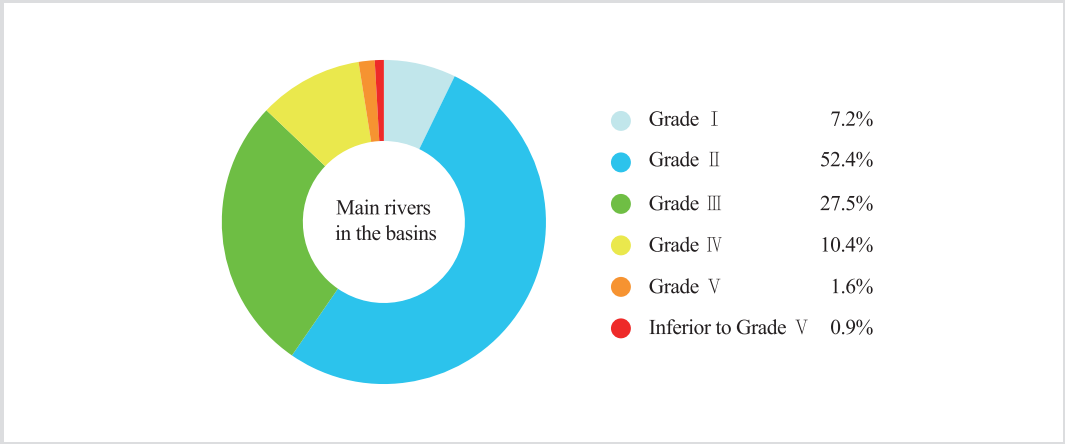
Overall status In 2021, out of the 3,117 surface water sections monitored by the state in the 7 major river basins of the Yangtze River, Yellow River, Pearl River, Songhua River, Huaihe River, Haihe River and Liaohe River as well as rivers in the Zhejiang-Fujian region, rivers in the northwestern and southwestern parts of China**, the water sections meeting Grade I~III standards took up 87.0%, up by 2.1 percentage points from 2020; water sections inferior to Grade V standard

*According to *the 14th Five-Year Plan National Surface Water Environmental Quality Monitoring Network Setup Plan*, during the 14th Five-Year Plan period, there were a total of 3,641 surface water sections (sites) under the national monitoring program for environmental quality evaluation, assessment and ranking (hereby referred to as the "surface water sections monitored by the state"). In 2021, there were 3,632 surface water sections monitored by the state. When compared with 2020, the sections (sites) identified in the 14th Five-Year Plan were used for assessment in 2020.

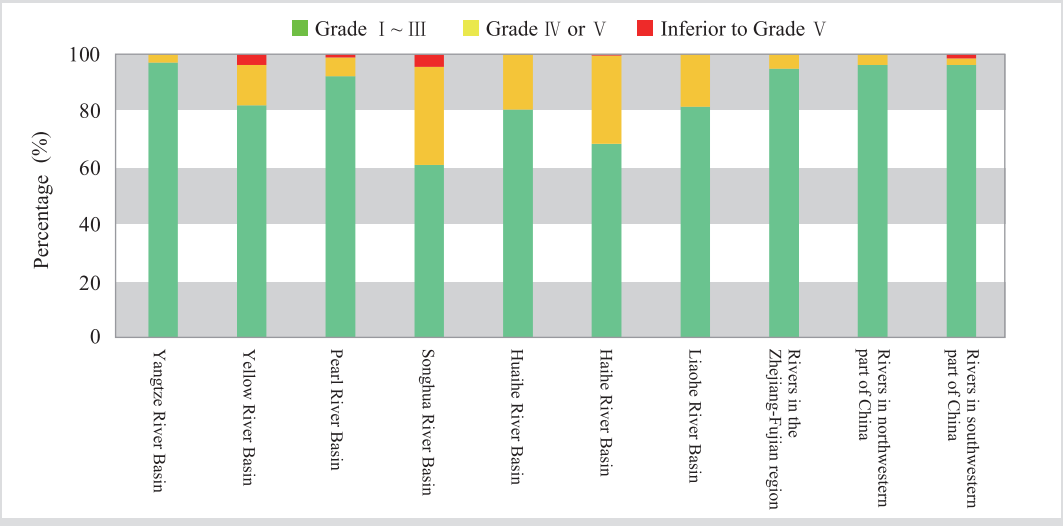
**The surface water quality of river basins refers to the water quality of the main rivers, excluding the lakes (reservoirs) in river basins; the same below.

took up 0.9%, down by 0.8 percentage point from 2020. The major pollution indicators were COD, permanganate index and TP.

The Yangtze River basin, rivers in northwest China, rivers in southwest China, rivers in the Zhejiang-Fujian region, and the Pearl River basin were of excellent quality. The water quality of the river basins of the Yellow River, Liaohe River and Huaihe River was fairly good, and that of the Haihe River and Songhua River was slightly polluted.

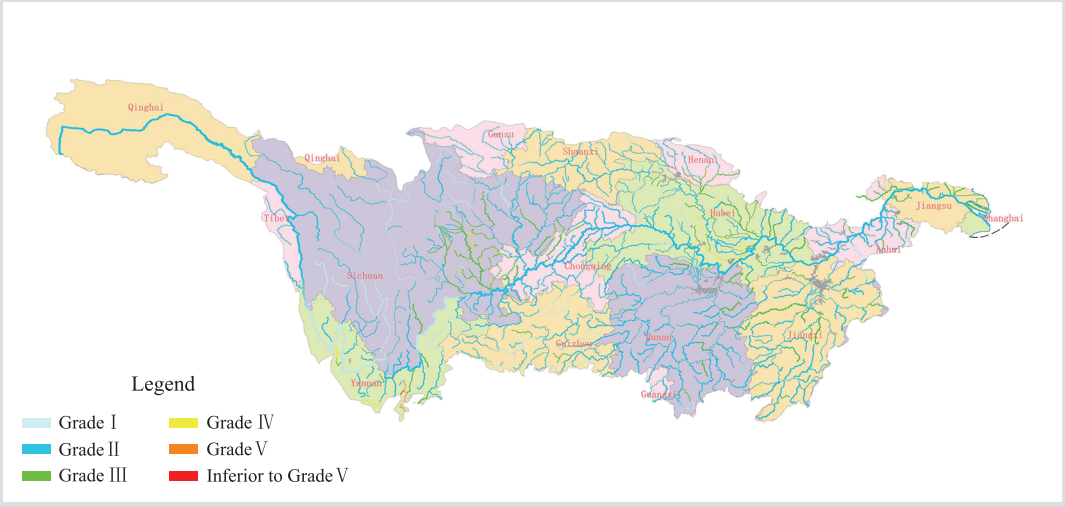


General water quality of river basins in China in 2021



Water quality of the 7 major river basins, rivers in the Zhejiang–Fujian region, and rivers in the northwestern and southwestern parts of China in 2021

The Yangtze River Basin showed excellent water quality. In all the 1,017 surface water sections monitored by the state, 97.1% met Grade I~III standards, up by 1.2 percentage points from 2020; 0.1% were inferior to Grade V standard, down by 0.4 percentage point from 2020. The water quality of the main stream and major tributaries of the Yangtze River was excellent.



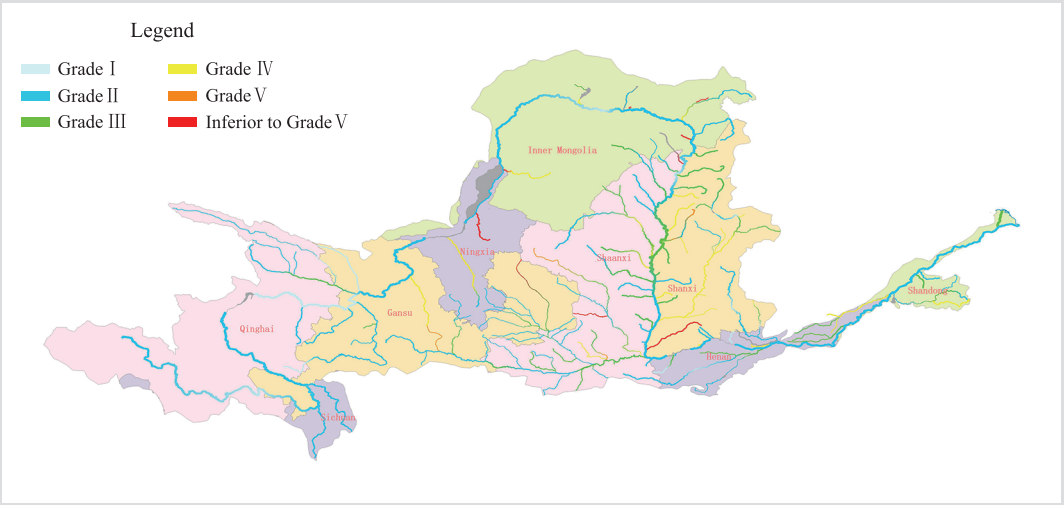
Water quality distribution of the Yangtze River Basin in 2021

Water quality of the Yangtze River Basin in 2021

Water body	Number of sections	Percentage (%)						Compared with that of 2020 (percentage points)					
		Grade I	Grade II	Grade III	Grade IV	Grade V	Inferior to Grade V	Grade I	Grade II	Grade III	Grade IV	Grade V	Inferior to Grade V
Basin	1,017	7.5	70.7	18.9	2.4	0.5	0.1	0.2	-0.4	1.4	-0.7	0	-0.4
Mainstream	82	13.4	86.6	0	0	0	0	6.1	-6.1	0	0	0	0
Major tributaries	935	7.0	69.3	20.5	2.6	0.5	0.1	-0.3	0.1	1.4	-0.8	0	-0.4
Water sections across provincial boundaries	156	6.4	77.6	11.5	3.8	0.6	0	-1.3	3.2	-2.6	0	0.6	0

The Yellow River basin was of fairly good water quality. Out of the 265 surface water sections monitored by the state, 81.9% met Grade I~III standards, up by 2.0 percentage points from 2020; 3.8% were inferior to Grade V standard, down

by 1.1 percentage points from 2020. The main stream of the Yellow River was of excellent water quality and the water quality of major tributaries was fairly good.

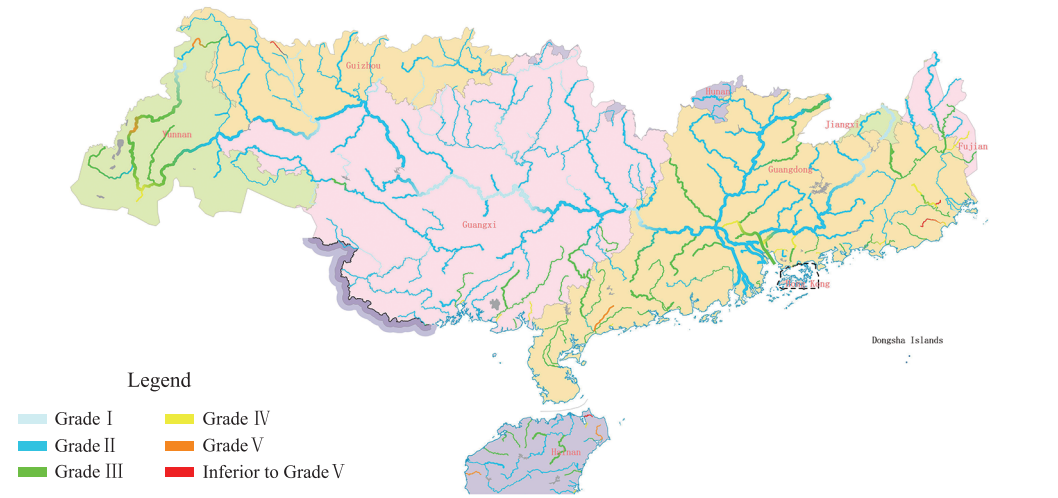


Water quality distribution of the Yellow River Basin in 2021

Water quality of the Yellow River Basin in 2021

Water body	Number of sections	Percentage (%)						Compared with that of 2020 (percentage points)					
		Grade I	Grade II	Grade III	Grade IV	Grade V	Inferior to Grade V	Grade I	Grade II	Grade III	Grade IV	Grade V	Inferior to Grade V
Basin	265	6.4	51.7	23.8	12.5	1.9	3.8	0.8	-2.0	3.3	0.9	-1.8	-1.1
Mainstream	43	14.0	81.4	4.7	0	0	0	9.3	-11.6	4.7	-2.3	0	0
Major tributaries	222	5.0	45.9	27.5	14.9	2.3	4.5	-0.8	-0.3	3.1	1.6	-2.1	-1.3
Water sections across provincial boundaries	74	8.1	62.2	17.6	8.1	0	4.1	2.8	-3.1	4.3	0.1	-4.0	0.1

The Pearl River basin was of excellent water quality. Among the 364 surface water sections monitored by the state, 92.3% met Grade I~III standards, up by 1.6 percentage points from 2020; 1.1% were inferior to Grade V standard, down by 0.3 percentage point from 2020. The main stream and major tributaries of the Pearl River were all of excellent water quality, and the coastal rivers in Guangdong and Guangxi and the rivers in Hainan were all of fairly good water quality.

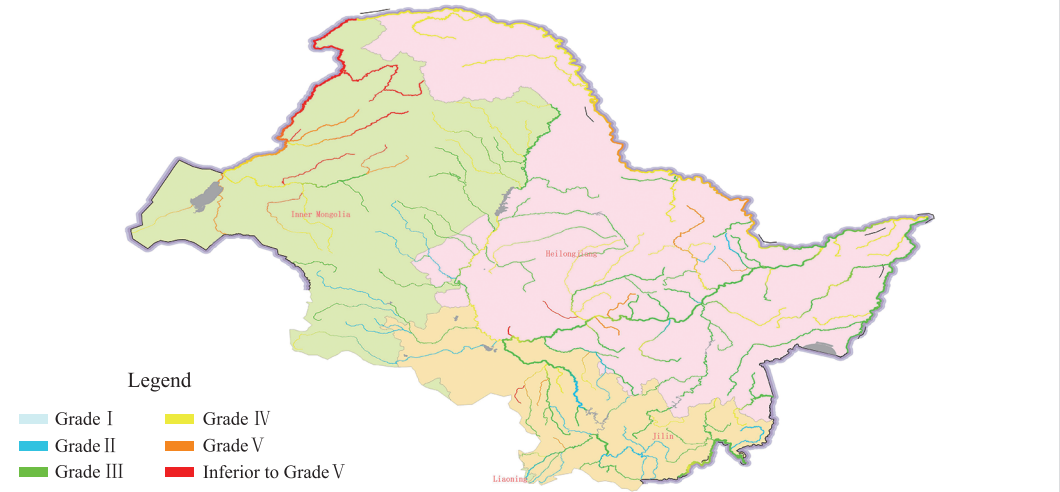


Water quality distribution of the Pearl River Basin in 2021

Water quality of the Pearl River Basin in 2021

Water body	Number of sections	Percentage (%)						Compared with that of 2020 (percentage points)					
		Grade I	Grade II	Grade III	Grade IV	Grade V	Inferior to Grade V	Grade I	Grade II	Grade III	Grade IV	Grade V	Inferior to Grade V
Basin	364	9.1	62.1	21.2	5.2	1.4	1.1	2.5	-1.1	0.3	-1.1	-0.2	-0.3
Mainstream	62	17.7	62.9	12.9	4.8	1.6	0	8.0	-8.1	3.2	-3.3	1.6	-1.6
Major tributaries	180	11.1	73.9	11.1	2.8	0.6	0.6	1.1	-0.5	0.5	-0.5	-0.5	0
Coastal rivers in Guangdong and Guangxi	79	1.3	35.4	48.1	11.4	1.3	2.5	1.3	-2.6	1.3	1.3	-1.2	0
Rivers in Hainan	43	2.3	60.5	25.6	4.7	4.7	2.3	2.3	9.3	-7.0	-4.6	0	0
Water sections across provincial boundaries	45	20.0	66.7	11.1	2.2	0	0	2.2	-6.6	4.4	0	0	0

The Songhua River basin was slightly polluted. The major pollution indicators were permanganate index, COD, ammonia nitrogen and TP. Among the 254 surface water sections monitored by the state, 61.0% met Grade I~III standards, down by 9.5 percentage points from 2020; 4.3% were inferior to Grade V standard, down by 1.2 percentage points from 2020. The main stream of the Songhua River basin, waters of Tumen River and Suifen River were of good water quality, and the major tributaries, waters of Heilongjiang River and Wusuli River were slightly polluted.

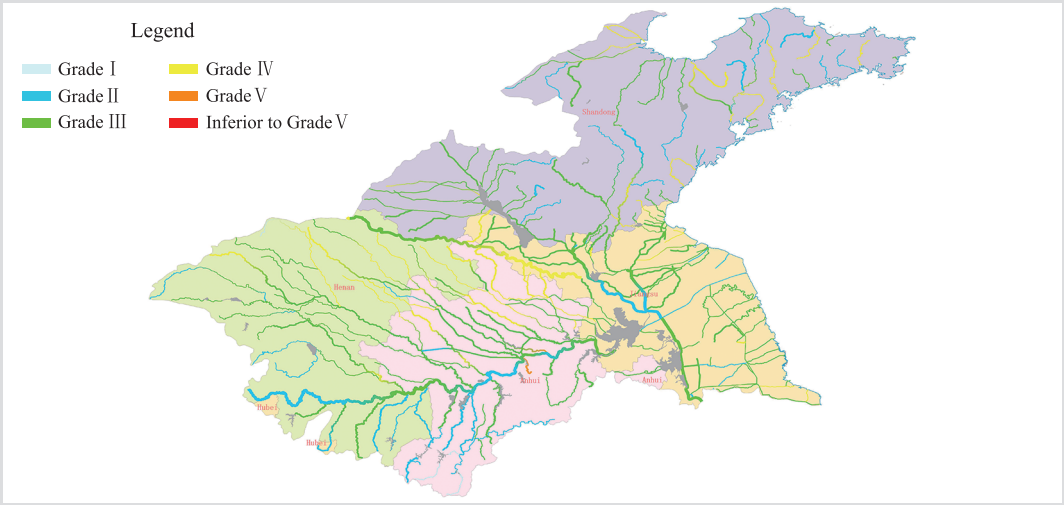


Water quality distribution of the Songhua River Basin in 2021

Water quality of the Songhua River Basin in 2021

Water body	Number of sections	Percentage (%)						Compared with that of 2020 (percentage points)					
		Grade Ⅰ	Grade Ⅱ	Grade Ⅲ	Grade Ⅳ	Grade Ⅴ	Inferior to Grade Ⅴ	Grade Ⅰ	Grade Ⅱ	Grade Ⅲ	Grade Ⅳ	Grade Ⅴ	Inferior to Grade Ⅴ
Basin	254	0	15.0	46.1	27.2	7.5	4.3	0	-0.4	-9.0	6.7	4.0	-1.2
Mainstream	19	0	15.8	68.4	15.8	0	0	0	-5.3	-10.5	15.8	0	0
Major tributaries	155	0	21.3	46.5	24.5	5.8	1.9	0	1.9	-6.4	5.8	3.9	-5.2
Waters of Heilongjiang	45	0	0	17.8	42.2	22.2	17.8	0	-8.9	-24.4	13.3	8.9	11.1
Waters of Tumen River	15	0	13.3	73.3	13.3	0	0	0	6.6	-6.7	0	0	0
Waters of Wusuli River	15	0	0	66.7	33.3	0	0	0	0	13.4	-13.4	0	0
Waters of Suifen River	1	0	0	100.0	0	0	0	0	0	0	0	0	0
Water sections across provincial boundaries	33	0	27.3	48.5	24.2	0	0	0	-12.1	-6.0	18.1	0	0

The Huaihe River basin was of fairly good water quality. Out of the 341 surface water sections monitored by the state, 80.4% met Grade I~III standards, up by 9.1 percentage points from 2020; none was inferior to Grade V standard, down by 1.5 percentage points from 2020. The main stream of the Huaihe River was of excellent water quality; and waters of the major tributaries of the Huaihe River and Yishu-Si waters were of good water quality; and the rivers flowing into sea in the Shandong Peninsula were slightly polluted.

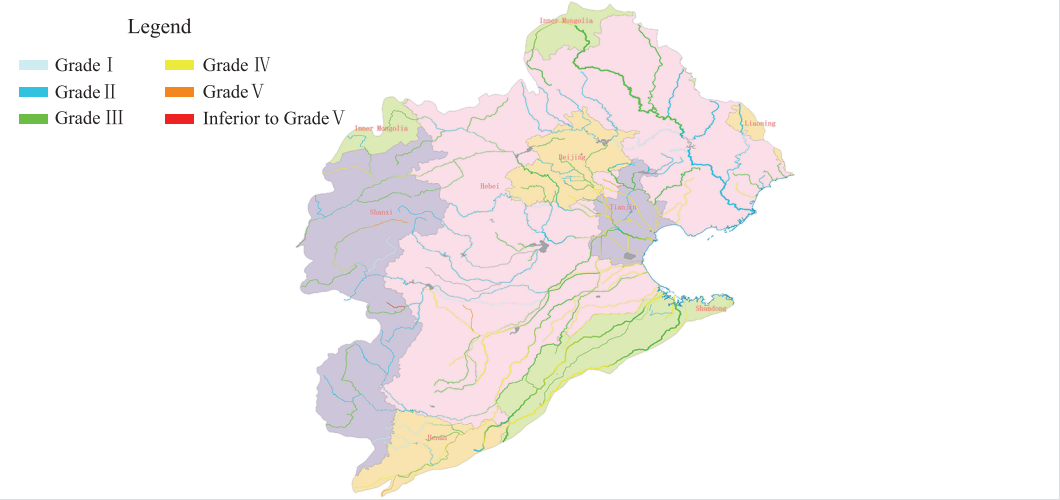


Water quality distribution of the Huaihe River Basin in 2021

Water quality of the Huaihe River Basin in 2021

Water body	Number of sections	Percentage (%)						Compared with that of 2020 (percentage points)					
		Grade I	Grade II	Grade III	Grade IV	Grade V	Inferior to Grade V	Grade I	Grade II	Grade III	Grade IV	Grade V	Inferior to Grade V
Basin	341	0.9	19.4	60.1	19.1	0.6	0	0.6	0.6	7.9	-5.5	-2.0	-1.5
Mainstream	13	0	61.5	38.5	0	0	0	0	7.7	-7.7	0	0	0
Major tributaries	182	1.6	16.5	59.9	20.9	1.1	0	1.1	-2.7	11.0	-6.0	-1.1	-2.2
Waters of the Yishu-Si water system	98	0	15.3	73.5	11.2	0	0	0	0	3.1	-2.1	-1.0	0
Waters of rivers flowing into sea in Shandong Peninsula	48	0	27.1	39.6	33.3	0	0	0	12.5	10.4	-12.5	-8.3	-2.1
Water sections across provincial boundaries	49	0	16.3	49.0	34.7	0	0	0	2.0	6.1	-6.1	-2.0	0

The Haihe River basin was slightly polluted. The major pollution indicators were COD, permanganate index and BOD_5. Of the 244 surface water sections monitored by the state, 68.4% met Grade I~III standards, up by 9.5 percentage points from 2020; 0.4% were inferior to Grade V standard, down by 2.5 percentage points from 2020. In 3 sections of the main stream of the Haihe River, the water quality of Sanchakou met Grade II standard, that of Haijin Bridge met Grade III standard, and that of Haihe River tidal gate met Grade IV standard. The waters of Luanhe River were of excellent quality. The major tributaries, the Tuhai River-Majia River and waters in east Hebei and coastal areas were slightly polluted.

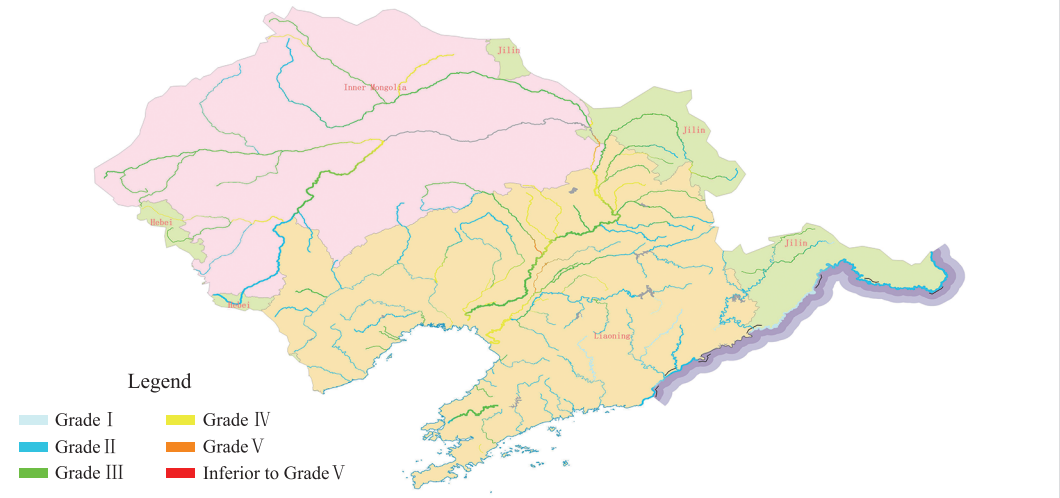


Water quality distribution of the Haihe River Basin in 2021

Water quality of the Haihe River Basin in 2021

Water body	Number of sections	Percentage (%)						Compared with that of 2020 (percentage points)					
		Grade Ⅰ	Grade Ⅱ	Grade Ⅲ	Grade Ⅳ	Grade Ⅴ	Inferior to Grade Ⅴ	Grade Ⅰ	Grade Ⅱ	Grade Ⅲ	Grade Ⅳ	Grade Ⅴ	Inferior to Grade Ⅴ
Basin	244	6.1	29.1	33.2	28.3	2.9	0.4	-3.4	4.6	8.3	-1.2	-5.8	-2.5
Mainstream	3	0	33.3	33.3	33.3	0	0	0	0	0	33.3	-33.3	0
Major tributaries	191	5.8	29.8	32.5	27.7	3.7	0.5	-3.2	4.3	9.6	-2.1	-5.9	-2.7
Waters of Luanhe River	21	19.0	42.9	33.3	4.8	0	0	-9.6	4.8	0	4.8	0	0
Waters of Tuhai River-Majia River	22	0	13.6	31.8	54.5	0	0	0	4.5	13.6	-4.6	-9.1	-4.5
Waters in east Hebei and coastal areas	7	0	14.3	57.1	28.6	0	0	0	14.3	-14.3	0	0	0
Water sections across provincial boundaries	66	6.1	28.8	31.8	31.8	1.5	0	-6.2	7.3	14.9	-0.5	-9.3	-6.2

The Liaohe River basn was fairly good in water quality. Out of the 194 surface water sections monitored by the state, 81.4% met Grade I~III standards, up by 8.2 percentage points from 2020; none was inferior to Grade V standard, down by 0.5 percentage point from 2020. The waters of Yalu River, the coastal rivers in eastern Liaoning and western Liaoning were of excellent quality. The waters of Daliaohe River and Dalinghe River were of good quality, and the main stream and major tributaries of Liaohe River were of slight pollution.



Water quality distribution of the Liaohe River Basin in 2021

Water quality of the Liaohe River Basin in 2021

Water body	Number of sections	Percentage (%)						Compared with that of 2020 (percentage points)					
		Grade Ⅰ	Grade Ⅱ	Grade Ⅲ	Grade Ⅳ	Grade Ⅴ	Inferior to Grade Ⅴ	Grade Ⅰ	Grade Ⅱ	Grade Ⅲ	Grade Ⅳ	Grade Ⅴ	Inferior to Grade Ⅴ
Basin	194	4.6	47.9	28.9	16.5	2.1	0	0.4	7.9	0	-7.7	0	-0.5
Mainstream	15	0	20.0	40.0	33.3	6.7	0	0	13.3	26.7	-46.7	6.7	0
Major tributaries	63	0	25.4	44.4	28.6	1.6	0	0	3.7	6.1	-8.1	-0.1	-1.7
Waters of Daliaohe River	38	5.3	52.6	21.1	15.8	5.3	0	2.7	7.9	-2.6	-5.3	-2.6	0
Waters of the Daling River	16	0	75.0	12.5	12.5	0	0	0	18.8	-18.7	0	0	0
Waters of the Yalu River	27	22.2	66.7	11.1	0	0	0	11.1	-7.4	3.7	-7.4	0	0
Coastal rivers in eastern Liaoning	22	4.5	68.2	22.7	4.5	0	0	-4.6	22.7	-22.8	4.5	0	0
Coastal rivers in western Liaoning	13	0	69.2	30.8	0	0	0	-16.7	19.2	-2.5	0	0	0
Water sections across provincial boundaries	21	0	42.9	28.6	23.8	4.8	0	0	14.3	-4.8	-9.5	0	0

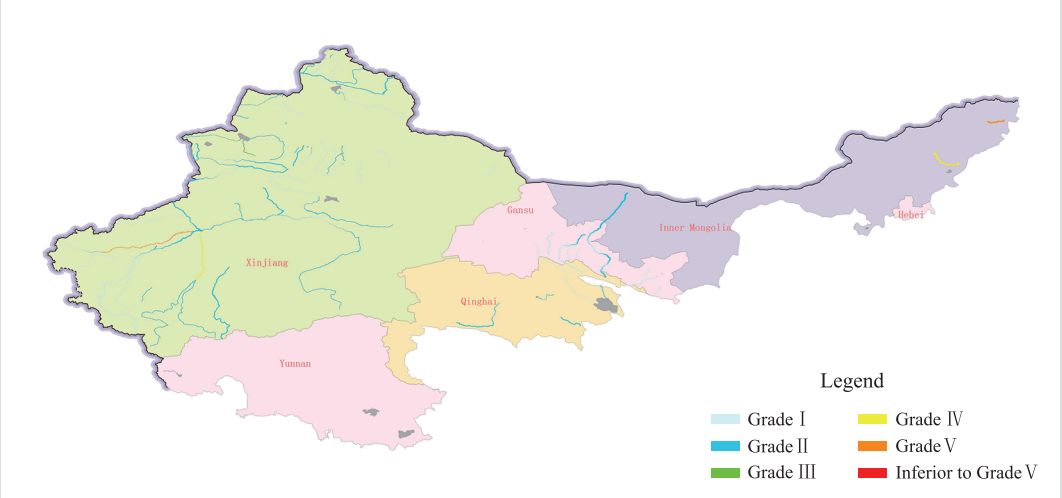
Rivers in the Zhejiang-Fujian region were of excellent water quality. Of the 198 surface water sections monitored by the state, 94.9% met Grade I~III standards, down by 0.6 percentage point from 2020; none was inferior to Grade V standard, leveled off with that of 2020.

Water quality distribution of the Rivers in the Zhejiang–Fujian Region in 2021

Water quality of the Rivers in the Zhejiang–Fujian Region in 2021

Water body	Number of sections	Percentage (%)						Compared with that of 2020 (percentage points)					
		Grade I	Grade II	Grade III	Grade IV	Grade V	Inferior to Grade V	Grade I	Grade II	Grade III	Grade IV	Grade V	Inferior to Grade V
Basin	198	8.6	62.1	24.2	4.5	0.5	0	3.0	-1.0	-2.6	0.5	0	0
Water sections across provincial boundaries	6	16.7	83.3	0	0	0	0	16.7	-16.7	0	0	0	0

Rivers in northwestern part of China were of excellent water quality. Of the 107 surface water sections monitored by the state, 96.3% met Grade I~III standards, up by 0.1 percentage point from 2020; none was inferior to Grade V standard, leveled off with that of 2020.

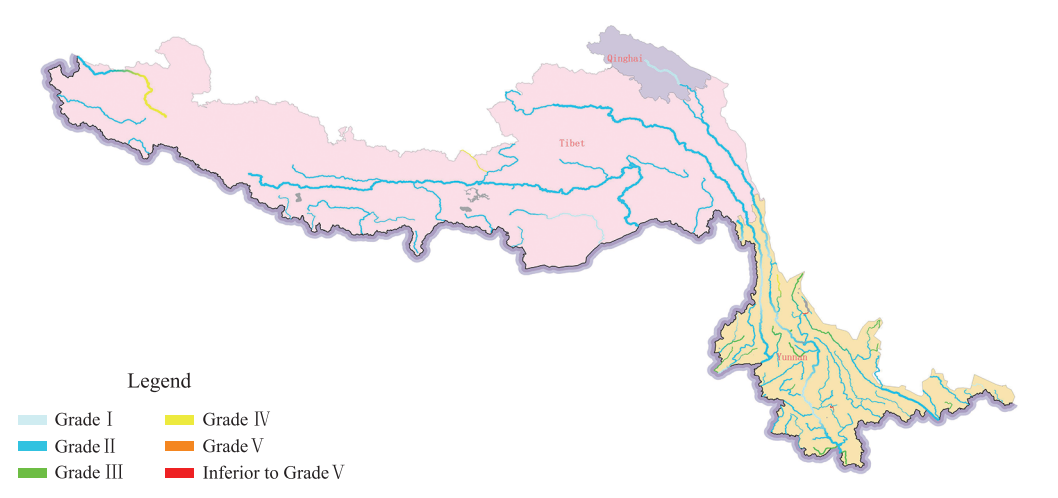


Water quality distribution of the Rivers in the northwestern part of China in 2021

Water quality of the Rivers in the northwestern part of China in 2021

Water body	Number of sections	Percentage (%)						Compared with that of 2020 (percentage points)					
		Grade Ⅰ	Grade Ⅱ	Grade Ⅲ	Grade Ⅳ	Grade Ⅴ	Inferior to Grade Ⅴ	Grade Ⅰ	Grade Ⅱ	Grade Ⅲ	Grade Ⅳ	Grade Ⅴ	Inferior to Grade Ⅴ
Basin	107	40.2	54.2	1.9	1.9	1.9	0	-2.3	4.2	-1.9	0	0	0
Water sections across provincial boundaries	8	25.0	50.0	12.5	0	12.5	0	12.5	-12.5	0	0	0	0

Rivers in southwestern part of China were of excellent water quality. Among the 133 surface water sections monitored by the state, 96.2% met Grade I~III standards, down by 0.8 percentage point from 2020; 1.5% were inferior to Grade V standard, leveled off with that of 2020.



Water quality distribution of the Rivers in the southwestern part of China in 2021

Water quality of the Rivers in the southwestern part of China in 2021

Water body	Number of sections (items)	Percentage (%)						Compared with that of 2020 (percentage points)					
		Grade Ⅰ	Grade Ⅱ	Grade Ⅲ	Grade Ⅳ	Grade Ⅴ	Inferior to Grade Ⅴ	Grade Ⅰ	Grade Ⅱ	Grade Ⅲ	Grade Ⅳ	Grade Ⅴ	Inferior to Grade Ⅴ
Basin	133	9.0	75.9	11.3	2.3	0	1.5	3.7	-6.1	1.5	0.8	0	0
Water sections across provincial boundaries	5	20.0	80.0	0	0	0	0	0	0	0	0	0	0

Lakes (Reservoirs)

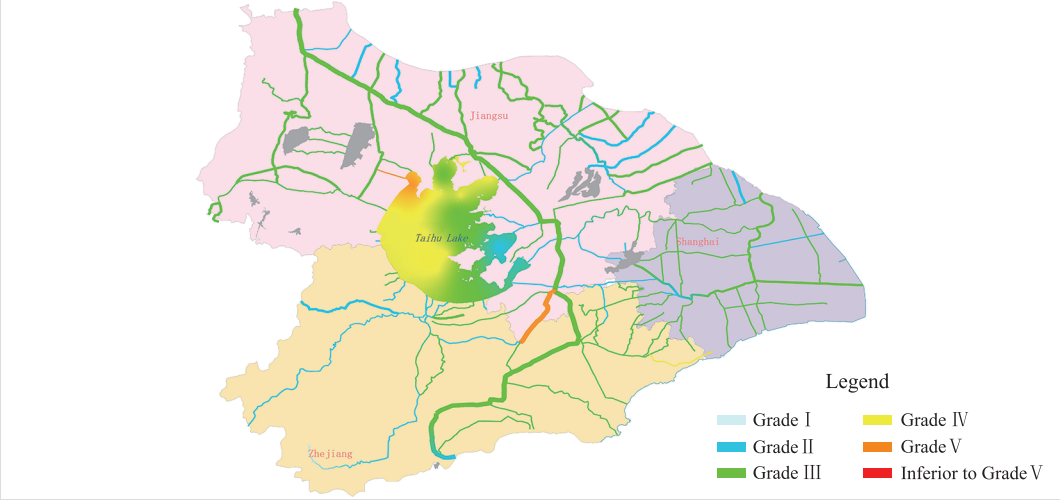
Overall status In 2021, among the 210 major lakes (reservoirs) across the country under the national monitoring program, 72.9% met Grade I~III standards, down by 0.9 percentage point from 2020; 5.2% were inferior to Grade V standard, keeping the same as that of 2020. The major pollution indicators were TP, COD and permanganate index.

In the 209 major lakes (reservoirs) monitored for nutritional status, 10.5% were under oligotrophic status, up by 5.2 percentage points from 2020; 62.2% were under mesotrophic status, down by 5.1 percentage points from 2020; 23.0% were under slight eutrophication, down by 0.1 percentage point from 2020; 4.3% were under intermediate eutrophication, leveled off with that of 2020.

The Taihu Lake was of slight pollution. The major pollution indicator was TP. In specific, the water quality in the eastern shore line was excellent; that of the central area, the northern shore line and western shore line were slightly polluted. The lake as a whole was under slight eutrophication. In specific, the eastern shore line was mesotrophic, and the central area, the northern shore line and western shore line were under slight eutrophication.

The rivers surrounding the Taihu Lake were of excellent water quality. Among the 133 surface water sections monitored by the state, 0.8% met Grade I standard, the same

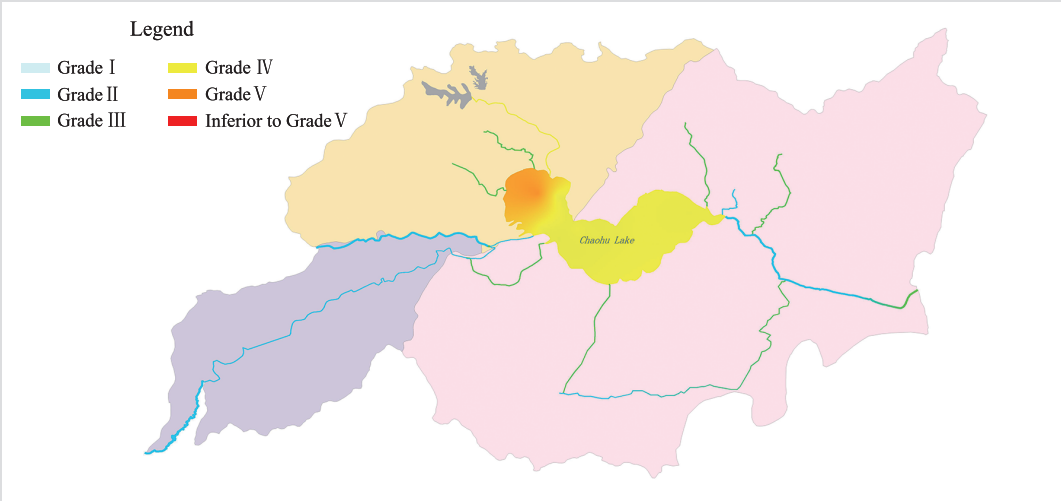
as that of 2020; 29.3% met Grade II standard, up by 8.2 percentage points from 2020; 67.7% met Grade III standard, down by 5.2 percentage points from 2020; 0.8% met Grade IV standard, down by 4.5 percentage points from 2020; 1.5% met Grade V standard, up by 1.5 percentage points from 2020; none was worse than Grade V standard, the same as 2020.



Water quality distribution of the Taihu Lake in 2021

The Chaohu Lake was slightly polluted. The major pollution indicator was TP. In specific, the eastern half and the western half of the lake were both slightly polluted. The lake as a whole was under intermediate eutrophication, while the eastern half was under slight eutrophication and the western half was under intermediate eutrophication.

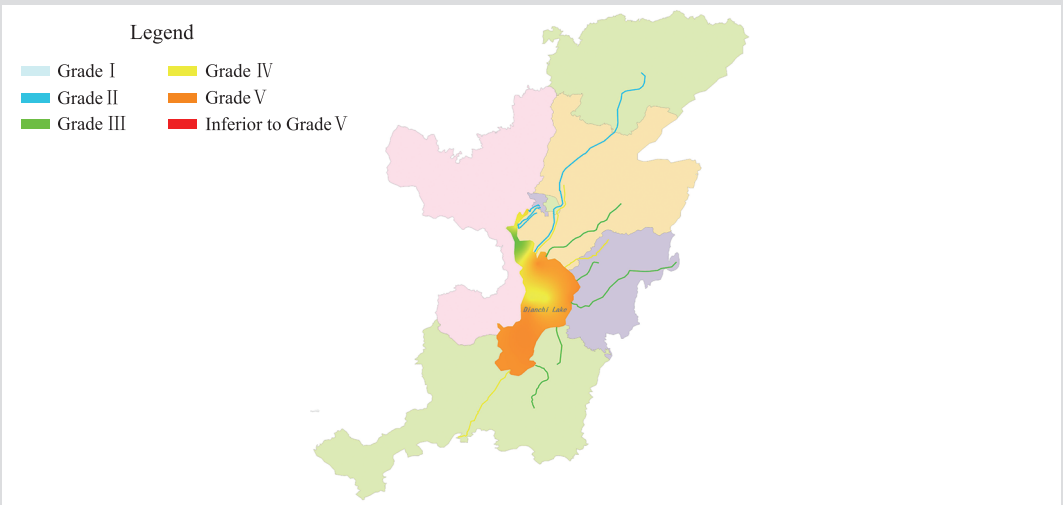
The rivers surrounding the Chaohu Lake were of excellent water quality. Of the 21 surface water sections monitored by the state, 47.6% met Grade II standard, up by 19.0 percentage points from 2020; 47.6% met Grade III standard, down by 14.3 percentage points; 4.8% met Grade IV standard, the same as that of 2020; none was at Grade V standard, down by 4.8 percentage points. None was at Grade I or worse than Grade V standard, the same as that of 2020.



Water quality distribution of the Chaohu Lake in 2021

The Dianchi Lake was of slight water pollution. The major pollution indicators were COD, TP and permanganate index. In specific, the Caohai part of the lake was of fairly good water quality, and the Waihai part was moderately polluted. The lake as a whole, Caohai part and the Waihai part were all under intermediate eutrophication.

The rivers surrounding the Dianchi Lake were of fairly good water quality. Of the 12 surface water sections monitored by the state, 33.3% met Grade II standard, up by 8.3 percentage points from 2020; 41.7% met Grade III standard, down by 25.0 percentage points from 2020; 25.0% met Grade IV standard, up by 16.7 percentage points from 2020; None was at Grade I, Grade V or worse than Grade V standard, the same as that of 2020.



Water quality distribution of the Dianchi Lake in 2021

Danjiangkou Reservoir was of excellent water quality and was under mesotrophic state.

Erhai Lake was of excellent water quality and was under mesotrophic state.

Baiyangdian Lake was of good water quality and was under mesotrophic state.

Groundwater

In 2021, among the 1,900 nationally monitored groundwater sites*, 79.4% met Grade I~IV water quality standards, and 20.6% met Grade V water quality standards. The major indicators exceeding stipulated limits were sulfate, chloride and sodium.

Drinking Water Sources

Centralized drinking water source areas of APL cities nationwide In 2021, among the 876 monitored sections (sites) of centralized drinking water source in use in APL cities across the country, 825 met the water quality standard throughout the year, taking up 94.2% of the total. In specific, 587 sections (sites) were surface drinking water source sections (sites), 564 of which were up to standard throughout the year, taking up 96.1%; major indicators exceeding limits were TP, permanganate index and iron. Among the 289 monitored groundwater drinking water source sites, 261 met the water quality standard throughout the year, taking up 90.3%; major indicators exceeding limits were manganese, iron and fluoride, mainly attributable to the relatively high natural background value.

Rural centralized drinking water sources serving a population of more than 10,000 or with a daily water supply of 1,000 tons In 2021, among the 10,345 sections (sites) of the rural centralized drinking water sources serving a population of more than 10,000 or with a daily water supply of 1,000 tons, 8,072 sites met the water quality standard throughout the year, taking up 78.0% of the total. In specific, 5,612 sections (sites) were surface drinking water source sections (sites), 5,165 of which met the water quality standard throughout the year, taking up 92.0%; major indicators exceeding limits were TP, permanganate index and manganese. There were 4,733 groundwater drinking water source sites, 2,907 of which met the water quality standard throughout the year, taking up 61.4% of the total; major indicators exceeding limits were fluoride, sodium and manganese, mainly attributable to the relatively high natural background value.

Water bodies of key water conservancy projects

The Three Gorges Reservoir Area In 2021, the water quality of the Three Gorges Reservoir Area was excellent. Among the 77 surface water sections monitored by the state, sections meeting Grade I~III standard took up 98.7%, sections meeting Grade IV standard took up 1.3%, and none was at Grade V or worse, all keeping the same as that of 2020. No section was under oligotrophic status, down by 1.3 percentage points from 2020; sections that were under mesotrophic status took up 74.0%, down by 1.3 percentage points from 2020; and sections that were under eutrophic status took up 26.0%, up by 2.6 percentage points from 2020.

South-North Water Diversion Project (East Route) In 2021, the intake of the Yangtze River was of excellent water quality. The water quality of the Liyunhe section, Baoying section, Bulao section, Hanzhuang section and Liangji section of the Beijing-Hangzhou Canal were all fairly good, and that of Suqian section was excellent. The Nansi Lake, Hongze Lake and Luoma Lake were under slight eutrophication, and Dongping Lake was under mesotrophic status.

South-North Water Diversion Project (Central Route) In 2021, the water quality of the intake was excellent. Among all 9 tributaries flowing into the Danjiangkou Reservoir, Guanshan River was of fairly good water quality, and others were of excellent water quality. Danjiangkou Reservoir was under mesotrophic status.

*According to *the 14th Five-Year Plan for National Groundwater Environmental Quality Assessment Site Setup Plan*, during the 14th Five-Year Plan period, the Ministry of Ecology and Environment has set up 1,912 national groundwater environmental quality assessment sites, covering the national first and second level hydro-geological divisions and 339 APL cities. In 2021, 1,900 sites were actually monitored.

Inland fishery waters

In 2021, the major indicator exceeding limits in the key fishery waters in rivers was total nitrogen (TN). The areas where the concentrations of TN, TP, permanganate index, non-ionic ammonia, petroleum, copper and volatile phenol were better than the assessment standards accounted for 0.3%, 56.4%, 88.7%, 97.0%, 98.0%, 98.1% and 99.6% of the monitored area respectively. Compared with 2020, the percentage of areas with limit-exceeding TN, permanganate index, petroleum, volatile phenol and non-ionic ammonia increased slightly, and that of TP and copper decreased slightly. The major limit-exceeding indicators in the key fishery waters in lakes (reservoirs) were TN and TP. The areas where the concentrations of TN, TP, permanganate index, copper, volatile phenols and petroleum were better than the assessment standards accounted for 5.2%, 25.2%, 63.3%, 94.0%, 95.7% and 96.4% of the monitored area respectively. Compared with 2020, the percentage of areas with limit-exceeding petroleum and volatile phenols grew slightly, and that of TN, TP, permanganate index and copper went down slightly. The major limit-exceeding indicator in the water bodies of 40 national aquatic germplasm resources conservation areas (inland) was TN. The areas where the concentrations of TN, non-ionic ammonia, volatile phenol, permanganate index, copper, TP and petroleum were better than the assessment standards accounted for 0.4%, 79.9%, 87.3%, 87.7%, 97.8%, 98.1% and 99.3% of the monitored area respectively. Compared with 2020, the ratio of areas with limit-exceeding TN, permanganate index, volatile phenol, non-ionic ammonia and copper increased slightly, and that of TP and petroleum decreased slightly.

Water ecology in major river basins

In 2021, the seven major river basins in China, namely the Yangtze River, Yellow River, Huaihe River, Haihe River, Pearl River, Songhua River and Liaohe River were mainly in intermediate to fairly good water ecological status. Among the 701 monitored sites*, 40.1% were in excellent or fairly good status, 40.8% were in intermediate status, and 19.1% were in poor or very poor status.

Farmland irrigation water

In 2021, among the 1,353 monitored irrigation water sections (sites) with the scale of or above 100,000 mu in farmland irrigation areas, 1,230 sections (sites) were up to standard, accounting for 90.9%. The main indicators exceeding the limits are fecal coliform, suspended substance and pH.

*In 2021, a total of 705 sites were set up for the investigation and monitoring of water ecological status in key river basins, and 4 sites were not included in the assessment due to lack of indicators.

Marine Environment

Marine water quality

Sea area under jurisdiction In 2021, the sea areas meeting Seawater Quality Standard Grade I took up 97.7% of the total area under jurisdiction, up by 0.9 percentage point compared with that of 2020; 21,350 km^2 were of water quality inferior to Grade IV Standard, 8,720 km^2 less than that of 2020. The main pollution indicators were inorganic nitrogen and activate phosphate*.

Nearshore sea areas In 2021, the overall water quality of nearshore sea areas in China was getting better while maintaining stability. 81.3% of the total sea areas met Seawater Quality Standard Grade I & II (namely excellent and good water quality), up by 3.9 percentage points compared with that of 2020; 9.6% failed to meet Standard Grade IV, up by 0.2 percentage point compared with that of 2020. The major pollution indicators were inorganic nitrogen and active phosphates**.

Among the 11 coastal provinces, the percentage of excellent and good quality seawater areas in nearshore waters in Jiangsu, Shanghai and Zhejiang increased slightly compared with 2020, that of Fujian, Guangdong and Hainan was basically the same, and that of Liaoning, Hebei, Tianjin, Shandong and Guangxi decreased slightly.

Among the 44 gulfs covering an area of more than 100 km^2, the water quality of 11 gulfs under monitoring inferior to Grade IV Standard during spring, summer and autumn. The main pollution indicators were inorganic nitrogen and active phosphate.

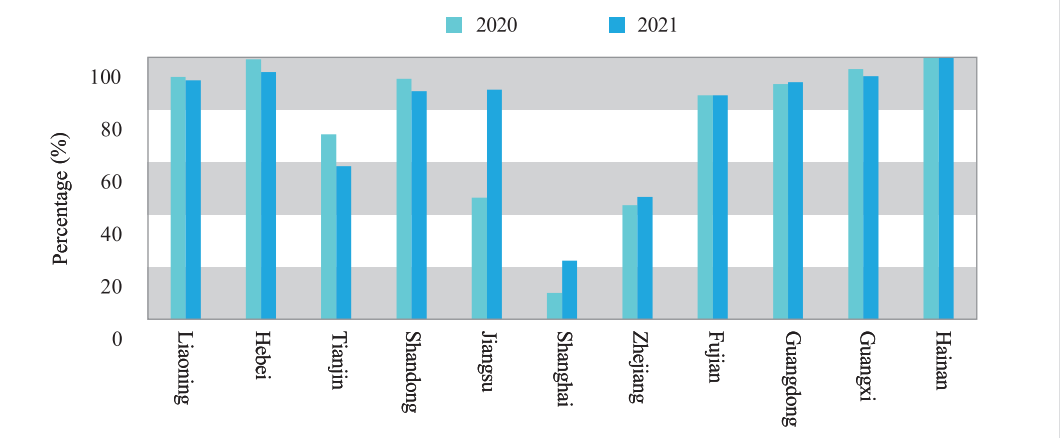
The sea areas under jurisdiction of China failing to meet Seawater Quality Standard Grade Ⅰ in 2021

Sea area	Marine area (km^2)				
	Grade Ⅱ	Grade Ⅲ	Grade Ⅳ	Inferior to Grade Ⅳ	Total
Bohai Sea	7, 710	2, 720	820	1, 600	12, 850
Yellow Sea	6, 310	1, 830	720	660	9, 520
East China Sea	11, 450	3, 490	4, 720	16, 310	35, 970
South China Sea	5, 070	2, 920	890	2, 780	11, 660
Sea area under jurisdiction	30, 540	10, 960	7, 150	21, 350	70, 000

*The water quality of the sea areas under jurisdiction is the result of monitoring in summer.

** The water quality of the nearshore waters is the result of monitoring in spring, summer and autumn.

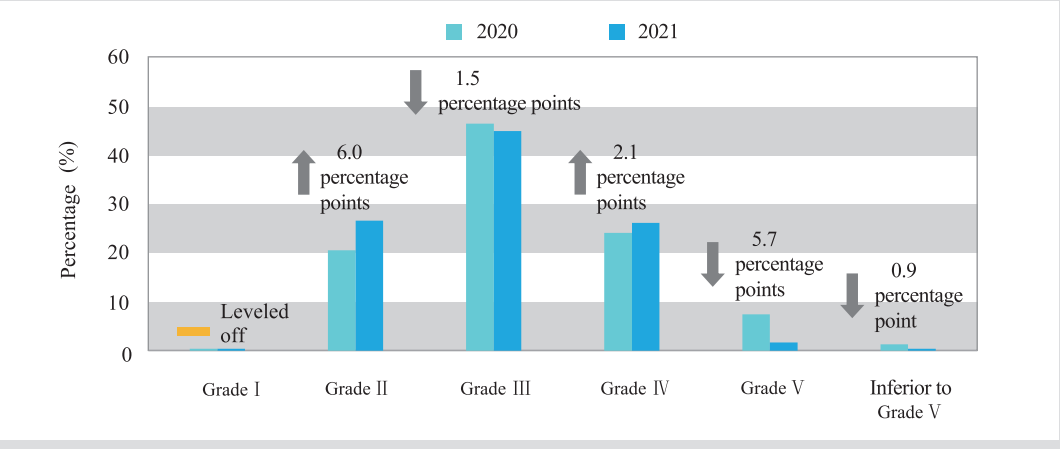
Water quality of sea area under jurisdiction of China in 2021



Percentage of excellent and good quality seawater in nearshore waters of coastal provinces in 2021 and interannual comparison

Sea-entering rivers

In 2021, out of the 230 surface water sections for national assessment of the rivers flowing into sea*, sections meeting Grade I~III standards took up 71.7%, up by 4.5 percentage points compared with that of 2020; and sections inferior to Grade V standard took up 0.4%, down by 0.9 percentage point compared with that of 2020. The main pollution indicators were COD, permanganate index, BOD_5, TP and ammonia nitrogen.



Water quality of sea–entering rivers in 2021 and interannual comparison

*According to *the 14th Five-Year Plan National Surface Water Environmental Quality Monitoring Network Setup Plan*, a total of 230 river sections flowing into the sea were set up across the country. The sections identified in the 14th Five-Year Plan Period shall be used for assessment when data in 2020 was needed for comparison.

Marine fishery waters

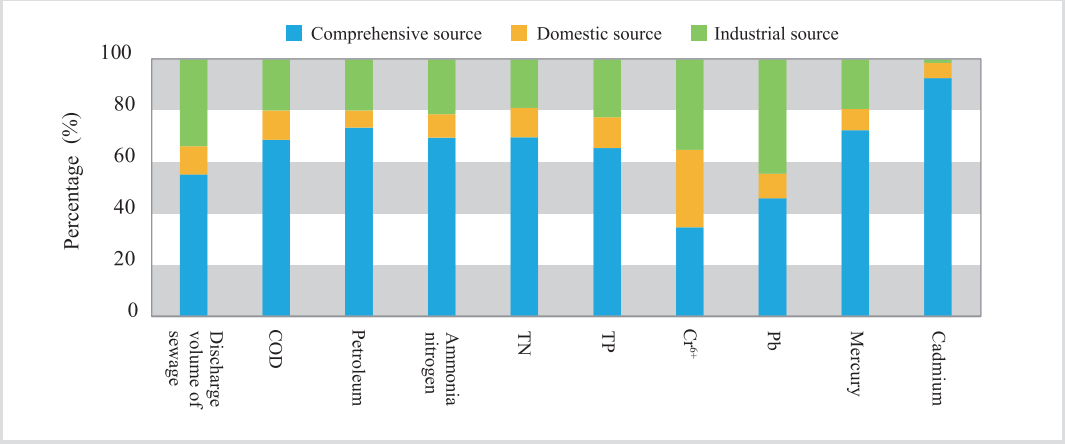
In 2021, the major pollution indicator in key natural marine fishery waters was inorganic nitrogen. The areas where the concentrations of inorganic nitrogen, active phosphate, COD, copper and petroleum were above the assessment standard accounted for 40.9%, 53.4%, 84.5%, 99.95% and 100% of the total monitored area respectively. Compared with 2020, the ratio of the area with standard-exceeding COD increased slightly, and that of inorganic nitrogen, active phosphate and petroleum decreased slightly. The major pollution indicator of the key marine aquaculture areas was inorganic nitrogen. The areas where the concentrations of inorganic nitrogen, active phosphate, COD, copper and petroleum were above the assessment standard accounted for 57.9%, 65.7%, 100%, 100% and 100% of the total monitored area respectively. Compared with 2020, the ratio of area with standard-exceeding active phosphate increased slightly, and that of inorganic nitrogen, petroleum, COD and copper decreased slightly. The major pollution indicator of the water bodies of the 7 national aquatic germplasm resource reserves (ocean) was inorganic nitrogen. The areas where the concentrations of inorganic nitrogen, COD, active phosphate, copper and petroleum above the assessment standard accounted for 37.6%, 66.4%, 72.4%, 99.8% and 100% of the total monitored area respectively. Compared with 2020, the ratio of the area with standard-exceeding COD and copper increased slightly, and that of inorganic nitrogen, active phosphate and petroleum decreased slightly. The sediments in 21 major marine fishery waters were in good condition.

Typical marine ecosystem

In 2021, among the 24 typical marine ecosystems monitored, 6 were in a healthy state, and 18 were in a sub-healthy state. Specifically, 7 estuary ecosystems were in a sub-healthy state, including the Yalu River Estuary, Shuangtaizi River Estuary, Luanhe River Estuary-Beidaihe River, Yellow River Estuary, Yangtze River Estuary, Minjiang River Estuary and Pearl River Estuary; 8 bay ecosystems were in a sub-healthy state, including Bohai Bay, Laizhou Bay, Jiaozhou Bay, Hangzhou Bay, Yueqing Bay, areas along the coast of East Fujian Province, Daya Bay and Beibu Gulf; the ecosystem of the northern Jiangsu shoal wetland was in a sub-healthy state; the 3 coral reefs in the southwest coast of Leizhou Peninsula, the east coast of Hainan and Xisha were healthy; the coral reefs in Beihai of Guangxi Province were in a sub-healthy state; the mangrove ecosystems of Beihai and Beilun Estuary of Guangxi Province, and were healthy; the seagrass bed ecosystem in Beihai of Guangxi Province was healthy, while that on the east coast of Hainan Province was in a sub-healthy state.

Pollutant Discharge Outlets

In 2021, the total discharge volume of 458 sea pollution discharge outlets with daily discharge over 100 tons reached about 7.28 billion tons. The largest share of sewage discharge came from the comprehensive sewage outlets, followed by industrial sewage outlets, and then domestic outlets. Among the major pollution indicators, the discharge volume of all types of pollutants from comprehensive sewage outlets was the largest except for hexavalent chromium.



Different types of pollution discharge outlets and the major pollution indicators in 2021

Soil Environment

Soil environmental quality

In 2021, the soil environmental risks nationwide were basically brought under control, and the increasing trend of soil pollution has been initially curbed. The safe utilization rate of contaminated cultivated land in the country has been stabilized at over 90%, and the safe utilization of key construction land has been effectively guaranteed. The soil environment of agricultural land nationwide was generally stable. The main pollutants affecting soil environmental quality of agricultural land were heavy metals, of which cadmium was the primary pollutant. Besides, the soil pollution risk in land use by companies in key industries across the country cannot be neglected.

According to *the Overall Plan on Soil Environment Monitoring during the 14th Five-Year Period*, a round of monitoring is completed in every five years by the National Soil Environment Monitoring Network. In 2021, 2,118 national soil environmental sites in the Pearl River Basin and Taihu Lake Basin were monitored, and the soil environmental quality in the above two basins remained generally stable.

Quality of cultivated land

The average grade of cultivated land quality nationwide was 4.76*. Among them, the areas of the first to third grades accounted for 31.24% of the total cultivated areas; that of the fourth to sixth grades accounted for 46.81%; and that of the seventh to tenth grades accounted for 21.95%.

Water loss and soil erosion

There were 2.6927 million km^2 of land subject to water loss and soil erosion in China, of which 1.12 million km^2 were eroded by water and 1.5727 million km^2 by wind. In terms of erosion intensity, the areas of mild, medium, severe, extremely severe and fierce erosion accounted for 63.3%, 17.2%, 7.6%, 5.7% and 6.2% of the total area of soil erosion in the country respectively**.

Land desertification and sandification across China

There were 2.6116 million km^2 of desertification land and 1.7212 million km^2 of sandy land across the country. The existing rocky desertification land area in the karst areas of China was 100,700 km^2***.

*The grade of cultivated land quality is based on *Cultivated Land Quality Grade (GB/T 33469-2016)* with the classification of ten grades. The quality of first-class cultivated land is the best, and the quality of the tenth grade is the worst. The first to third grades, the fourth to sixth grades, and the seventh to tenth grades are further divided into high, medium and low grade respectively. Up to the time this Report was published, the data of the cultivated land quality in 2019 are the latest.

**Up to the time this Report was published, the monitoring results of water and soil erosion in 2020 are the latest data.

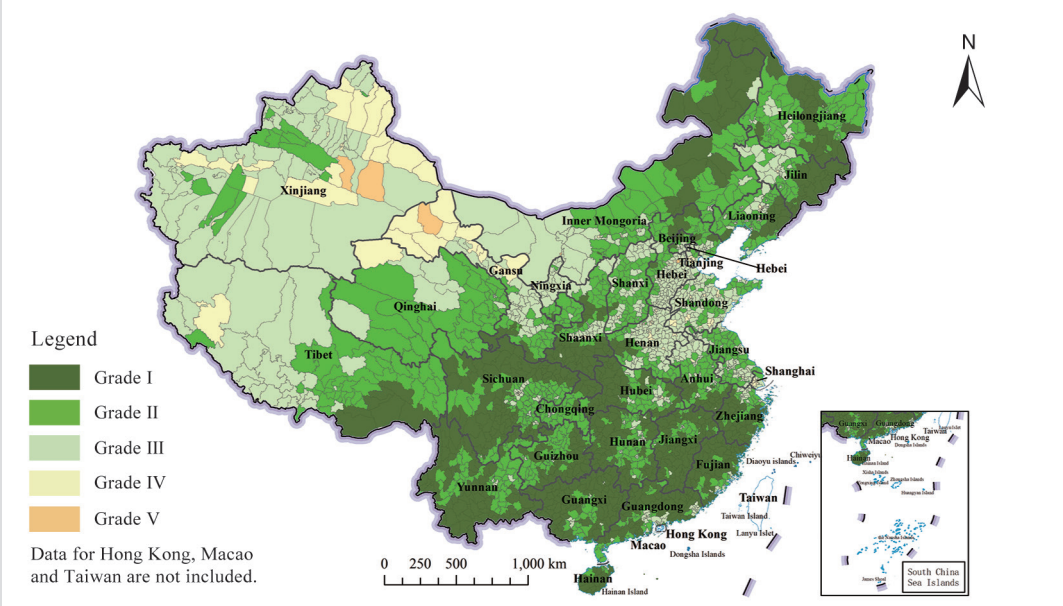
***Up to the time this Report was published, the monitoring results of the Fifth National Monitoring of Desertification and the Third Monitoring of Rocky Desertification in the karst areas are the latest.

Natural and Ecological Environment

Ecological environment quality

In 2021, the national Ecological Quality Index (EQI) value was 59.77, and the ecological quality* met Grade II standard, which was basically stable compared with that of 2020**.

The total area of counties with ecological quality of Grade I took up 27.7% of total land area, mainly distributed in the Daxing'anling and Xiaoxing'anling Mountain areas, Changbai Mountain, the southeast of the Qinghai-Tibet Plateau and the south of the Qinling Mountain and Huaihe River. The total area of counties with ecological quality of Grade II took up 32.1%, mainly distributed in Sanjiang Plain, Inner Mongolia Plateau, Loess Plateau, Kunlun Mountains, Sichuan Basin, Pearl River Delta and the plains along the middle and lower reaches of the Yangtze River. The total area of counties with ecological quality of Grade III took up 32.7%, mainly distributed in the North China Plain, the Yellow River-Huaihe River-Haihe River Plain, the central and western Northeast Plain, the western Alxa, the central and western Qinghai-Tibet Plateau and the central and southern parts of Xinjiang. The total area of counties with ecological quality of Grade IV took up 6.6%, and that of Grade V took up 0.8%, mainly distributed in central and northern Xinjiang and western Gansu.



Map of eco-environmental quality at county level across China in 2021

*Since 2021, the basis for ecological quality assessment has been adjusted to *the Regional Ecological Quality Assessment Methods (Interim)*. That with EQI ⩾ 70 falls into Grade I, 55 ⩽ EQI<70 falls into Grade II, 40 ⩽ EQI<55 falls into Grade III, 30 ⩽ EQI<40 falls into Grade IV, and EQI<30 falls into Grade V. New methods for assessment should be adopted when data in 2020 is used for comparison.

**The change spectrum of ecological quality is divided into 4 levels: basically stable (|ΔEQI|<1); slight change (1 ⩽ |ΔEQI|<2), general change (2 ⩽ |ΔEQI|<4), and significant change (|ΔEQI| ⩾ 4). The positive value stands for betterment, while the negative value stands for worsening situation.

Biodiversity

Ecosystem diversity China boasts all types of terrestrial ecosystems on earth, including 212 types of forests, 36 types of bamboo forests, 113 types of shrubs, 77 types of meadows, 55 types of prairies, 52 types of deserts and 30 types of natural wetlands. China is also home to various marine ecosystems including mangroves, coral reefs, sea grass beds, islands, gulfs, estuaries and up-welling current as well as artificial ecosystems like cropland, artificial forests, artificial wetlands, artificial grassland and urban ecosystems.

The national forest coverage rate was 23.04%. The forest stock volume was 17.56 billion m^3, including 14.108 billion m^3 of natural forests and 3.452 billion m^3 of artificial forests. The total biomass of forest vegetation was 18.802 billion tons, and the total carbon stock was 9.186 billion tons*.

The main data results of the third national land census show that the grassland area in the country was 264.5301 million hectares.

Species diversity A total of 127,950 species and subspecies have been discovered in China covering 56,000 zoological species, 38,394 botanical species, 463 bacteria species, 1,970 pigments, 15,095 fungi, 2,487 protozoa and 655 viruses. 980 species and 8 categories of wild animals are included in the list of key protected wild animals in China, covering 234 species and 1 category of national first-class protected wild animals and 746 species and 7 categories of second-class protected animals, of which animals such as giant panda, Hainan gibbon, procapra przewalskii, brown-eared pheasant, Yangtze finless porpoise, Yangtze sturgeon, and Chinese alligator are unique to China. 455 species and 40 categories of wild plants are included in the list of key protected wild plants in China, including 54 species and 4 categories of national first-class protected wild plants and 401 species and 36 categories of second-class species, among which wild plants such as abies beshanzuensis, Metasequoia, Dendrobium huoshanense, and Yunnan agarwood are unique to China.

Genetic resource diversity China has 1,339 varieties of 528 types of cultivated crops with over 1,000 economic tree species. A total of 7,000 varieties of ornamental plants and 948 varieties of domestic animals are originated from China.

Threatened species

The assessment results of 34,450 identified species of higher plants across China showed that 10,102 of them require key attention and protection, taking up 29.3% of the total assessment number, among which, 3,767 species are threatened, 2,723 species belong to near threatened (NT) Grade, and 3,612 belong to data deficient (DD) Grade. The assessment results of 4,357 identified vertebrates (marine fishes were not included) showed that 2,471 of them need special attention and protection, accounting for 56.7% of the total assessment number, of which 932 vertebrates are threatened, 598 vertebrates belong to NT Grade, and 941 belong to DD Grade. The assessment results of 9,302 identified macro-fungi showed that 6,538 of them require special attention and protection, making up 70.3% of the total assessment number, among which 97 macro-fungi are threatened, 101 macro-fungi belong to NT Grade, and 6,340 belong to DD Grade.

Nature reserves

The total area of various levels and types of nature reserves across the country accounts for about 18% of the land area of China. The first batch of national parks such as Sanjiangyuan, Giant Panda, Siberian Tiger and Leopard, Hainan Tropical Rainforest and Wuyi Mountain were officially established.

*Up to the time this Report was published, the results of 9th National Inventory of Forest Resources (Year 2014-2018) were the latest data.

Acoustic Environment

Acoustic environment of functional zones

In 2021, acoustic environment of functional zones* of 324 APL cities was monitored, 95.4% of which met the standard during daytime, up by 0.8 percentage points compared with that of 2020; 82.9% met the standard during nighttime, up by 2.8 percentage points.

Regional Acoustic Environment

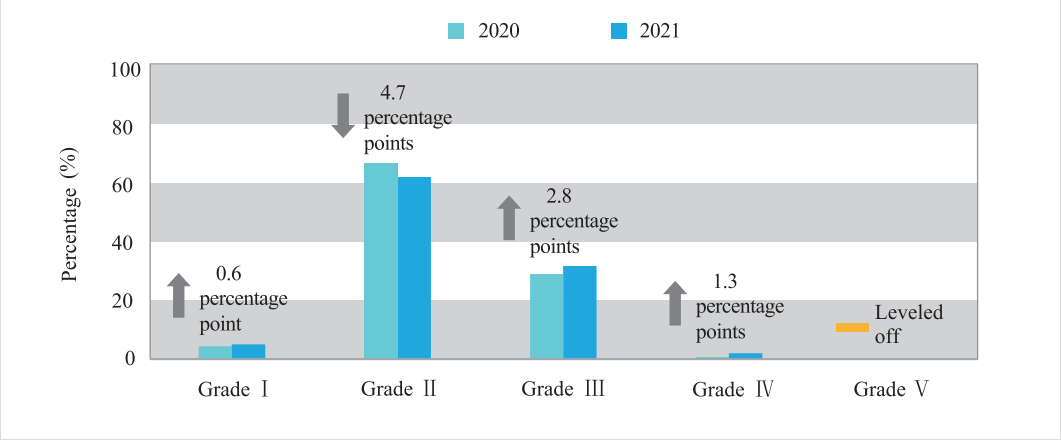
In 2021, regional daytime acoustic environment of 324 APL cities was monitored, and the average value of equivalent sound level was 54.1 dB(A). Among them, 16 cities met Grade I daytime environmental noise standard on the whole, taking up 4.9%; 200 cities met Grade II standard, taking up 61.7%; 102 cities met Grade III standard, accounting for 31.5%; 6 cities met Grade IV standard, taking up 1.9%; and no city met Grade V standard**.

Standard reaching rate of different functional zones of cities across China in 2021 (Unit: %)

Year	Type 0		Type 1		Type 2		Type 3		Type 4a		Type 4b	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2021	87.5	59.4	89.9	78.2	95.4	89.5	98.5	93.1	98.3	66.3	98.1	81.7
2020	75.5	57.4	89.1	75.3	94.8	88.1	98.9	91.9	97.3	62.9	95.7	81.2

*Type 0 functional zone refers to the areas requiring highly quiet environment such as rehabilitation and recuperation areas. Type 1 functional zone refers to the areas with residential housing, health care, culture and education, scientific research and design, administration and office as the main functions, which need quiet environment. Type 2 refers to the areas with commerce, finance and markets as main functions or areas with residential communities, commercial and industrial activities, which need to maintain quiet residential environment. Type 3 refers to the areas dominated by industrial production, warehousing and logistics, where the strong impacts of industrial noise on the surrounding environment need to be prevented. Type 4a refers to the areas along highways. Type 4b refers to the areas along railways.

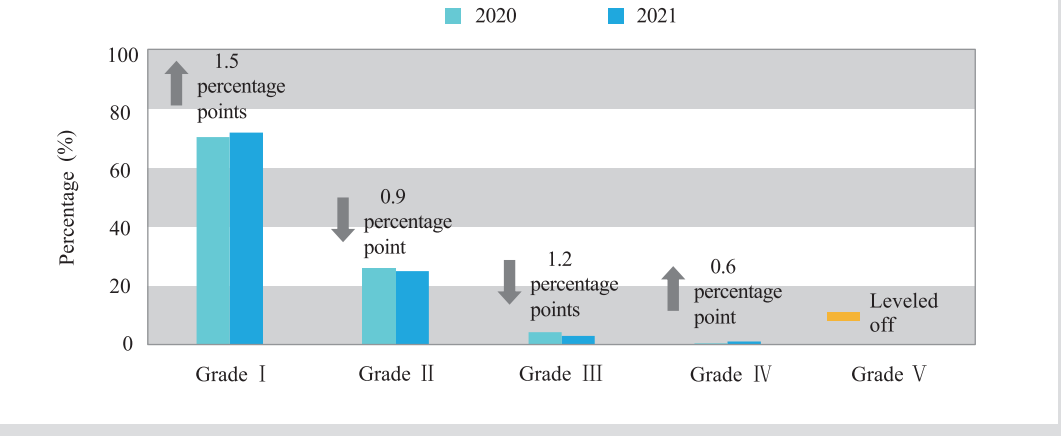
**The average equivalent sound level during daytime ≤ 50.0 dB(A) is excellent (Grade I); 50.1~55.0 dB(A) is good (Grade II); 55.1~60.0 dB(A) is average (Grade III); 60.1~65.0 dB(A) is relatively poor (Grade IV) and > 65.0 dB(A) is poor (Grade V).



Proportions of cities at all levels across China in terms of environmental noise in urban areas during daytime in 2021 and interannual comparison

Acoustic environment of traffic noise

In 2021, the acoustic environment of traffic noise of 324 APL cities was monitored in the daytime, and the average value of equivalent sound level was 66.5 dB(A). Among them, 232 cities met Grade I daytime traffic noise standard, taking up 71.6%; 80 cities met Grade II standard, making up 24.7%; 9 cities met Grade III standard, accounting for 2.8%; 3 cities met Grade IV standard, taking up 0.9%; and no city met Grade V standard.*



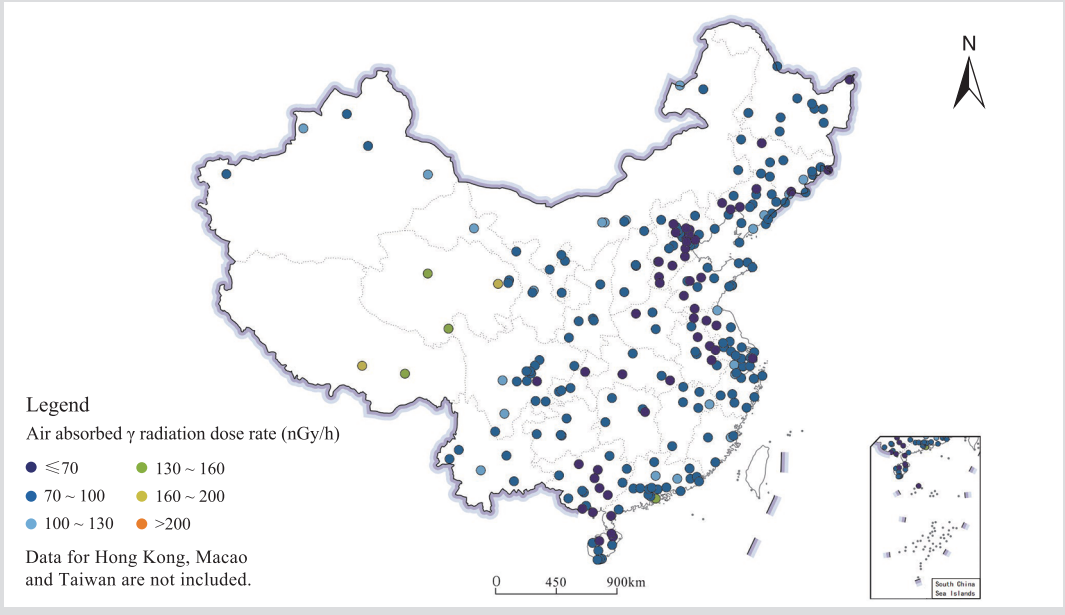
Proportions of cities at all levels across China in terms with traffic noise intensity during daytime in 2021 and interannual comparison

*The average equivalent sound level during daytime ≤ 68.0 dB(A) is excellent (Grade I); 68.1~70.0 dB(A) is good (Grade II); 70.1~72.0 dB(A) is average (Grade III); 72.1~74.0 dB(A) is relatively poor (Grade IV) and>74.0 dB(A) is poor (Grade V).

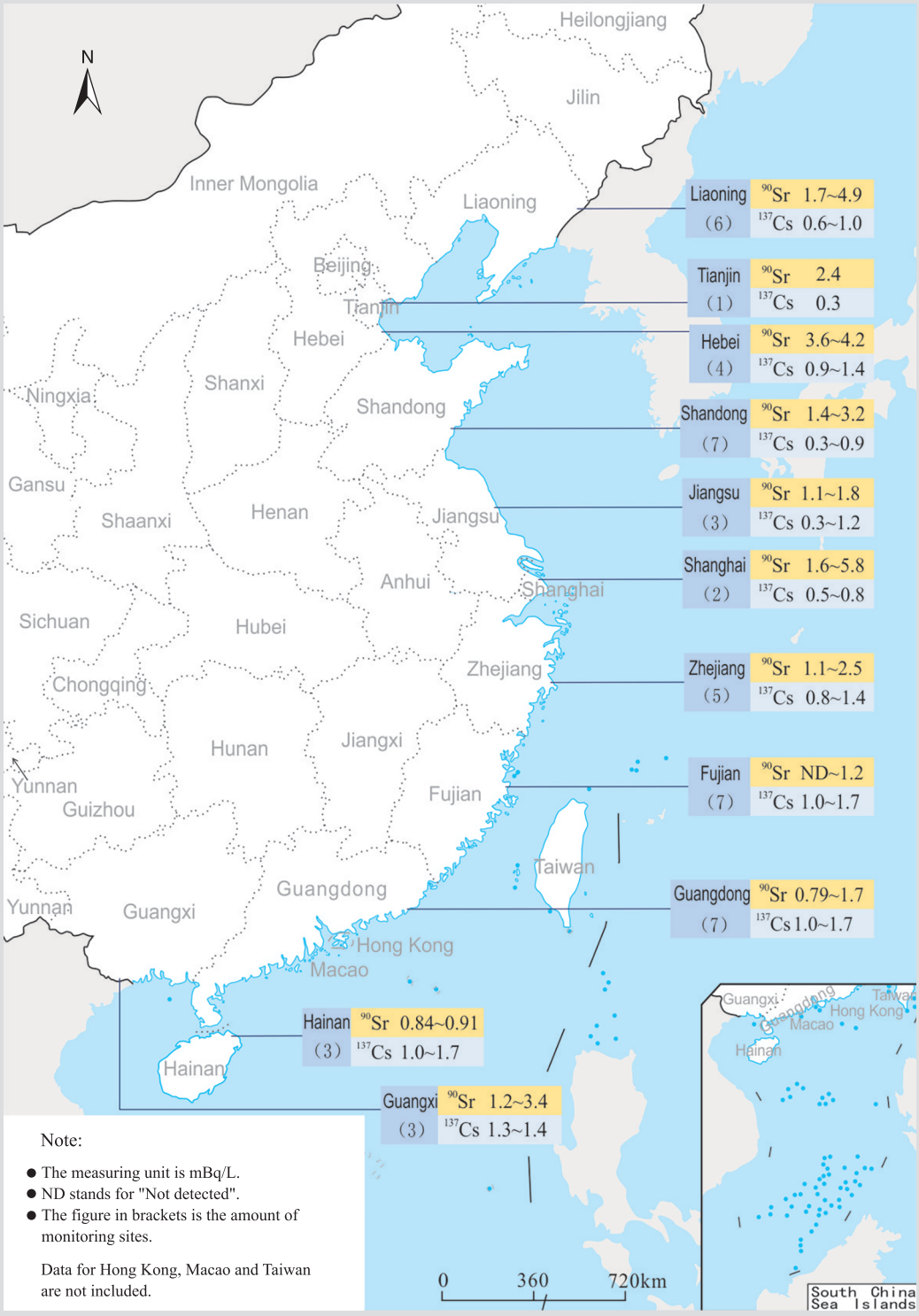
Radiation Environment

Ionizing Radiation

The environmental ionizing radiation level in China remained within the fluctuation range of natural background level in 2021. The γ radiation dose absorption rate by air and its accumulated dose were within the fluctuation range of natural baseline value. The natural radionuclide activity concentrations in the air were within the natural background level. There was no abnormality of artificial radionuclide activity concentrations in the air. The activity concentration of natural radionuclide remained at the baseline level in the following areas: the 7 major river basins including Yangtze River, Yellow River, Pearl River, Songhua River, Huaihe River, Haihe River, and Liaohe River, and rivers in Zhejiang and Fujian provinces, rivers in Northwest and Southwest China, as well as major lakes and reservoirs. No abnormality of the activity concentration of artificial radionuclides has been discovered. The activity concentration of gross α and gross β of urban centralized drinking water sources and groundwater met the guidance limit of radioactivity specified in *the Standard for Drinking Water Quality (GB 5749-2006)*. The activity concentration of natural radionuclide of nearshore marine water and organisms was at the baseline level. There was no abnormality of the activity concentration of artificial radionuclide in seawater, which was far below the limit specified in *the Marine Water Quality Standard (GB 3097-1997)*. The activity concentration of natural radionuclide of soil was at the baseline level, and no abnormality of the activity concentration of artificial radionuclide has been monitored.



Map of the γ radiation dose absorption rate by air at radiation environment automatic monitoring stations in China in 2021



Map of the activity concentration of Sr–90 and Cs–137 of nearshore water in China in 2021

Environment ionizing radiation in the vicinity of nuclear facilities Both the γ radiation dose absorption rate by air in the vicinity of operational nuclear power bases, civil research reactors, facilities for the cycle use of nuclear fuels and waste disposal, and the activity concentration of radionuclide in the air, water, soil and organisms related to facility activities were within the range of fluctuations over the years on the whole. The assessment findings showed that the radiation dose resulted from the operation of the above-mentioned nuclear facilities to the public was far below the national limit, making no impact on environmental safety and public health.

Ionizing radiation in the vicinity of uranium mines and metallurgical plants Both the γ radiation dose absorption rate by the air in the vicinity of uranium mining and metallurgical facilities, and the activity concentration of radionuclide in air, water and soil related to facility activities were within the range of fluctuations over the years.

Electromagnetic radiation

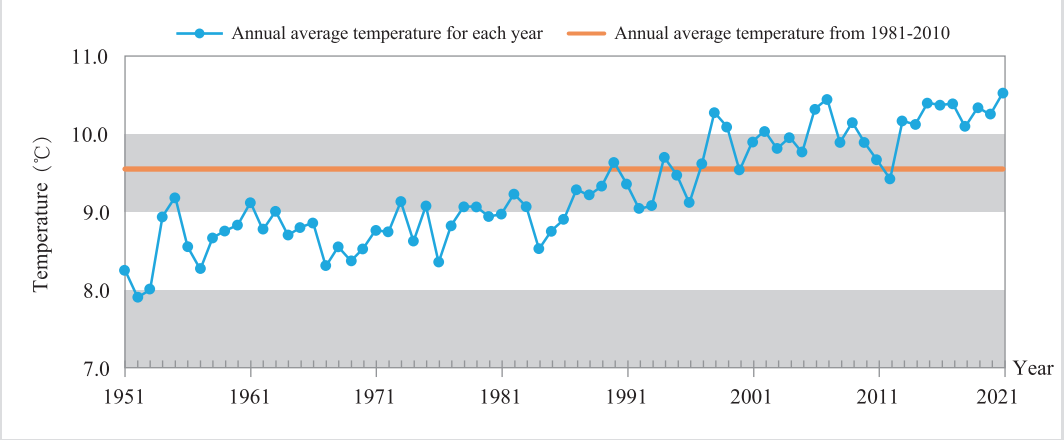
In 2021, the electromagnetic radiation level of state monitoring sites in 31 provinces (autonomous regions and municipalities), and that of radio and television signal emitting facilities, power transmission and transformation facilities and antenna of mobile communication base stations were all lower than the public exposure limit specified in *the Controlling Limits for Electromagnetic Environment (GB 8702-2014)*.

Climate Change and Natural Disasters

Climate change

Air temperature In 2021, the national average air temperature was 10.53 ℃, 1.0 ℃ higher than normal, hitting a record high since 1951. The temperature in each month was slightly higher or close to that of the same period of the previous years, among which the temperature in February and September were the highest in history.

The temperature in all 31 provinces (autonomous regions and municipalities) across the country was relatively high, among which 11 provinces (autonomous regions) of Zhejiang, Jiangsu, Ningxia, Jiangxi, Fujian, Hunan, Anhui, Henan, Guangdong, Hubei and Guangxi have seen the highest temperature in history since 1961. The average temperature in the six major regions of the country was higher than the historical average. Among them, the temperature in the middle and lower reaches of the Yangtze River, South and Southwest China has reached the new highest since 1961.

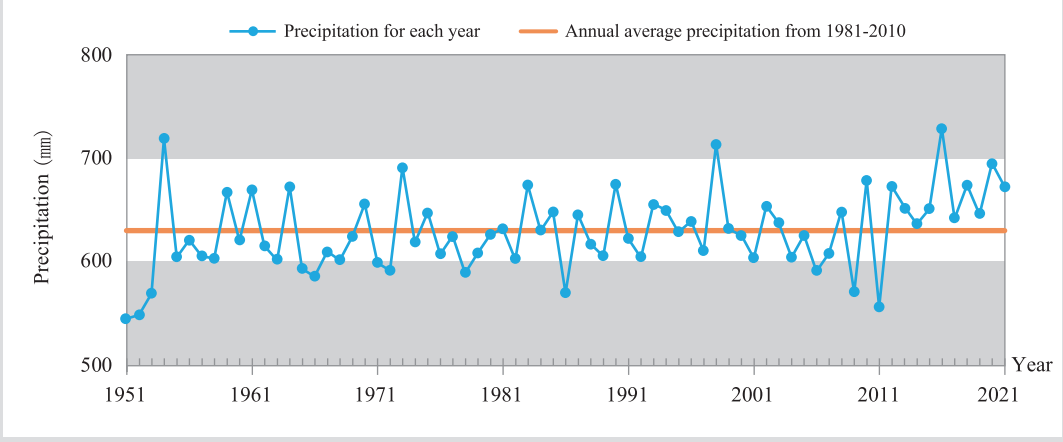


Interannual change of national average air temperature from 1951 to 2021

Precipitation The national average precipitation was 672.1 mm in 2021, up by 6.7% compared with the historical average, being the 12th highest year since 1951. The precipitation was higher than the historical average in February, May and July-November, among which that in October was 45.4% more than the historical average. The precipitation in January, March, April, June and December was less than usual, and that in January was 56.6% less.

Annual precipitation in Mount Huang in Anhui (2,878.3 mm) and Ninghai in Zhejiang (2,736.2 mm) were the highest and second highest respectively, while Toksun (5.5 mm) and Turpan (8.7 mm) in Xinjiang had the lowest and second lowest annual precipitation in the country.

Compared with previous years, the precipitation was 20%~100% more than historical average in the western part of Northeast China, most of North China, the region



Interannual change of national average precipitation from 1951 to 2021

between Yellow River and Huaihe River, the northern part of the region between Yangtze River and Huaihe River, the northwestern part of the Jianghan region, eastern Inner Mongolia, central and southern Shaanxi, northeastern Sichuan, northern Chongqing, eastern Zhejiang, southwestern Qinghai, southwestern Xinjiang, parts of western and central Tibet, etc. The precipitation was 100% to 200% more than previous years in northern Henan and southwestern Xinjiang, etc. It was 20%~50% less in northwestern Gansu, western Inner Mongolia, western and northern Yunnan, southeastern Guangxi, most parts of Guangdong, southern Fujian, etc. Other parts of the country saw similar precipitation to the historical average.

Carbon intensity Based on preliminary calculations, the CO_2 emissions per 10,000 yuan of GDP nationwide dropped by 3.8% compared with that of 2020*.

Greenhouse gases In 2020**, the average concentrations of CO_2, CH_4 and N_2O in the Waliguan Station in Qinghai Province were 414.3±0.2 ppm, 1,949±0.6 ppb and 333.8±0.1 ppb respectively. The annual average of absolute increments over the past 10 years were 2.42 ppm, 8.8 ppb, and 1.02 ppb respectively.

Natural disaster

Meteorological disasters In 2021, the meteorological droughts in China were generally at a mild state, but regional and periodic droughts were evident, with Southern China and Yunnan Province being greatly impacted. In 2021, the northern region recorded the second highest precipitation since 1961, and rainstorms during the flood season were intense with notable extremity. Serious rainstorm disasters occurred in Henan and other places, severe autumn floods hit the Yellow River Basin, and the Weihe River saw the largest flood in the same period since 1935. Fewer typhoons were generated and made landfall in 2021. The Typhoon In-Fa stayed on land for a long time and affected a wide range of places. Typhoon Lionrock and Typhoon Kompasu landed in Hainan one after another within a week, and the Super Typhoon Rai hit the Nansha Islands in mid-December. The year 2021 also recorded the largest number of high temperatures since 1961, which came to an end later than normal. Cold waves were obviously on the high side, with strong cold waves occurring

*CO_2 emissions per 10,000 yuan of GDP are calculated at the price in 2020.

**Up to the time this Report is published, the monitoring results of the greenhouse gases in 2020 were the latest data.

at the beginning of the year and early November, resulting in extreme low temperatures in lots of regions. Frequent and severe convective weather caused serious disasters. Sand-dust weather in the northern region appeared earlier with many strong sand and dust storms. March 2021 recorded the strongest sand and dust weather in the past 10 years.

Earthquake disasters In 2021, there were 37 earthquakes at or above 5.0 Richter Scale (20 happened in the Chinese mainland, and 17 happened in Taiwan and its surrounding waters). Earthquakes hitting the Chinese mainland were concentrated mainly in Xinjiang, Tibet, Qinghai, Yunnan, Sichuan and other western regions. The largest earthquake happened on May 22nd in Madoi, Qinghai Province with a magnitude of 7.4 Richter Scale.

Geological disasters In 2021, 4,772 various kinds of geological disasters happened across the country, a decrease of 39.1% from 2020 and a decrease of 30.3% from the annual average of the 13th Five-Year Plan period.

Forest disasters In 2021, a total of 12.5537 million hectares of forests across the country suffered from forest hazardous creatures, down by 1.8% compared with that of 2020, among which, 7.7665 million hectares were affected by insect pests, down by 1.8% from 2020; 2.8474 million hectares suffered from forest diseases, down by 3.5%; 1.7467 million hectares were hurt by forest rats and rabbits, basically leveled off with that of 2020; 193,100 hectares were harmed by hazardous plants, up by 3.4% compared with that of 2020.

In 2021, a total of 616 forest fires took place across the country with no occurrence of major forest fires and above. About 4,292 hectares were damaged. The number of forest fires and the damaged forest area decreased by 46.6% and 49.7% respectively compared with 2020.

Grassland disasters In 2021, a total of 51.7995 million hectares of grassland across the country were damaged by grassland pest hazards. Among them, 37.6189 million hectares were hurt by rats, 7.9193 million hectares were harmed by insect pests, 6.112 million hectares were damaged by harmful plants, and 149,400 hectares suffered from diseases.

In 2021, a total of 18 grassland fires occurred across the country with no major or above grassland fires. The damaged grassland area was about 4,170 hectares. The number of grassland fires increased by 38.5% while the damaged grassland area decreased by 62.2% from 2020.

Infrastructure and Energy

Infrastructure

Industrial flue gas In 2020*, there were 372,962 sets of flue gas treatment facilities in flue gas-related industrial enterprises surveyed nationwide, with the sulfur dioxide removal rate of 95.5% and nitrogen oxide removal rate of 74.2%.

Industrial wastewater In 2020**, there were 68,150 sets of wastewater treatment facilities in wastewater-related enterprises surveyed across the country, with the COD removal rate of 97.3% and ammonia nitrogen removal rate of 98.3%.

General industrial solid waste In 2020***, the general industrial solid waste production volume was 3.68 billion tons nationwide, the comprehensive utilization volume was 2.04 billion tons, and the disposal volume was 920 million tons.

Hazardous waste By the end of 2021, the national centralized utilization and disposal capacity of hazardous waste was about 170 million tons per year, and the utilization and disposal capacity was 2.1 times and 2.8 times higher than that at the end of 2015 respectively.

Urban sewage treatment According to preliminary calculation, by the end of 2021, the urban sewage treatment capacity across the country reached 202 million m^3/day, and the sewage treatment volume reached 58.46 billion m^3. The sewage treatment rate was up to 97.5%.

Urban refuse treatment Based on preliminary accounting, by the end of 2021, the decontamination capacity of urban refuse across the country was 994,900 tons/day, and the decontamination rate of urban refuse reached 99.9%.

Agricultural non-point sources In 2021, the comprehensive utilization rate of livestock manure was over 76%. The national comprehensive utilization rate of straw was over 87%. The national recovery rate of agricultural film was over 80%.

Energy

Based on preliminary accounting, the total consumption of energy across the country in 2021 was 5.24 billion tons of coal equivalent, up by 5.2% compared with that of 2020. Among them, coal consumption went up by 4.6%, crude oil up by 4.1%, natural gas up by 12.5%, and electricity up by 10.3%. Coal consumption took up 56.0% of total energy consumption volume, down by 0.9 percentage point compared with that of 2020. The consumption of clean energy such as natural gas, hydro-power, nuclear power, wind power and solar power took up 25.5% of the total energy consumption volume, up by 1.2 percentage points compared with that of 2020. The national energy consumption per 10,000 yuan GDP**** went down by 2.7% compared with that of 2020.

Based on preliminary accounting, in 2021, the total output of primary energy stood at 4.33 billion tons of coal equivalent, up by 6.2% than that of 2020. Among all the major energy products covered in the accounting, the output of raw coal was 4.13 billion tons, up by 5.7% than 2020; crude oil 198.881 million tons, up by 2.1% than 2020; natural gas 207.58 billion m^3, up by 7.8% than 2020, power generation 8.53425 trillion kWh, up by 9.7% than 2020. In specific, the production of thermal power***** registered 5.80587 trillion kWh, up by 8.9% than 2020, hydro power 1.339 trillion kWh, down by 1.2% than 2020, and nuclear power 407.52 billion kWh, up by 11.3% than that of 2020.

*Up to the time this Report was published, the indicators in relation to industrial flue gas in 2020 were the latest data.

**Up to the time this Report was published, the indicators in relation to industrial wastewater in 2020 were the latest data.

***Up to the time this Report was published, the indicators in relation to general industrial solid waste in 2020 were the latest data.

****The energy consumption per 10,000 yuan GDP is calculated at the 2020 price.

*****Thermal power includes coal-fired power generation, oil-fired power generation, gas-fired power generation, waste heat, residual pressure, waste gas power generation, waste incineration power generation, and biomass power generation.

Data Sources and Explanations for Assessment

The data in the current report mainly come from the monitoring data of Environmental Monitoring Network of Ministry of Ecology and Environment. The report also absorbed the environmental data provided by relevant ministries and commissions.

As of 2021, Environmental Monitoring Network of Ministry of Ecology and Environment included 1,734 monitoring sites of national ambient air quality in APL cities; around 1,000 precipitation monitoring sites in 465 cities (districts and counties) (including 339 APL cities and some county-level cities); 3,632 sections (sites) for the assessment, examination and ranking of surface water quality covering 1,824 rivers and 210 lakes (reservoirs); 1,912 regional assessment sites for national groundwater environmental quality; 876 centralized in-service drinking water source monitoring sections (sites) in APL cities; 10,345 monitoring sections (sites) of rural centralized drinking water sources with daily water supply of 1,000 tons and supplying capacity of over 10,000 people; 701 monitoring sites for water ecological status in key river basins; 1,353 irrigation water sections (sites) in farmland irrigation areas at or above 100,000 mu; 1,359 national environmental monitoring sites for seawater environmental quality; 458 pollution sources directly discharged into sea with a daily discharge volume over 100 tons; 2,118 national soil environment basic sites in the Pearl River Basin and Taihu Lake Basin; 2,855 ecological and environmental quality monitoring counties in 31 provinces (autonomous regions and municipalities); around 80,000 urban acoustic environment monitoring sites in APL cities; 1,512 environmental ionizing radiation monitoring sites in APL cities and 44 environmental electromagnetic radiation monitoring sites; the surrounding environment in the vicinity of 46 nuclear and radiation facilities under national key supervision and 41 electromagnetic radiation facilities; as well as the remote sensing data from GF-1, GF-2 and ZY-3 satellites and MODIS data.

The information of geological disasters was provided by Ministry of Natural Resources; the data on urban sewage treatment and municipal solid waste were provided by Ministry of Housing and Urban-Rural Development; the data on water and soil erosion were provided by Ministry of Water Resources. The data on water quality of inland and marine fishery waters, cultivated land quality, safe utilization rate of contaminated cultivated land and agricultural non-point sources were provided by Ministry of Agriculture and Rural Affairs. Data on flood and drought disasters (partially), earthquake disasters, forest and grassland fires were provided by Ministry of Emergency Management; carbon intensity and energy data were provided by National Bureau of Statistics; temperature, precipitation, greenhouse gases and meteorological disasters data were provided by China Meteorological Administration; data on desertification and sandification, the state of forests and grasslands, species diversity (partially), natural protected areas, forest and grassland biological disasters were provided by National Forestry and Grassland Administration.

The assessment of urban ambient air quality was based on *the Ambient Air Quality Standard (GB 3095-2012)* and the revision list, *Technical Regulation for Ambient Air Quality Assessment (on Trial) (HJ 663-2013)*, *the Supplementary Regulation on Urban Air Quality Assessment Affected by Sandstorm Weather Process* and *Letter on Issues Related to Excluding the Impact of Sandstorm Weather*. The assessment of surface water quality was based on *Environmental Quality Standards for Surface Water (GB 3838-2002)* and *the Measures on assessment of Surface Water Quality (on Trial)*. The assessment of water quality of drinking water sources was based on *Environmental Quality Standards for Surface Water (GB 3838-2002)* and *Standard for Groundwater Quality (GB/T 14848-2017)*. The assessment of the quality of groundwater was based on *Standard for Groundwater Quality (GB/T 14848-2017)*. The assessment of the water ecological status of key river basins was based on *Technical Guidelines for Water Eco-environmental Quality Monitoring and Evaluation of River and Stream* and *Technical Guidelines for Water Eco-environmental Quality Monitoring and Evaluation of Lake and Reservoir*. The assessment of farmland irrigation water quality was based on *the Standard for Irrigation Water Quality (GB 5084-2021)*. The seawater quality assessment was based on *Technical Regulation for Seawater Quality Assessment (on Trial)* and *Sea Water Quality Standard (GB 3097-1997)*. The assessment of eco-environmental quality was based on *Measures for Regional Eco-environmental Quality Assessment (on Trial)*. The assessment of acoustic environment was based on *Environmental Quality Standard for Noise (GB 3096-2008)* and *Technical Specifications for Environmental Noise Monitoring - Routine Monitoring for Urban Environmental Noise (HJ 640-2012)*. The assessment of radiation environment quality was based on *Standards for Drinking Water Quality (GB 5749-2006)*, *Sea Water Quality Standard (GB 3097-1997)* and *Electromagnetic Environment Control Limits (GB 8702-2014)*. The distribution of straw burning fire points was based on *Technical Specification for Straw Burning Monitoring Based on Satellite Remote Sensing (HJ 1008-2018)*. The rounding off for data was based on *the Rules of Rounding off for Numerical Value and Expression and Judgment of Limiting Values (GB/T 8170-2008)*.

Map review number: No. GS (2022) 2352

Note: National data in the current Report do not cover Hong Kong SAR, Macao SAR and Taiwan Province of China except that on administrative zoning, national land area and earthquake disasters.

Contributors to the 2021 Report on the State of the Ecology and Environment in China

Leading Department

Ministry of Ecology and Environment

Contributing Ministries and Administrations

National Development and Reform Commission

Ministry of Natural Resources

Ministry of Housing and Urban–Rural Development

Ministry of Transport

Ministry of Water Resources

Ministry of Agriculture and Rural Affairs

National Health Commission

Ministry of Emergency Management

National Bureau of Statistics

China Meteorological Administration

National Forestry and Grassland Administration