2019

Report on the State of the Ecology and Environment in China

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

The 2019 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

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Summary

The year 2019 marked the 70th anniversary of the founding of the People's Republic of China, and it was also a crucial year to win the critical battle against pollution and to achieve the decisive victory in building a moderately prosperous society in all respects. Guided by Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, various localities and departments have put into action the spirits embodied in the 19th National Congress of the CPC, the 2nd, 3rd and 4th Plenary Session of the 19th CPC Central Committee, and have earnestly implemented Xi Jinping Thought on Ecological Civilization as well as requirements made at the National Conference on Ecological and Environmental Protection. Focusing on improving ecological and environmental quality, various localities and departments have sought critical progress in the tough battle of pollution prevention and control in accordance with the decisions and deployment of the Central Committee of the Communist Party of China and the State Council.

First, we were resolute in winning the campaign of "Beat Air Pollution". Tough measures against atmospheric pollution in the autumn and winter season in key areas were brought forward. Pilot cities for clean heating initiative in northern China have been fully implemented in the entire Beijing-Tianjin-Hebei region and its surrounding areas as well as in the Fenwei Plain, where heating for more than 7 million households previously fueled by coal now has been replaced by clean fuel. Ultra-low emission was expanded to about 890 million kilowatts of coal-fired generating units, which accounted for 86% of the total installed capacity. Such renovation to 550 million tons of crude steel production capacity was also well underway. Continued efforts were made to treat volatile organic compounds (VOCs) from industrial furnaces and key industries, and to better manage those enterprises that were in unauthorized locations, lack proper certificate and fail to meet emission standards. There were also steps to promote "road-to-railway transformation". According to preliminary statistics, the national railway freight volume in 2019 had increased by 7.2% compared with that of 2018, among which, the railway freight volume in Beijing-Tianjin-Hebei region had increased by 26.2%. We took severe measures to crack down on illegal gas stations and poor-quality oil products, and special campaigns for clean vehicle oil products were rolled out in 31 cities. A total of 1,466 illegal gas stations and 644 gas stations where sulfur content of diesel exceeding the standard were investigated and dealt with in accordance with law. We strengthened the response to heavy air pollution, and took differentiated management and control measures in different key industries based on their environmental protection performance. Special law enforcement inspections of ODS (Ozone Depleting Substances) had been carried out in 11 provinces and municipalities.

Second, we continued the efforts to promote the campaign on "Beat Water Pollution".

Inspections on enforcement of law on the prevention and control of water pollution were implemented. We continued to investigate and rectify eco-environmental problems in drinking water sources, and 3,624 out of 3,626 problems in 899 county-level water sources had been rectified. Among the 2,899 black and malodorous water bodies in cities at or above prefecture level, 2,513 had been treated. We completed inspection to 60,292 outlets that discharge sewage into the Yangtze River and 18,886 that into the Bohai Sea. Under our national water monitoring program, the number of water sections of Yangtze River Basin and that of rivers discharging into the Bohai Sea with the water quality worse than Grade Ⅴ standard were respectively reduced from 12 and 10 to 3 and 2. We also carried out special campaigns for sewage treatment in industrial parks, and 95% of industrial parks at or above provincial level along the Yangtze River Economic Belt had been equipped with sewage treatment facilities and online monitoring devices. Special investigations and rectifications of the "Three Phosphorus" (phosphorite mines, Phosphorus Chemical, Phosphogypsum tailing pond) in the Yangtze River were advanced. As a result, rectification had been completed for 172 enterprises (mines and tailing ponds) among the 281 problematic enterprises (mines and tailing ponds). The number of sections of the Yangtze River Basin with total phosphorus exceeding the upper limit decreased by 40.7% compared with that of 2018. The pilot project for groundwater pollution prevention and control has been launched. We set and managed the protected areas that ban livestock and poultry breeding in a standard manner, shutting down 14,000 unlawfully delineated areas. Rural environment in 25,000 administrative villages were comprehensively improved.

Third, we had steadily promoted the campaign on "Beat Soil Pollution". We had completed the detailed investigation on the soil pollution status of agricultural land, verified and specified the objectives and tasks for the safe use of agricultural land exceeding the filtering value in the next stage for each province (autonomous region and municipality). Steady progress were made in investigating into the land use by enterprises in key industries. Those enterprises in key industries involving cadmium and other heavy metal use were investigated and ordered for rectification. Imported waste was strictly prohibited, bringing its actual total import down to 13.48 million tons nationwide, dropping by 40.4% than that of 2018. "11+5" cities and regions including Shenzhen were selected as pilot "Zero-waste City". "Waste Removal Action 2019" targeting the Yangtze River Economic Belt was rolled out, with 1,163 out of the 1,254 identified problems properly solved. Special campaign to control the emission from waste incineration power plants was further taken forward, having 405 enterprises installed automatic monitoring equipment on pollution source, established display screen to show emission data to public, and connected

its automatic monitoring system with the environmental authorities through network. With this, automatic monitoring data on pollutants would be published starting from 2020. A total of 13,994 heavy metal-related companies had been examined nationwide, and 261 heavy metal emission reduction projects were initiated. Pollution prevention and control programs had been formulated and implemented for 1,105 tailing ponds along the Yangtze River Economic Belt.

Fourth, we took proactive measures to serve stability on six fronts (employment, financial sector, foreign trade, foreign investment, domestic investment, and expectations). The *Opinions on Further Deepening Eco-Environmental Regulation and Services to Promote High-Quality Economic Development* was issued. We were proactive in supporting the major national strategic policies such as the coordinated development of Beijing-Tianjin-Hebei region. "Three Lines and One List" (the ecological conservation red line, environmental quality baseline, resource utilization ceiling, and negative list on eco-environmental access) were drawn up and put into action in 11 provinces along the Yangtze River Economic Belt and Qinghai Province. Another 19 provinces (autonomous regions and municipalities) initially worked out such lines and list. We continued to deepen the reforms to streamline administration, delegate powers, and improve regulation and services by abolishing the EIA qualification licensing in accordance with the law and issuing supporting documents such as the *Supervision and Management Measures for the Preparation of Environmental Impact Report (Form) for Construction Projects* to strengthen interim and post-event supervision. The *Catalogue of Construction Projects upon the Approval of Environmental Impact Assessment Documents by the Ministry of Ecology and Environment (2019)* was released, by which the power to assess and approve 9 types of projects including transport airports was delegated to lower levels. A total number of 220,000 EIA reports (forms) on project had been examined and approved nationwide, involving a total investment of about 18.6 trillion yuan. 1.165 million projects was registered online, and it took only 10 minutes for each project to finish an online registration form. We tracked and adjusted based on new developments the assessment over major projects including major national, local, and foreign investment ones by providing service and guidance in advance, opening green channels, and enhancing the efficiency of check and approval procedures. We supported the green development of enterprises and issued the *Opinions on Supporting the Green Development of Private Enterprises by the Ministry of Ecology and Environment and the All-China Federation of Industry and Commerce*. The national comprehensive service platform for the transformation of scientific and technological achievements in ecological environment was launched, having brought together more than 4,000 scientific and technological achievements and accumulatively promoted more than 1,000 advanced pollution control technologies. We introduced

in industrial parks the auditing system on the third-party treatment of environmental pollution and clean production, conducted pilot to entrust the third party to provide comprehensive environmental service, and vigorously promoted the development of the environmental protection industry. Notable progress had been made in poverty alleviation through ecological and environmental protection.

Fifth, we strived to conserve, restore and regulate ecological environment. We promoted the assessment and mapping of ecological protection red line. The ecological protection red line of 15 provinces including Beijing-Tianjin-Hebei region, 11 provinces (cities) along the Yangtze River Economic Belt and Ningxia Hui Autonomous Region had been initially drawn up, and the delineation plan for another 16 provinces including Shanxi province was basically mapped out. The supervision platform of national ecological protection red line was initially established. We pushed forward "Green Shield" initiative to strengthen supervision over protected areas. In the past three years, a total of 5,740 problems in 342 national nature reserves had been identified, and 3,986 of which rectified. In the second China Ecological Civilization Awarding Ceremony, we commended 35 groups and 54 individuals for their outstanding performance, granted 84 cities and counties as national ecological civilization models, and proposed 23 innovation bases for practicing "green is gold".

Sixth, we reinforced eco-environmental protection inspection. The *Regulations on the Ecological and Environmental Protection Inspection by the Central Governmen*t was issued, and the Central Leading Group for Ecological and Environmental Protection Inspection was approved and established by the Central Committee of the CPC. The second round of routine inspections of eco-environmental protection was carried out by the central government in 6 provinces (cities) and 2 central government-owned companies, where a total of 18,900 cases of problems reported by the public were received, handled and transferred to relevant authorities, with 16,000 cases settled or basically settled. Based on further investigation, of the approximately 170,000 problems reported by the public in the first round of inspection, a total of 1,395 problems were yet to be handled. In response, a checklist on this was made, and as of the end of 2019, 1,133 problems had been solved or basically solved with prominent outcomes, and ongoing efforts were underway to tackle the remaining problems. To follow through the important instructions made by CPC Party General Secretary Xi Jinping, special inspection were carried out by the central government to examine the performance on protecting and restoring the ecological environment along Yangtze River, "Beat Air Pollution" and on other key tasks. Through secret investigation and unannounced visits, all efforts were intended to go straight to the problem, and create deterrence to force local authorities

to fulfill their due responsibilities. We pushed actions to rectify problems identified during inspection. For the 3,294 rectification tasks clearly identified in the first round of inspection and follow-up re-examination, 2,226 tasks had been rectified and 938 had been proceeded as scheduled. We vigorously promoted the implementation and rectification of the eco-environmental problems in Jinyun Mountain in Chongqing Municipality, the northern foothills of Qinling Mountains in Shaanxi Province, Qilian Mountains in Gansu Province, etc. as instructed by General Secretary Xi Jinping, addressing a large number of outstanding ecological and environmental issues. This also served high-quality economic development and encouraged fine conduct of local environmental authorities. We resolutely opposed and strictly prohibited the "one-size-fits-all approach" or an oversimplified approach to problems. Since the special rectification campaign was carried out in June 2019, we conducted cross-spot inspections and supervision on the aforesaid problems reported by the public and the rectification progress in 31 cities (districts). covering Lanshan District, Linyi City, Shandong Province, Dongfang City, Hainan Province and etc. In-depth investigations targeting 11 provinces (cities) along the Yangtze River Economic Belt were also carried out, and based on that, a documentary film was made in 2019, laying out 152 prominent eco-environmental problems to urge actions on them. Of 163 problems disclosed in the 2018 documentary, 134 were rectified, including those related to the deteriorating eco-environment along the Ma'anshan section of Yangtze River and the illegal development and construction in Zhenjiang Yangtze River Dolphin Nature Reserve. In response to problems such as inadequate performance and deteriorating eco-environmental quality, we held admonitory talks with key government officials in 12 cities to resolve prominent environmental problems and specify responsibilities of eco-environmental protection.

Seventh, we conducted environmental supervision and regulation in strict accordance with relevant laws and regulations. We strengthened the supervision and assistance in the designated key areas of the Beat Air Pollution Campaign. Throughout the whole year of 2019, a total number of 20,700 people had been involved, 925,000 sites inspected, and 65,000 air quality-related issues handed over to local governments. We actively carried out off-site supervision and regulation over marine dumping activities. We introduced the system of "selecting inspection targets and inspectors on a random basis, and opening investigation results public in a timely manner" to all cities and county-level eco-environmental departments across the country. We further regulated the use of discretion, and advocated the put in place such systems as disclosing information of administrative law enforcement, recording the entire process of law enforcement, and reviewing major law enforcement decisions. Administrative punishment had been imposed on 162,800 cases

nationwide involving a total fine of 11.878 billion yuan, and 28,700 cases were subject to five types of punishment including imposing daily fine. We also issued documents such as the *Minutes of the Symposium on Relevant Issues of Handling Related Criminal Cases of Environmental Pollution*.

Eighth, we implemented reform measures in the field of ecological environment. Seven watershed ecological environment supervision administrations and their monitoring and research centers had been established. The reform to bring inspection and monitoring branches of environmental protection agencies below the provincial level under the direct oversight of their respective provincial-level agencies had been basically completed. The *List of Responsibilities for Eco-Environmental Protection of the Central and State Organs and Related Departments* and the *Guiding Catalogue of Comprehensive Administrative Law Enforcement Matters for Ecological Environmental Protection* were formulated and reported to the CPC Central Committee and the State Council. More than 150,000 pollution emission permits for key industries were approved and issued nationwide. In accordance with the two-step principle of "pilot first, promotion afterwards" and "permit issuing first, implementation afterwards", we regulated pollution emission permitting on point pollution sources from 24 key industries in 8 pilot provinces (municipalities). The *Outline of Ecological Environment Monitoring Plan (2020-2035)* was issued, and the optimization and adjustment of the national monitoring networks of environmental air, surface water, and marine ecological environment during the 14th "Five-Year Plan" period were completed. The lists of cities with relatively good/poor air quality as well as the ones with notable/less notable improvement in air quality were released on a monthly basis, and cities were also ranked in terms of water environment quality on a quarterly basis. We also held the 2nd National Competition of Skilled Professionals in Ecological Environment Monitoring. The *Guiding Opinions on Reforming and Improving the Working Mechanism for Complaints and Appeal and Promoting the Resolution of Outstanding Ecological and Environmental Problems of the People* was issued to regulate the handling and transfer of complaints and appeals.

Ninth, we have prevented and defused eco-environmental risks. We issued the *Guiding Opinions on Strengthening the Prevention and Defusing "Not in My Backyard" Issues* and summarized and promoted Ningbo's experience in dealing with issues where a construction project won't be stopped until protest takes place. More than 40 key chemical industrial parks had carried out pilot projects on early warning systems for toxic and harmful gases. We formulated the *Guiding Opinions on Establishing a Joint Prevention and Control Mechanism for Emergency Water Pollution Events in Inter-provincial Watersheds* and initially established a government-led and enterprise-involving maritime emergency response mechanism. The national environmental

protection reporting platform "12369" had received 531,000 reports, all of which were basically handled within the time limit. In 2019, a total of 263 environmental emergency cases had occurred throughout the country, of which 84 were directly dealt with by the Ministry of Ecology and Environment, especially after the "March the 21st" special serious explosion accident in Xiangshui of Jiangsu province, when the ministry actively coordinated all parties to carry out emergency response in an orderly manner, effectively maintaining the safety of the surrounding ecological environment. We efficiently operated the national nuclear safety coordination mechanism and vigorously promoted the standardization of nuclear and radiation safety supervision. The white paper of *Nuclear Safety in China* was released for the first time. The first phase of the National Nuclear and Radiation Safety Regulatory Technology R&D Base was completed. 47 operating nuclear power units safely operated, quality control had been conducted over 15 units under construction, and 19 civil research reactors (critical devices) were under safe operation.

Tenth, we strengthened the supporting measures for eco-environmental protection. The *Regulations for the Management of Discharge Permits* was prepared and submitted to the State Council for deliberation, and the *List of Classified Management of Discharge Permits for Point Pollution Sources (2019 Edition)* was released after amendment. The *Law on the Prevention and Control of Environmental Pollution by Solid Wastes of the People's Republic of China (Revised Draft)* had been submitted to the Standing Committee of the National People's Congress for second deliberation. The *Protection Law of the Yangtze River of the People's Republic of China (Draft)* had been submitted to the Standing Committee of the National People's Congress for deliberation. The establishment, amendment and abolishment of 21 departmental rules and regulations had been completed, and 96 national eco-environmental standards had been formulated and revised. In 2019, a total of 53.2 billion yuan of special environmental protection funds had been allocated by the central government to support various localities to intensify the treatment of air, water, and soil pollution and the comprehensive improvement of rural environment. A national green development fund had been set up and the mid-term evaluation of the implementation of the Eco-environment Protection Plan of the 13th "Five-Year Plan" had been concluded. The 2nd national Census of Pollution Sources was basically completed, and surveys were conducted among 3.5797 million census subjects to find out the basic status of various sources of pollution and the generation, discharge, and treatment of pollutants. We further pushed forward major special programs on water pollution control and treatment technology, the cause analysis of heavy air pollution and solutions to it, joint research related to the Yangtze River ecological conservation and restoration, as well as on the cause and treatment technology pertaining to the contaminated sites. We tracked and studied the

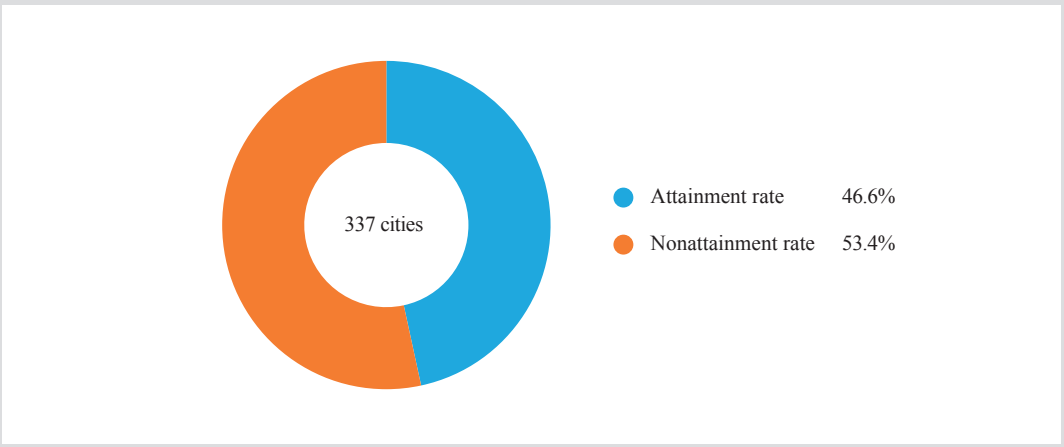
treatment of air pollution in key areas of the "Beat Air Pollution" Campaign including 39 cities and Xiong'an New Area and took differentiated approach based on different conditions of cities. We sent 58 expert teams to relevant cities along the Yangtze River to conduct site research and provide technical guidance. The Global Celebrations for World Environment Day in 2019 was successfully held, and activities and events on the theme of "Act towards A Beautiful China" were staged. The "Belt and Road Initiative" Green Development Coalition (BRIGC) had been launched and the BRI Environmental Big Data Platform unveiled. China co-led the "Nature-based solutions" action area of the UN Climate Action Summit and pushed positive results in the 2019 UN Climate Change Conference in Madrid. China also actively prepared for hosting the 15th Conference of Parties to the Convention on Biological Diversity (CBD COP15) and released the theme of the conference of "Ecological Civilization-Building a Shared Future for All Life on Earth". Many publicity activities took place such as National Low Carbon Day and International Biodiversity Day. Four types of facilities were opened to the public nationwide, with 1,115 additional facility operators and owners joining into this opening list. The tasks of eco-environmental informationalization have been accomplished, including the establishment of the unified database of nationwide point pollution sources, "Internet+supervision" and integrated government service platform.

In 2019, the overall eco-environment quality throughout the country had been improved, in which progress in improving environmental and air quality was further consolidated, the water environment quality continued to improve, the quality of marine environment was steadily improving, and the soil environmental risks had been brought under control. The overall ecosystem is stable, nuclear and radiation safety is effectively ensured, and environmental risks remain stable.

Atmospheric Environment

Air quality*

Cities at or above prefecture level In 2019, out of all the 337 cities at and above prefecture-level (APL cities)** (hereinafter referred to as the 337 cities) across the country, 157 cities met national air quality standard***, accounting for 46.6% of the total; 180 cities failed to meet national air quality standard, taking up 53.4%**** .



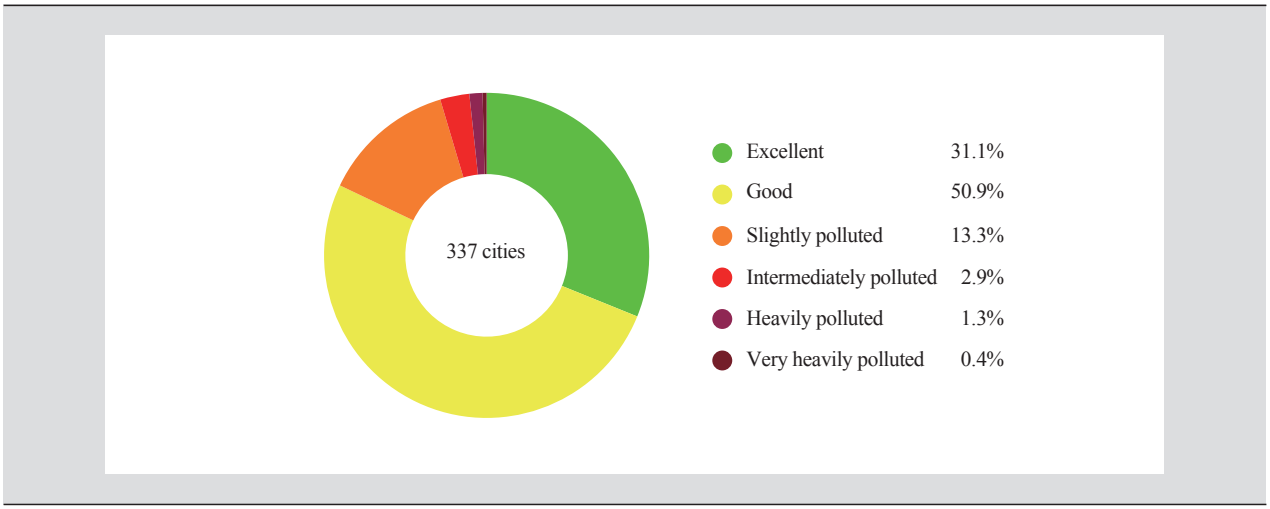
Environmental quality of 337 cities in 2019

*In 2019, the real-time (reference status) data are used for air quality assessment in cities, the data in 2018 have been adjusted accordingly, and the same below. The assessment based on real-time data will be adopted unless otherwise explained.

**Cities at or above prefecture level (APL cities): including municipality, cities or regions at prefecture level, autonomous prefectures and league. Since Laiwu City has been merged into Jinan City, the number of cities has been changed from 338 to 337, the same below.

***Air quality meeting the standard: the ambient air quality meets the standard when the concentrations of all 6 pollutants under assessment meet the standard, among which, $PM_{2.5}$, 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 (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 small to big, then the percentile value at 90% with the daily maximum 8-hour average concentration of O_3 is compared with the daily maximum 8-hour average concentration of O_3 of national standard date to judge if O_3 concentration meets the standard; and the percentile value at 95% with 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. The impact of sand and dust is excluded when calculating the annual average concentration of $PM_{2.5}$ and PM_{10}.

****The calculation of the percentage of all categories and grades in this report is based on the number of items divided 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 combined proportion of two or more categories does not equal the sum of the proportions of the various categories, or the case where the sum of the proportions of all categories does not equal 100% or the sum of the percentage changes from the same period does not equal 0, the same below.



The percentage of days with different air quality levels of 337 cities in 2019

In 2019, the average percentage of days of the 337 cities meeting air quality standard* was 82.0%. In specific, the attainment rate reached 100% for 16 cities, stood between 80%~100% for 199 cities, 50%~80% for 106 cities and less than 50% for 16 cities. The ratio of average number of days failing to meet the standard** took up 18.0%, among which, the number of days with $PM_{2.5}$, O_3, PM_{10}, NO_2 and CO as the primary pollutant*** took up 45.0%, 41.7%, 12.8%, 0.7% and less than 0.1% respectively. There was no occurrence of non-attainment days with SO_2 as the primary pollutant.

In 337 cities, 452 days were under very heavy pollution, 183 days less than that of 2018; 1,666 days were under heavy pollution, 88 days more than that of 2018. Among them, days with $PM_{2.5}$, PM_{10} and O_3 as the primary pollutant took up 78.8%, 19.8% and 2.0% respectively. There was no occurrence of heavy or very heavy pollution with SO_2, NO_2 and CO as the primary pollutant.

The concentration of $PM_{2.5}$, PM_{10}, O_3, SO_2, NO_2 and CO were 36 μg/m^3, 63 μg/m^3, 148 μg/m^3, 11 μg/m^3, 27 μg/m^3 and 1.4 mg/m^3 respectively. Compared with that of 2018, the

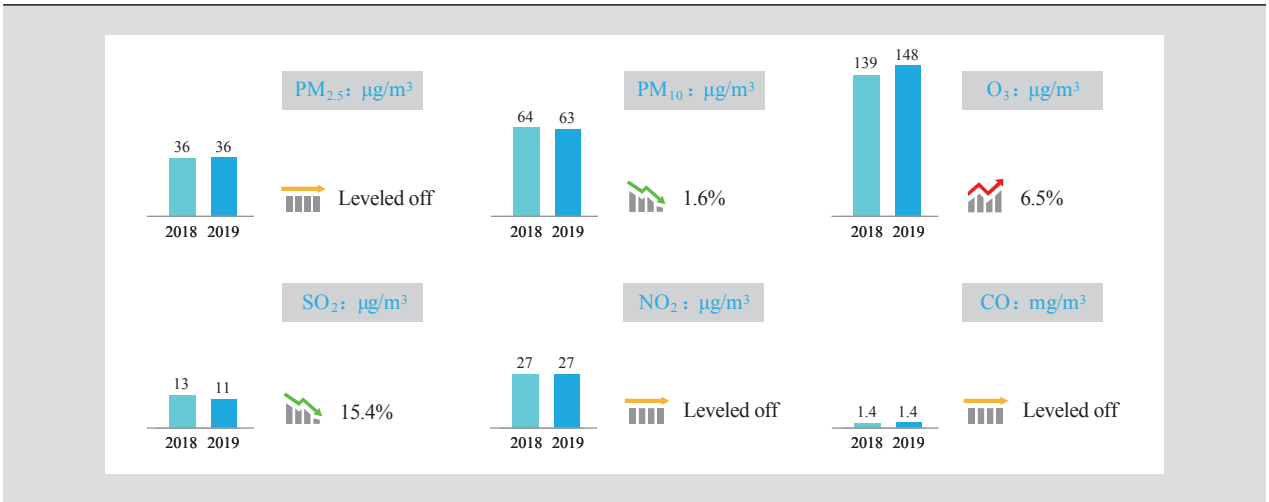
Percentage of 337 cities of various standards of six major pollutants in 2019

Indicator	Standard Ⅰ (%)	Standard Ⅱ (%)	Worse than Standard Ⅱ (%)
$PM_{2.5}$	4.5	48.4	47.2
PM_{10}	15.7	52.2	32.0
O_3	2.4	67.1	30.6
SO_2	94.4	5.6	0.0
NO_2	89.9 (same for Standard Ⅰ & Standard Ⅱ)		10.1
CO	100.0 (same for Standard Ⅰ & Standard Ⅱ)		0.0

*The number of attainment days: It refers to the amount 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 non-attainment days: the amount 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 non-attainment days.

***Primary pollutant: When AQI > 50, the pollutant with the biggest individual AQI is the primary pollutant.

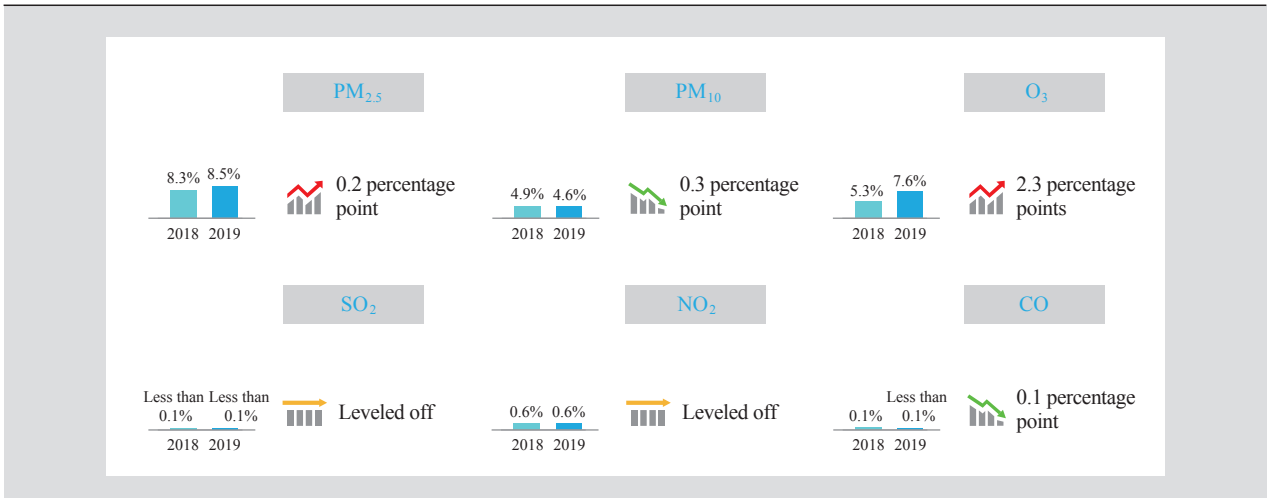


Comparison of concentrations of six major pollutants in 337 cities between 2018 and 2019

concentration of PM_{10} and SO_2 decreased, that of O_3 increased, and that of other pollutants remained the same.

The percentage of nonattainment days for $PM_{2.5}$, PM_{10}, O_3, SO_2, NO_2 and CO are 8.5%, 4.6%, 7.6%, less than 0.1%, 0.6% and less than 0.1% respectively. Compared with that of 2018, the ratio of nonattainment days for PM_{10} and CO decreased, that for SO_2 and NO_2 kept the same and that for $PM_{2.5}$ and O_3 increased.

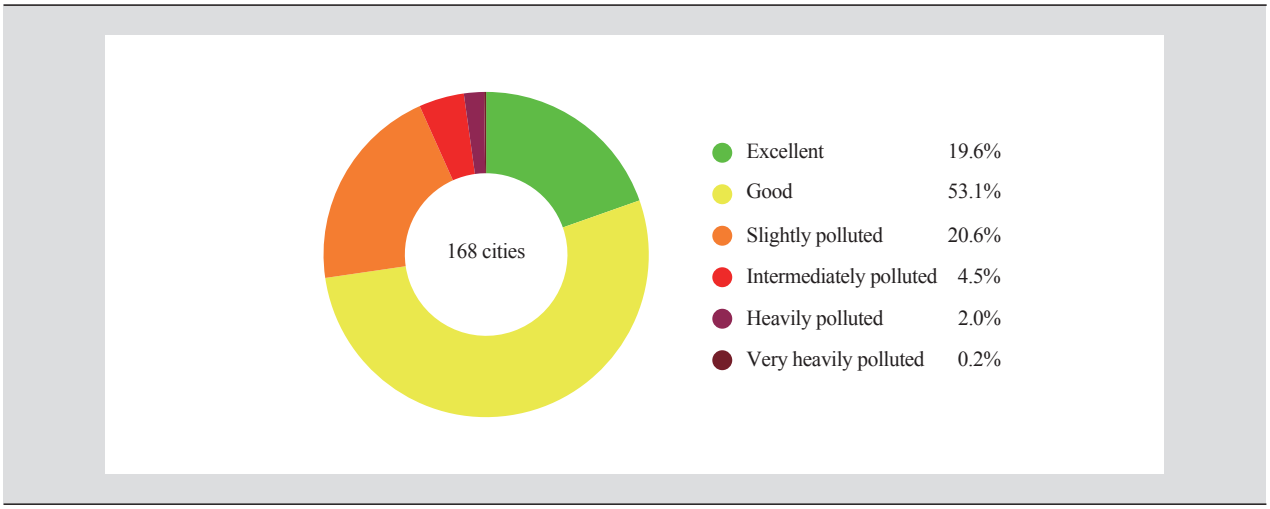
If the impact of dust was not excluded, among the 337 cities, 42.7% met national air quality standard, while 57.3% cities failed to meet national air quality standard; the average concentration of $PM_{2.5}$ is 37 μg/m^3, the same as that of 2018;



Comparison of the percentage of days with concentration of six major pollutants failing to meet the national air quality standard in 337 cities between 2018 and 2019

the average concentration of PM_{10} was 67 μg/m^3, down by 4.3% compared with that of 2018.

168 Cities In 2019, 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 72.7%, among which, the attainment rate stood between 80%~100% for 60 cities, 50%~80% for 94 cities and less than 50% for 14 cities. The average percentage of days failing to meet air quality standard was 27.3%, and the nonattainment days with O_3, $PM_{2.5}$, PM_{10}, NO_2 and CO as the primary pollutant accounted for 46.4%, 45.8%, 7.2%, 0.9% and less than 0.1% of the total number of days exceeding the standard respectively. There was no occurrence of nonattainment days with SO_2 as the primary pollutant.



The percentage of days with different air quality levels of 168 cities in 2019

The evaluation results of comprehensive air quality index** showed that the top 20 cities with relatively poor air quality (from No.168 to No. 149) in the 168 cities were Anyang, Xingtai, Shijiazhuang, Handan, Linfen, Tangshan, Taiyuan, Zibo, Jiaozuo, Jincheng, Baoding, Jinan, Liaocheng, Xinxiang, Hebi, Linyi, Luoyang, Zaozhuang, Xianyang and Zhengzhou. The top 20 cities with relatively good air quality (from No. 1 to No. 20) were Lhasa, Haikou, Zhoushan, Xiamen, Huangshan, Fuzhou, Lishui, Guiyang, Shenzhen, Taizhou, Ya'an, Huizhou, Suining, Zhuhai, Kunming, Zhangjiakou, Nanning, Wenzhou, Neijiang and Guang'an.

The average concentration of $PM_{2.5}$, PM_{10}, O_3, SO_2, NO_2 and CO were 44 μg/m^3, 74 μg/m^3, 167 μg/m^3, 12 μg/m^3, 33 μg/m^3 and 1.5 mg/m^3 respectively. The concentration of PM_{10} and SO_2 dropped, that of O_3 increased, and that of other pollutants kept the same compared with that of 2018.

The average percentage of nonattainment days for $PM_{2.5}$, PM_{10}, O_3, SO_2, NO_2 and CO are 13.0%, 6.7%, 12.9%, less than 0.1%, 1.2% and 0.1% respectively. Compared with that of 2018, the percentage of nonattainment days for PM_{10} decreased, that for $PM_{2.5}$ and O_3 increased, and that for other pollutants kept the same.

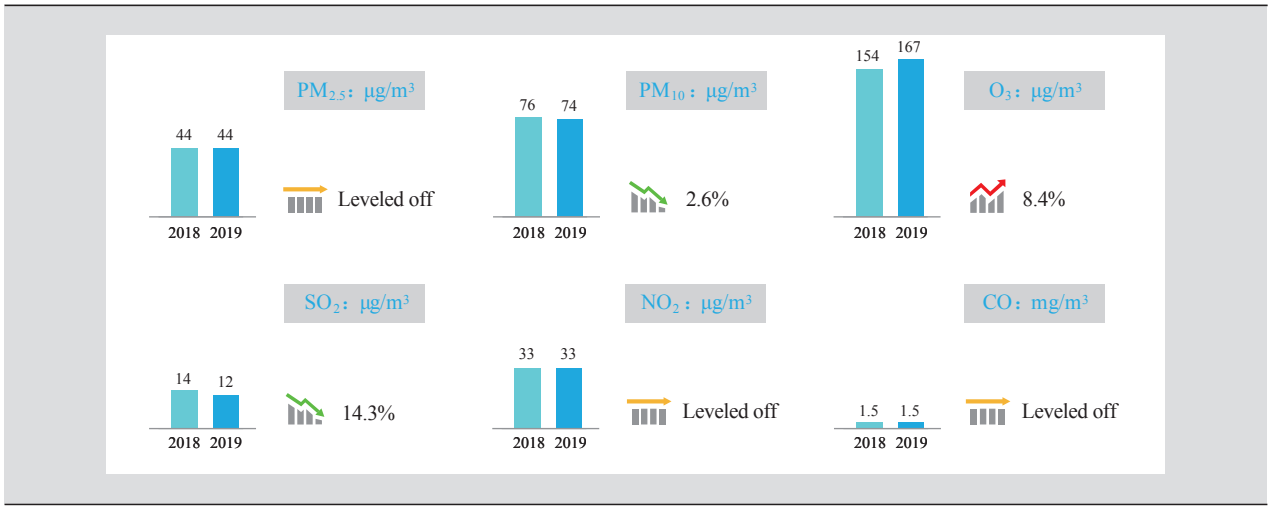
If the impact of dust was not excluded, the average concentration of $PM_{2.5}$ and PM_{10} of the 168 cities were 44 μg/m^3 and 76 μg/m^3 respectively, down by 2.2% and 3.8% compared from that of 2018.

*Including key regions such as Beijing-Tianjin-Hebei region and surrounding areas, the Yangtze River delta , the Fenwei Plain, Chengdu-Chongqing region, the middle reaches of the Yangtze River, the Pearl River Delta region, and provincial capital cities and cities under separate plan of the State Council. Since Laiwu City was merged into Jinan City, the number of cities was changed from 169 to 168, the same below.

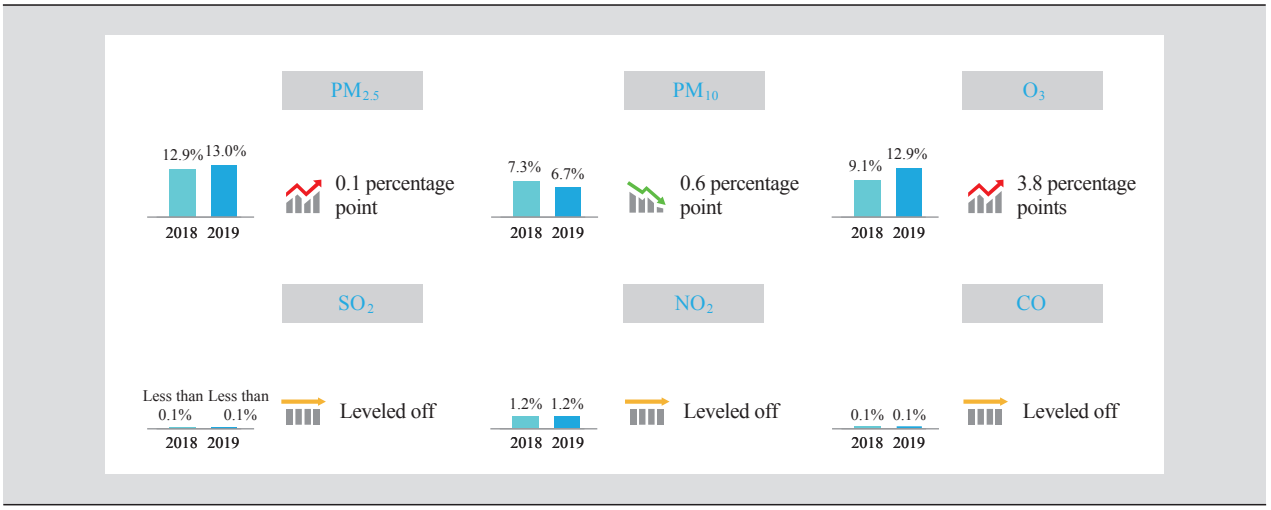
**Comprehensive air quality index: The sum of the quotients of concentration of the 6 air pollutants against corresponding Grade II limit within the assessment period is the comprehensive air quality index of the current city in that period, which is employed for ranking of urban air quality.

Percentage of 168 cities of various standards of six major pollutants in 2019

Indicator	Standard Ⅰ (%)	Standard Ⅱ (%)	Worse than Standard Ⅱ (%)
$PM_{2.5}$	0.6	23.2	76.2
PM_{10}	3.0	43.5	53.6
O_3	0.0	40.5	59.5
SO_2	91.7	8.3	0.0
NO_2	81.0 (same for Standard Ⅰ & Standard Ⅱ)		19.0
CO	100.0 (same for Standard Ⅰ & Standard Ⅱ)		0.0



Comparison of concentrations of six major pollutants in 168 cities between 2018 and 2019



Comparison of the percentage of non–attainment days of six major pollutants in 168 cities between 2018 and 2019

Beijing-Tianjin-Hebei region and surrounding areas*
In 2019, the ratio of the number of days of "2+26" cities in Beijing-Tianjin-Hebei region and surrounding areas of the whole year meeting air quality standard was within the range of 41.1%~65.8% with the average rate of 53.1%. In specific, the share of attainment days took up 50%~80% for 16 cities and less than 50% for 12 cities. The average number of nonattainment days accounted for 46.9% of the total; 32.1%, 9.4%, 4.9% and 0.6% of which was of slight pollution, intermediate pollution, heavy pollution and very heavy pollution respectively. 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 48.2%, 42.9%, 8.9% and 0.2% respectively. There was no occurrence of nonattainment days with SO_2 and CO as the primary pollutant.

The percentage of the number of attainment days was 65.8% for Beijing. There was no occurrence of heavy pollution, there were 4 days registered as very heavy pollution, and the number of days under very heavy pollution and above was 10 days less than that of 2018.

The Yangtze River delta** In 2019, 41 cities had witnessed 56.5%~98.1% share for the number of attainment days throughout the year with the average ratio of 76.5%. In specific, the percentage of number of attainment days took up 80%~100% for 15 cities and 50%~80% for 26 cities. The average percentage of number of nonattainment days accounted for 23.5% of the total; 19.5%, 3.5%, 0.6% and less than 0.1% of which was of slight pollution, intermediate pollution, heavy pollution and very heavy pollution respectively. 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 49.5%, 44.3%, 5.1% and 1.3% respectively. There was no occurrence of nonattainment days with SO_2 and CO as the primary pollutant.

The percentage of the number of attainment days was 84.7% for Shanghai around the year. There was no occurrence of days under heavy pollution but 1 day under very heavy pollution, and the number of days under very heavy pollution and above was 1 day less than that of 2018.

Fenwei Plain*** The percentage of the number of

The concentration of six major pollutants in Beijing–Tianjin–Hebei region and surrounding areas in 2019

Region	Indicator	Concentration (CO: mg/m^3, others: μg/m^3)	Change compared with that of 2018 (%)
Beijing-Tianjin-Hebei and surrounding areas	$PM_{2.5}$	57	-1.7
	PM_{10}	100	-3.8
	O_3	196	7.7
	SO_2	15	-16.7
	NO_2	40	2.6
	CO	2.0	0.0
Beijing	$PM_{2.5}$	42	-12.5
	PM_{10}	68	-8.1
	O_3	191	8.5
	SO_2	4	-20.0
	NO_2	37	-5.1
	CO	1.4	-12.5

*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.

attainment days of 11 cities in Fenwei Plain was within the range of 47.7%~76.7% with the average rate of 61.7%. In specific, the attainment rate was within the range of 50%~80% for 9 cities and less than 50% for 2 cities. The average ratio of nonattainment days was 38.3%; 25.3% of which were of slight pollution, 7.1% of intermediate pollution, 4.8% of heavy pollution and 1.1% of very heavy pollution. Among the nonattainment days, the number of days with $PM_{2.5}$, O_3, PM_{10} and NO_2 as the primary pollutant took up 51.6%, 37.6%, 10.7% and 0.2% respectively. There was no occurrence of nonattainment days with CO and SO_2 as the primary pollutant.

Straw burning In 2019, satellite remote sensing monitored a total of 6,300 straw burning sites in the country (excluding burning site information under cloud cover), mainly distributed in Heilongjiang, Inner Mongolia, Jilin, Hebei, Shanxi, Liaoning, Anhui, Shandong, Hubei and Henan province (region). The number of burning sites was 1,347 fewer than that in 2018.

The concentration of six major pollutants in the Yangtze River Delta in 2019

Region	Indicator	Concentration (CO: mg/m^3, others: μg/m^3)	Change compared with that of 2018 (%)
The Yangtze River Delta region	$PM_{2.5}$	41	-2.4
	PM_{10}	65	-3.0
	O_3	164	7.2
	SO_2	9	-10.0
	NO_2	32	0.0
	CO	1.2	0.0
Shanghai	$PM_{2.5}$	35	2.9
	PM_{10}	45	-6.2
	O_3	151	3.4
	SO_2	7	-22.2
	NO_2	42	7.7
	CO	1.1	10.0

The concentration of six major pollutants in Fenwei Plain in 2019

Region	Indicator	Concentration (CO: mg/m^3, others: μg/m^3)	Change compared with that of 2018 (%)
Fenwei Plain	$PM_{2.5}$	55	1.9
	PM_{10}	94	-3.1
	O_3	171	4.3
	SO_2	15	-31.8
	NO_2	39	-2.5
	CO	1.9	-9.5

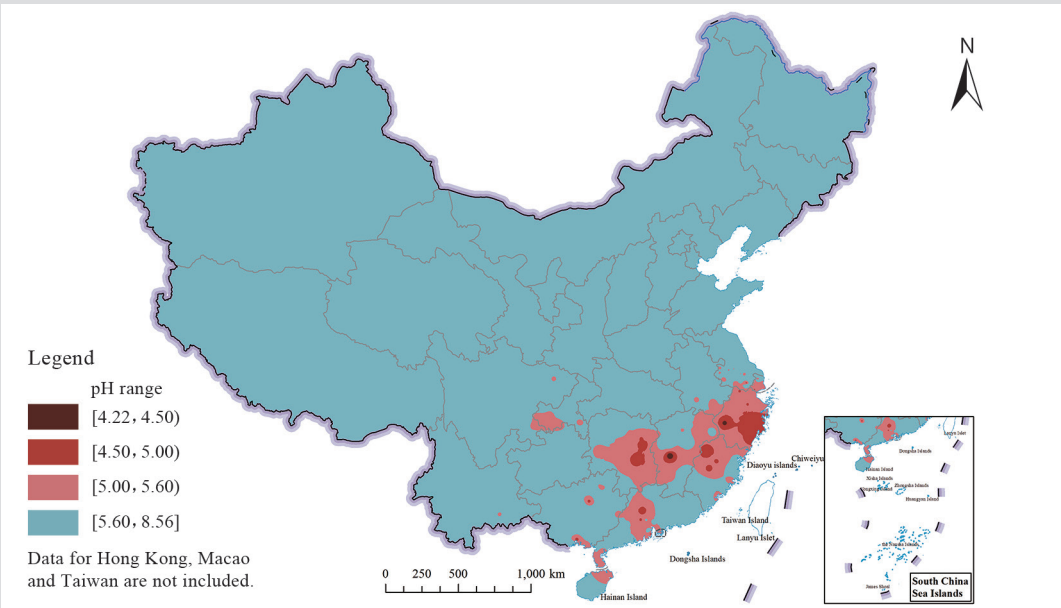
Acid rain

Acid rain distribution In 2019, the total area covered by acid rain was about 474,000 km^2, taking up 5.0% of total land area of China, down by 0.5 percentage point compared with that of 2018. Among them, the percentage of land area with relatively serious acid rain was 0.7%*. Acid rain was mainly distributed in the region south to the Yangtze River and east to Yunnan-Guizhou Plateau, mainly including Zhejiang, most of Shanghai, northern part of Fujian, central part of Jiangxi, central and eastern part of Hunan, central part of Guangdong and southern part of Chongqing.

Acid rain frequency In 2019, the average acid rain frequency of 469 cities (districts or counties) under precipitation monitoring was 10.2%, down by 0.3 percentage point compared with that of 2018. The rate of cities with acid rain occurrence was 33.3%, down by 4.3 percentage points compared with that of 2018. The percentage of cities with acid rain frequency over 25%, 50% and 75% was 15.4%, 8.3% and 2.6% respectively.

Precipitation acidity In 2019, the annual average pH value of precipitation across the country ranged from 4.22 (Ji'an of Jiangxi province) to 8.56 (Korla of Xinjiang autonomous region) with the average value of 5.58. The rate of cities with acid rain, relatively serious acid rain and serious acid rain was 16.8%, 4.5% and 0.4% respectively.

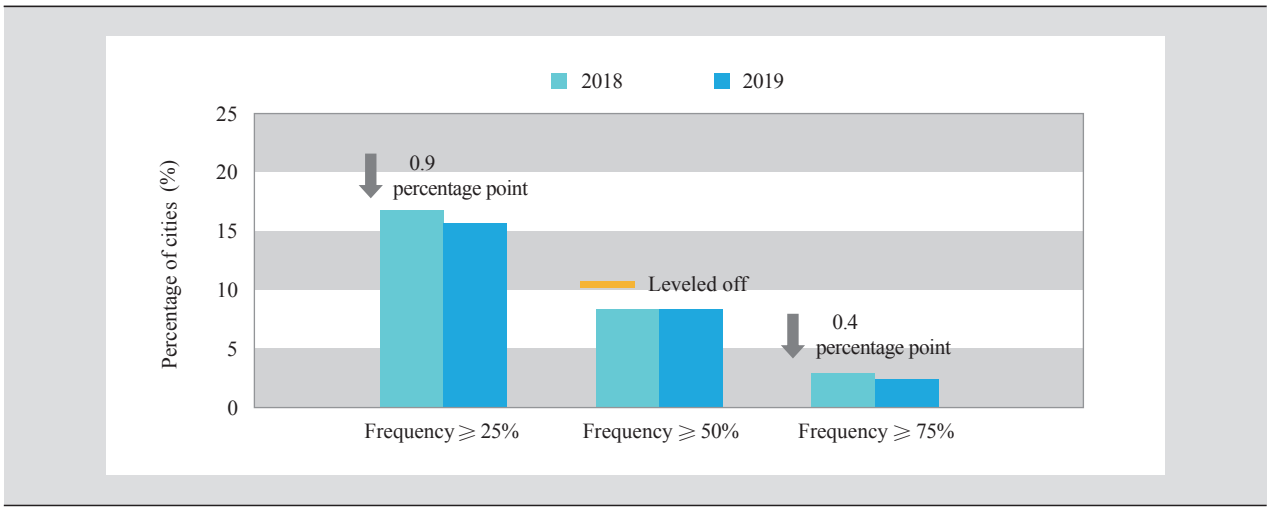
Chemical composition In 2019, the main cations in precipitation were calcium ion and ammonium, with an equivalent concentration ratio of 26.3% and 16.8% respectively. The key anion was sulfate radical with an equivalent concentration ratio of 18.9%, and the equivalent concentration ratio of nitrate radical was 9.7%. In general,



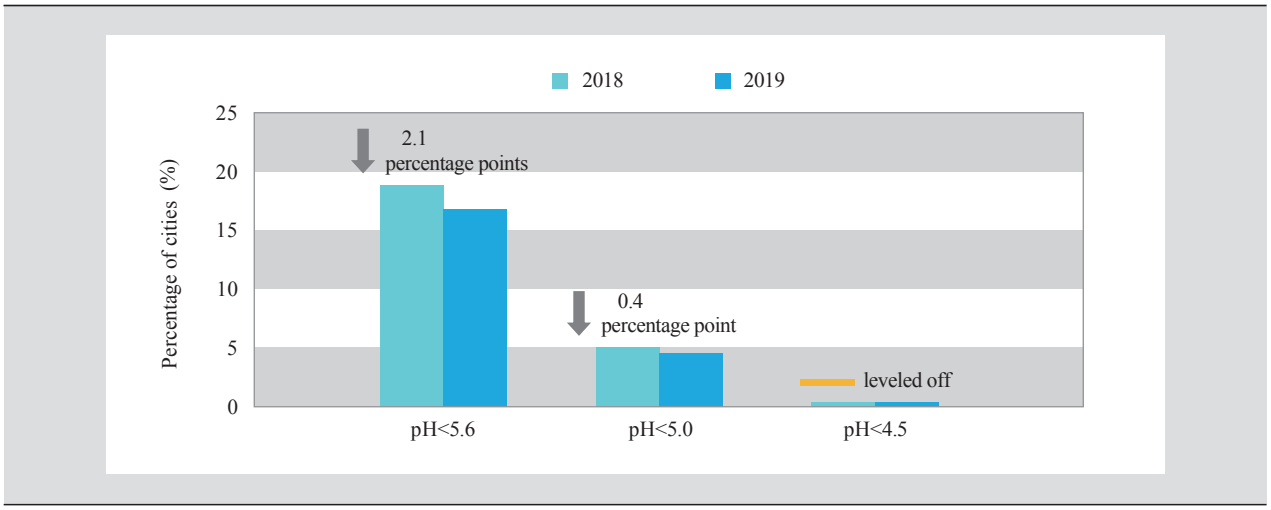
The isoline of annual average pH value of precipitation in China in 2019

*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.

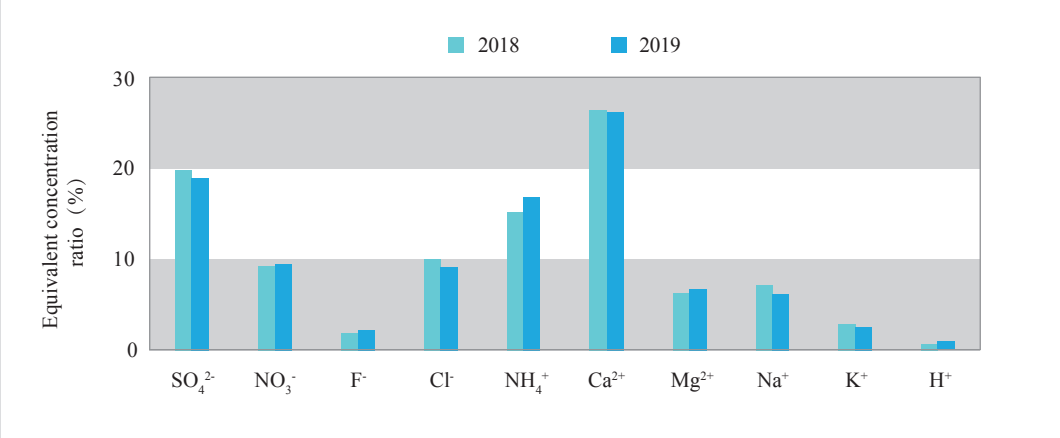
the type of acid rain can still be classified as sulfuric acid. Compared with that of 2018, the percentage of concentration of sulfate radical, chloridion and sodion went down slightly, while the percentage of concentration of fluorid ion, ammonium ion, magnesium ion went up a bit, and that of other ion equivalents kept at a stable level.



Comparison of the percentage of cities with different acid rain frequency between 2018 and 2019



Comparison of the percentage of cities with different annual pH value of precipitation between 2018 and 2019



Comparison of main ion equivalent concentration ratio of precipitation between 2018 and 2019

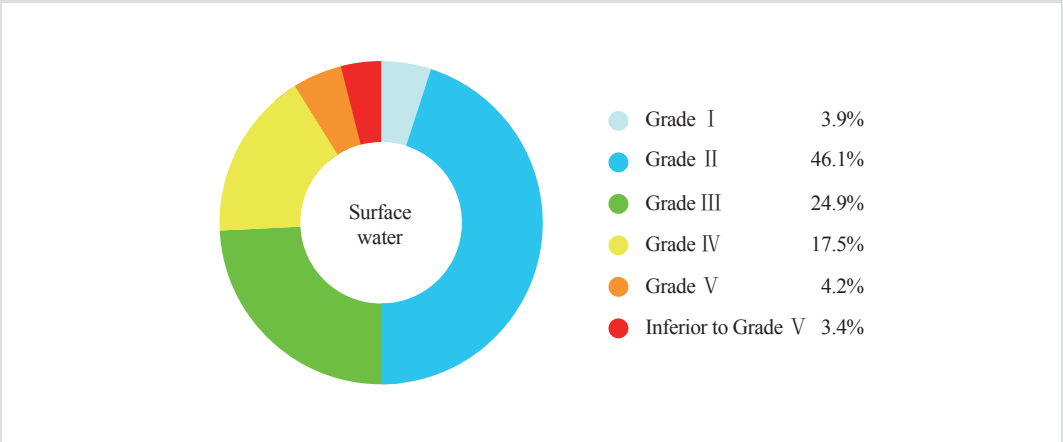
Freshwater Environment

Surface waters

In 2019, there were 1,931 surface water sections (sites) under national monitoring program*, among which water sections (sites) meeting Grade I~III water quality standards took up 74.9%, up by 3.9 percentage points compared with that of 2018; sections that are inferior to Grade V standard took up 3.4%, down by 3.3 percentage points compared with that of 2018**. The major pollution indicators were chemical oxygen demand (COD), total phosphorus (TP) and permanganate index.

River

In 2019, out of the 1,610 water sections under national monitoring program in 7 big river basins of the Yangtze River, Yellow River, Pearl River, Songhua River, Huaihe River, Haihe River and Liaohe River as well as rivers in Zhejiang and Fujian, rivers in northwestern and southwestern parts of China, the water sections of Grade I~III standards took up 79.1%, up by 4.8 percentage points compared with that of 2018; water sections inferior to Grade V standard took



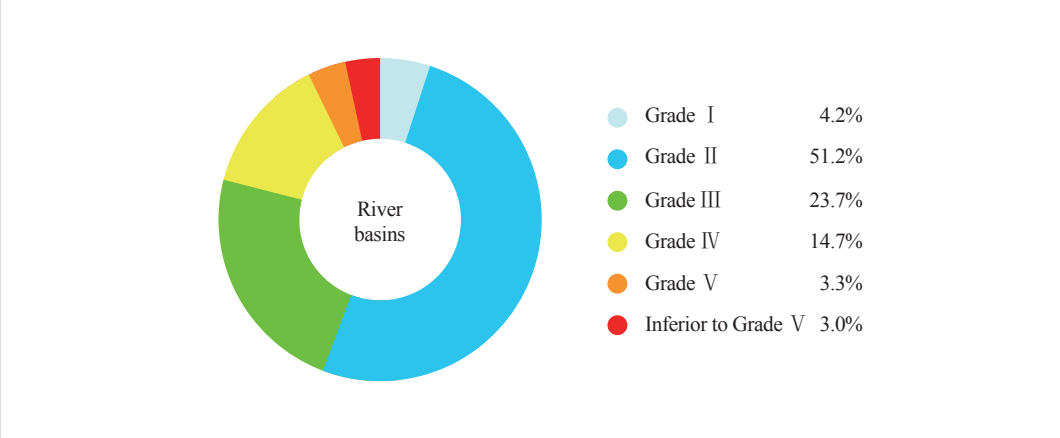
General surface water quality of China in 2019

*According to The *National Surface Water Environmental Quality Monitoring Network Plan during the 13th "Five-Year Plan" Period,* 1,940 sections have been established for the purpose of evaluating, assessing and ranking the water quality of sections (sites). Among them, a total of 1,931 sections (sites) in 2019 were monitored, and the other 9 were not due to interruption of flow and traffic.

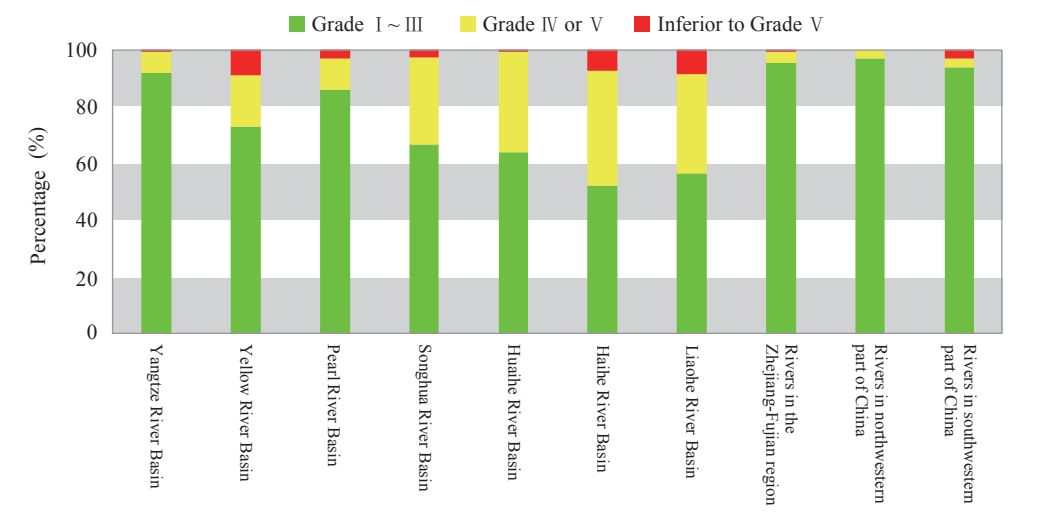
**21 indicators of Table 1 of *Environmental Quality Standard for Surface Water (GB 3838-2002)* except water temperature, TN and E-coli are employed to assess the water grade based on each individual limit, and the highest grade from the single factor approach will be taken as the type of water quality of the section. Grade I or II standard of water refers to the water in Class I protected areas of drinking water sources, habitats of rare aquatic species, fish and shrimp spawning grounds and feeding grounds of fry and young fish. Grade III standard of water could be used for Class II drinking water source protected areas, fish and shrimp wintering grounds, migration channels, aquaculture areas and swimming sites. Grade IV standard of water could be used for general industrial water use and recreation without any direct contact with human body. Grade V standard of water could be used for agriculture and landscape related irrigation, and waters failing to meet Grade V standard hardly has any function except adjustment of local climate.

up 3.0%, down by 3.9 percentage points compared with that of 2018; The major pollution indicators were COD, permanganate index and ammonia nitrogen.

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

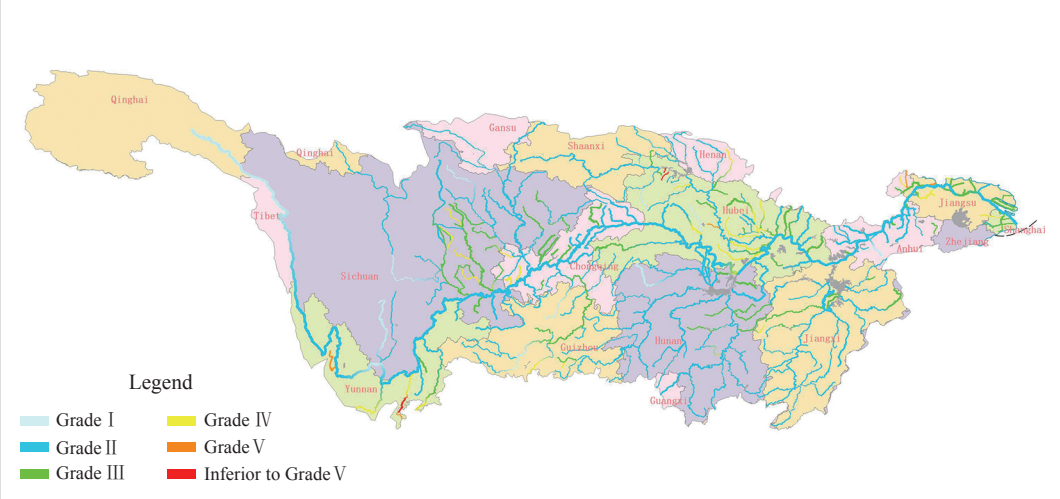


General water quality of river basins of China in 2019



Water quality of 7 big river basins, rivers in Zhejiang and Fujian, rivers in northwestern part and southwestern part of China in 2019

The Yangtze River basin witnessed excellent water quality. In all the 509 water sections under national monitoring program, 91.7% met Grade I~III standards, up by 4.2 percentage points compared with that of 2018; 0.6% were inferior to Grade V standard, down by 1.2 percentage points compared with that of 2018. The water quality of the mainstream and major tributaries of the Yangtze River was excellent.

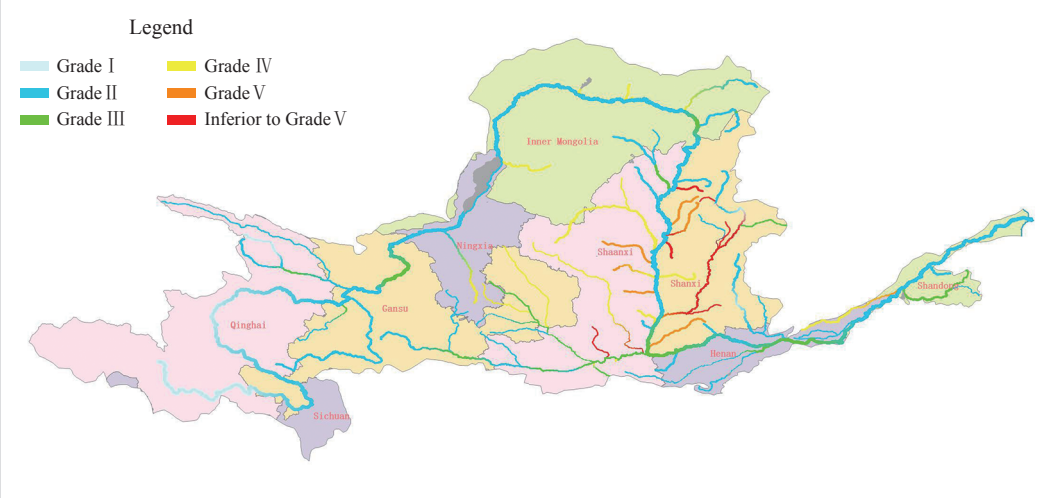


Map of waters at different quality levels of Yangtze River basin in 2019

Water quality of Yangtze River basin in 2019

Water body	Number of sections (items)	Percentage (%)						Change compared with 2018 (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	509	3.3	67.0	21.4	6.7	1.0	0.6	-2.4	12.3	-5.7	-2.3	-0.8	-1.2
Mainstream	59	6.8	91.5	1.7	0.0	0.0	0.0	0.0	13.5	-13.6	0.0	0.0	0.0
Major tributaries	450	2.9	63.8	24.0	7.6	1.1	0.7	-2.6	12.1	-4.6	-2.6	-0.9	-1.3
Water sections across provincial boundaries	60	3.3	81.7	13.3	1.7	0.0	0.0	-8.4	11.7	0.0	-3.3	0.0	0.0

The Yellow River basin was slightly polluted. The major pollution indicators were ammonia nitrogen, COD and TP. Out of the 137 water sections under national monitoring program, 73.0% met Grade I~III standards, up by 6.6 percentage points compared with that of 2018; 8.8% were inferior to Grade V standard, down by 3.6 percentage points compared with that of 2018. In specific, the mainstream of the Yellow River was of excellent water quality and the major



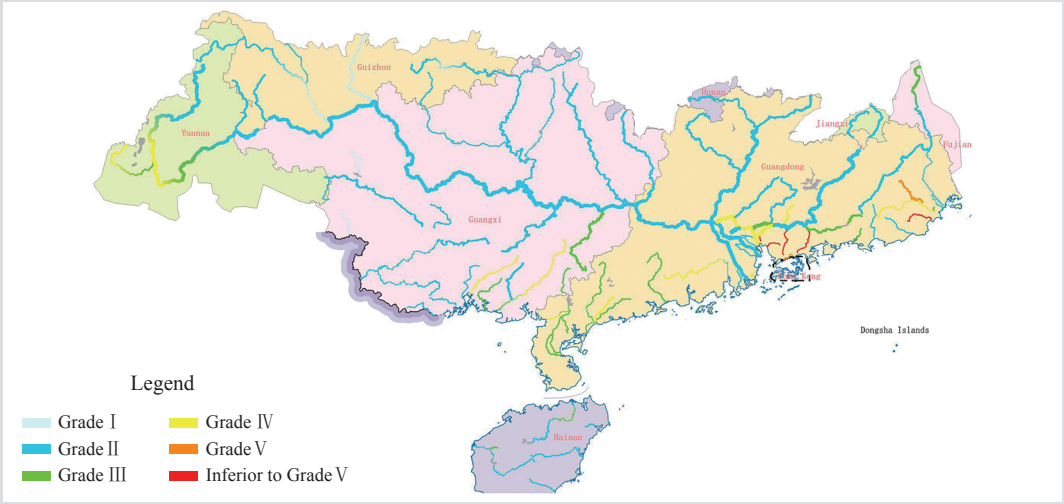
Map of waters at different quality levels of Yellow River basin in 2019

Water quality of Yellow River basin in 2019

Water body	Number of sections (items)	Percentage (%)						Change compared with 2018 (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	137	3.6	51.8	17.5	12.4	5.8	8.8	0.7	6.5	-0.7	-5.1	2.2	-3.6
Mainstream	31	6.5	77.4	16.1	0.0	0.0	0.0	0.0	-3.2	3.2	0.0	0.0	0.0
Major tributaries	106	2.8	44.3	17.9	16.0	7.5	11.3	0.9	9.4	-1.9	-6.6	2.8	-4.7
Water sections across provincial boundaries	39	2.6	56.4	12.8	10.3	10.3	7.7	0.0	-2.6	5.1	-5.1	2.6	0.0

tributaries were slightly polluted.

The Pearl River basin was of good water quality. Among the 165 water sections under national monitoring program, 86.1% met Grade I~III standards, up by 1.3 percentage points compared with that of 2018; 3.0% were inferior to Grade V standard, down by 2.5 percentage points compared with that of 2018. In specific, the rivers within Hainan Island were of excellent water quality, and the mainstream and major tributaries of the Pearl River were of good water quality.

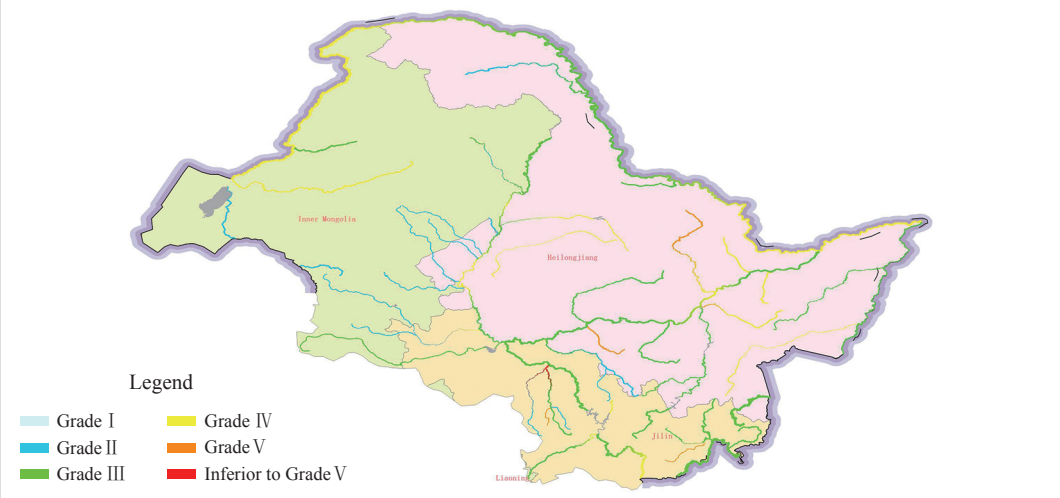


Map of waters at different quality levels of Pearl River basin in 2019

Water quality of Pearl River basin in 2019

Water body	Number of sections (items)	Percentage (%)						Change compared with 2018 (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	165	3.6	69.1	13.3	9.7	1.2	3.0	-1.2	7.3	-4.9	1.8	-0.6	-2.5
Mainstream	50	0.0	80.0	4.0	16.0	0.0	0.0	-2.0	16.0	-16.0	6.0	-2.0	-2.0
Major tributaries	101	5.9	63.4	15.8	7.9	2.0	5.0	-1.0	5.0	-1.0	0.0	0.0	-2.9
Rivers within Hainan Island	14	0.0	71.4	28.6	0.0	0.0	0.0	0.0	-7.2	7.2	0.0	0.0	0.0
Water sections across provincial boundaries	17	11.8	82.4	5.9	0.0	0.0	0.0	0.0	5.9	-5.9	0.0	0.0	0.0

The Songhua River basin was slightly polluted. The major pollution indicators were COD, permanganate index and ammonia nitrogen. In all the 107 water sections under national monitoring program, 66.4% met Grade I~III standards, up by 8.5 percentage points compared with that of 2018; 2.8% were inferior to Grade V standard, down by 9.3 percentage points compared with that of 2018.In specific, the mainstream, waters of Tumen River and Suifen River were of good water quality, and the major tributaries, waters of Heilongjiang and Wusuli River were slightly polluted.

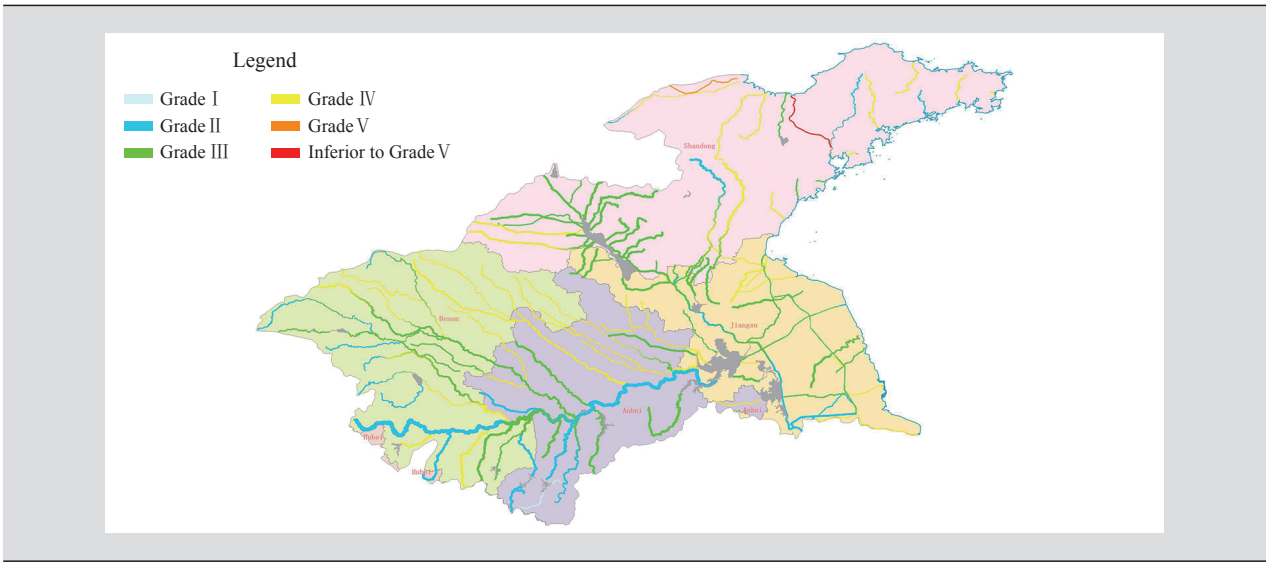


Map of waters at different water quality levels of Songhua River basin in 2019

Water quality of Songhua River basin in 2019

Water body	Number of sections (items)	Percentage (%)						Change compared with 2018 (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	0.0	13.1	53.3	26.2	4.7	2.8	0.0	1.0	7.5	-0.9	1.9	-9.3
Mainstream	17	0.0	0.0	88.2	11.8	0.0	0.0	0.0	-17.6	11.7	5.9	0.0	0.0
Major tributaries	55	0.0	21.8	41.8	23.6	7.3	5.5	0.0	9.3	0.7	4.0	3.7	-17.7
Waters of Heilongjiang	18	0.0	11.1	33.3	55.6	0.0	0.0	0.0	-0.7	9.8	-3.2	-5.9	0.0
Waters of Tumen River	7	0.0	0.0	85.7	14.3	0.0	0.0	0.0	-14.3	42.8	-28.6	0.0	0.0
Waters of Wusuli River	9	0.0	0.0	66.7	33.3	0.0	0.0	0.0	0.0	11.1	-11.1	0.0	0.0
Waters of Suifen River	1	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water sections across provincial boundaries	23	0.0	43.5	52.2	4.3	0.0	0.0	0.0	17.4	-8.7	-8.7	0.0	0.0

The Huaihe River basin was slightly polluted. The major pollution indicators were COD, permanganate index and fluoride. In the 179 water sections under national monitoring program, 63.7% met Grade I~III standards, up by 6.5 percentage points compared with that of 2018; 0.6% were inferior to Grade V standard, down by 2.2 percentage points compared with that of 2018. The mainstream of Huaihe River was of excellent water quality; the waters of the Yishu-Si water system were of good quality; and waters of major tributaries of Huaihe River and the waters of rivers flowing into sea in Shandong Peninsula were slightly polluted.



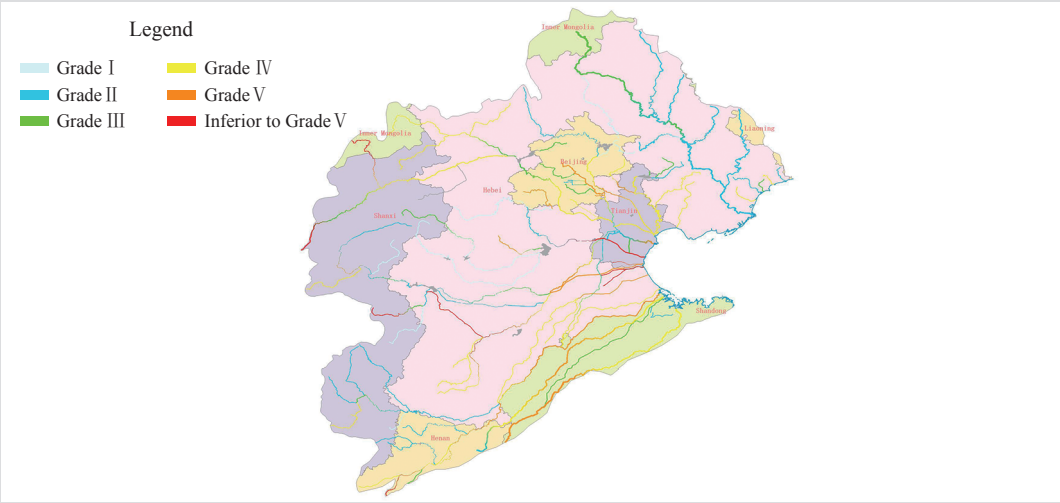
Map of waters at different quality levels of Huaihe River basin in 2019

Water quality of Huaihe River basin in 2019

Water body	Number of sections (items)	Percentage (%)						Change compared with 2018 (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	179	0.6	20.1	43.0	35.2	0.6	0.6	0.0	7.9	-1.4	4.6	-8.8	-2.2
Mainstream	10	0.0	90.0	10.0	0.0	0.0	0.0	0.0	80.0	-70.0	-10.0	0.0	0.0
Major tributaries	101	1.0	20.8	37.6	40.6	0.0	0.0	0.0	7.9	0.0	5.0	-9.9	-3.0
waters of the Yishu-Si water system	48	0.0	6.2	72.9	20.8	0.0	0.0	0.0	-8.4	10.4	-2.1	0.0	0.0
waters of rivers flowing into sea in Shandong Peninsula	20	0.0	15.0	15.0	60.0	5.0	5.0	0.0	10.2	-4.0	26.7	-28.3	-4.5
Water sections across provincial boundaries	30	0.0	10.0	43.3	46.7	0.0	0.0	0.0	-6.7	-3.4	20.0	-6.7	-3.3

The Haihe River basin was slightly polluted. The major pollution indicators were COD, permanganate index and BOD_5. In 160 water sections under national monitoring program, 51.9% met Grade I~III standards, up by 5.6 percentage points compared with that of 2018; 7.5% were inferior to Grade V standard, down by 12.5 percentage points compared with that of 2018. In specific, the water quality of 2 sections of the mainstream and Sanchakou met Grade II standard, and the

water quality at Haihe River tidal gate met Grade V standard. The waters of Luanhe River were of good quality. The water qualities of major tributaries, the Tuhai River-Majia River and waters in east Hebei and coastal areas were of slight pollution.



Map of waters at different quality levels of Haihe River basin in 2019

Water quality of Haihe River basin in 2019

Water body	Number of sections (items)	Percentage (%)						Change compared with 2018 (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	160	6.9	28.8	16.2	27.5	13.1	7.5	1.3	6.9	-2.6	8.1	-1.3	-12.5
Mainstream	2	0.0	50.0	0.0	0.0	50.0	0.0	0.0	50.0	-50.0	0.0	50.0	-50.0
Major tributaries	124	8.1	22.6	16.9	28.2	14.5	9.7	0.8	2.4	1.6	9.7	0.8	-15.3
Waters of Luanhe River	17	5.9	70.6	17.6	5.9	0.0	0.0	5.9	29.4	-29.5	-5.9	0.0	0.0
Waters of Tuhai River-Majia River	11	0.0	27.3	9.1	45.5	18.2	0.0	0.0	0.0	9.1	9.1	-18.2	0.0
Waters in east Hebei and coastal areas	6	0.0	33.3	16.7	50.0	0.0	0.0	0.0	33.3	-16.6	16.7	-33.3	0.0
Water sections across provincial boundaries	47	12.8	8.5	17.0	29.8	21.3	10.6	4.3	-12.8	6.4	4.3	8.5	-10.7

The Liaohe River basin was of slight pollution. The major pollution indicators were COD, permanganate index and BOD_5. In 103 water sections under national monitoring program, 56.3% met Grade I~III standards, up by 7.3 percentage points compared with that of 2018; 8.7% were inferior to Grade V standard, down by 13.4 percentage points compared with that of 2018. In specific, the waters of Yalu River were of excellent quality. The waters of the mainstream, Daliaohe River and Dalinghe River were of slight pollution, and the major tributaries of the Liaohe River were of intermediate pollution.

Map of waters in different quality levels of Liaohe River basin in 2019

Water quality of Liaohe River basin in 2019

Water body	Number of sections (items)	Percentage (%)						Change compared with 2018 (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	103	3.9	37.9	14.6	25.2	9.7	8.7	0.1	9.1	-1.7	6.0	0.1	-13.4
Mainstream	14	0.0	14.3	0.0	57.1	21.4	7.1	0.0	0.0	-7.1	21.4	0.0	-14.3
Major tributaries	19	0.0	10.5	15.8	36.8	15.8	21.1	0.0	0.5	-4.2	21.8	-4.2	-13.9
Waters of Daliaohe River	28	7.1	35.7	17.9	17.9	10.7	10.7	0.0	10.7	3.6	7.2	3.6	-25.0
Waters of the Daling River	11	0.0	54.5	18.2	9.1	9.1	9.1	0.0	18.1	-9.1	-18.2	9.1	0.0
Waters of the Yalu River	13	15.4	84.6	0.0	0.0	0.0	0.0	0.0	7.7	0.0	-7.7	0.0	0.0
Water sections across provincial boundaries	10	0.0	40.0	0.0	30.0	20.0	10.0	0.0	10.0	-20.0	20.0	10.0	-20.0

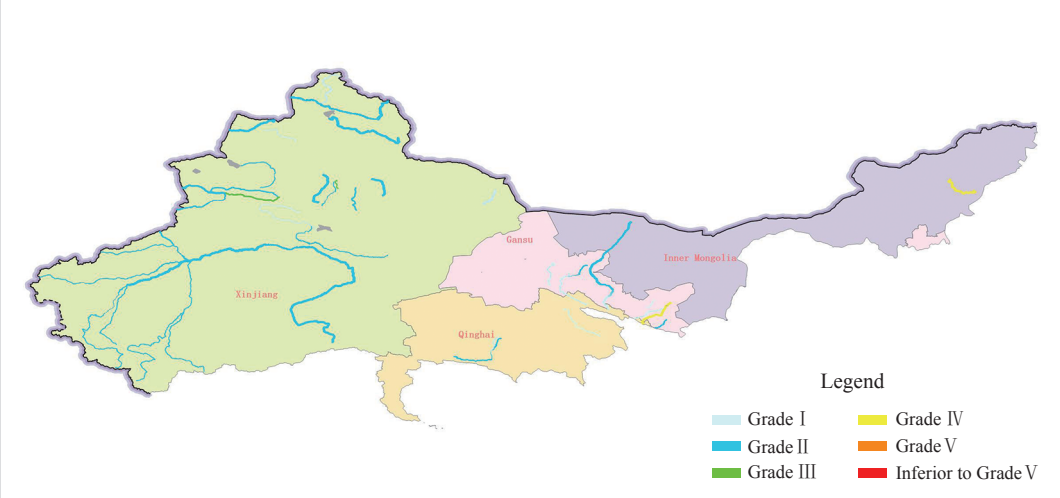
Rivers in Zhejiang Province and Fujian Province were of excellent water quality. In 125 water sections under national monitoring program, 95.2% met Grade I~III standards, up by 6.4 percentage points compared with that of 2018; 0.8% were inferior to Grade V standard, up by 0.8 percentage point compared with that of 2018.

Map of Rivers in different quality levels in Zhejiang Province and Fujian Province in 2019

Water quality of Rivers in Zhejiang Province and Fujian Province in 2019

Water body	Number of sections (items)	Percentage (%)						Change compared with 2018 (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
Rivers	125	3.2	56.8	35.2	3.2	0.8	0.8	0.8	4.0	1.6	-6.4	-0.8	0.8
Water sections across provincial boundaries	2	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Rivers in northwestern part of China were of excellent water quality. In 62 water sections under national monitoring program, 96.8% met Grade I~III standards, and no water was inferior to Grade V standard, all keeping the same as that of 2018.

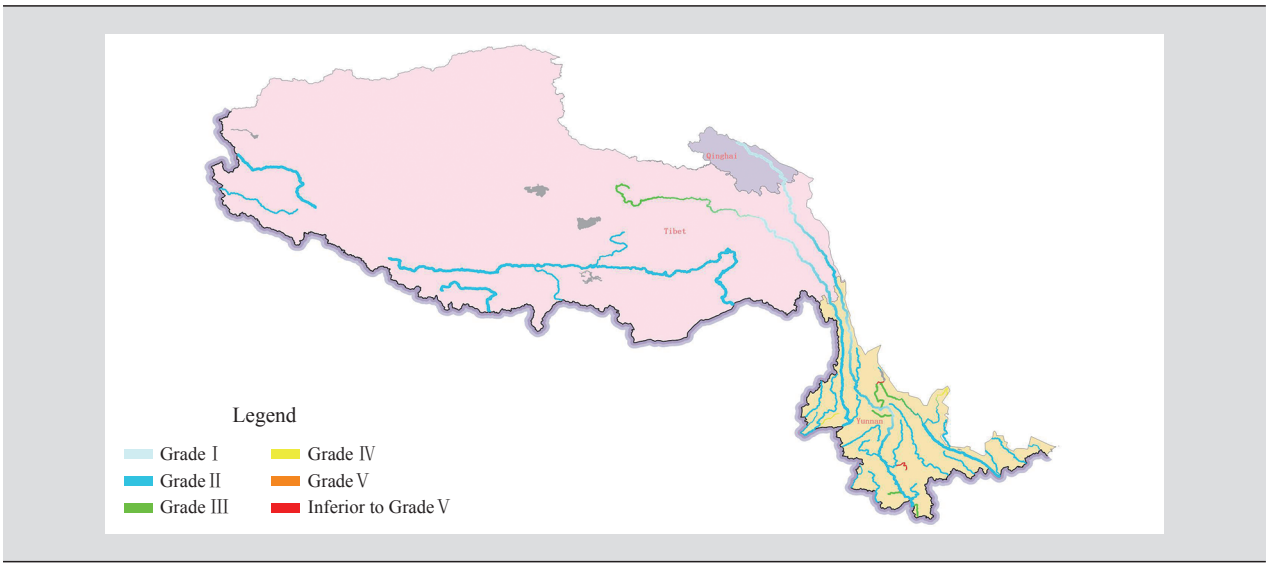


Map of Rivers in different quality levels in northwestern part of China in 2019

Water quality of Rivers in northwestern part of China in 2019

Water body	Number of sections (items)	Percentage (%)						Change compared with 2018 (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
Rivers	62	22.6	71.0	3.2	3.2	0.0	0.0	-3.2	8.1	-4.9	0.0	0.0	0.0
Water sections across provincial boundaries	2	50.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Rivers in southwestern part of China were of excellent water quality. In 63 water sections under national monitoring program, 93.7% met Grade I~III standards, down by 1.5 percentage points compared with that of 2018; 3.2% were inferior to Grade V standard, down by 1.6 percentage points compared with that of 2018.



Map of Rivers in different quality levels in southwestern part of China in 2019

Water quality of Rivers in southwestern part of China in 2019

Water body	Number of sections (items)	Percentage (%)						Change compared with 2018 (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
Rivers	63	7.9	76.2	9.5	3.2	0.0	3.2	-1.6	3.2	-3.2	3.2	0.0	-1.6
Water sections across provincial boundaries	2	50.0	50.0	0.0	0.0	0.0	0.0	-50.0	50.0	0.0	0.0	0.0	0.0

Lakes (reservoirs)

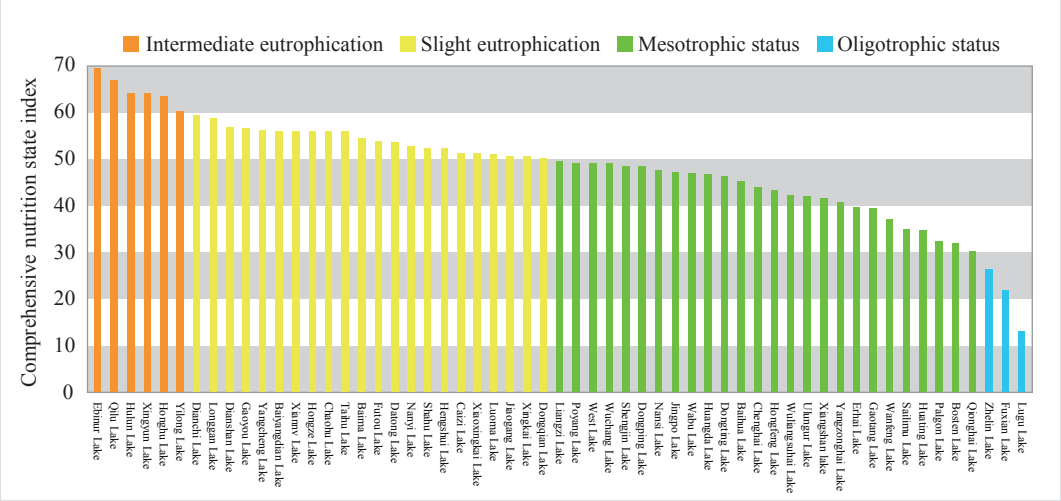
In 2019, among 110 major lakes (reservoirs) across the country under the national monitoring program, 69.1% met Grade I~III standards, up by 2.4 percentage points compared with that of 2018; 7.3% were inferior to Grade V standard, down by 0.8 percentage point compared with that of 2018. The major pollution indicators were TP, COD and permanganate index.

Water quality of major lakes (reservoirs) in 2019

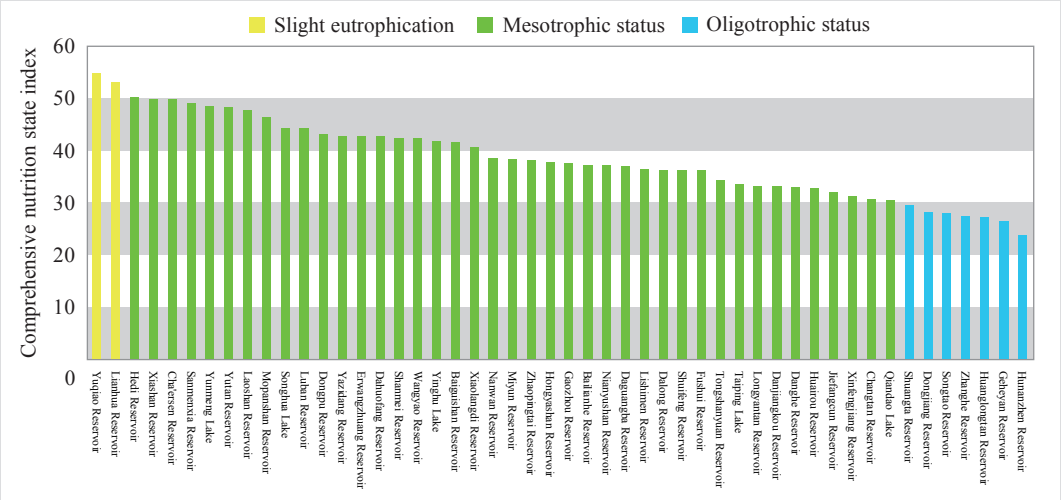
Water quality grade	The three lakes	Major lakes	Major reservoirs
Grade I and II standard	——	Hongfeng Lake, Xiangshan lake, Gaotang Lake, Wanfeng Lake, Huating Lake, Pangong Tso, Qionghai Lake, Zhelin Lake, Fuxian Lake, Lugu Lake	Taiping Lake, Xinfengjiang Reservoir, Changtan Reservoir, Dongjiang Reservoir, Geheyan Reservoir, Hunanzhen Reservoir, Dongpu Reservoir, Yazidang Reservoir, Dahuofang Reservoir, Yinghu Lake, Nanwan Reservoir, Miyun Reservoir, Hongyashan Reservoir, Gaozhou Reservoir, Daguangba Reservoir, Lishimen Reservoir, Dalong Reservoir, Shuifeng Lake, Tongshanyuan Reservoir, Longyantan Reservoir, Danjiangkou Reservoir, Danghe Reservoir, Huairou Reservoir, Jiefangcun Reservoir, Qiandao Lake, Shuangta Reservoir, Songtao Reservoir, Zhanghe Reservoir, Huanglongtan Reservoir
Grade III standard	——	Futou Lake, Hengshui Lake, Caizi Lake, Luoma Lake, Dongqian lake, Liangzi Lake, West Lake, Wuchang Lake, Shengjin Lake, Dongping Lake, Nansi Lake, Jingpo Lake, Huangda Lake, Baihua Lake, Wuliangsuhai Lake, Yangzong Lake, Erhai Lake, Sailimu Lake, Siling Lake	Yuqiao Reservoir, Hedi Reservoir, Xiashan Reservior, Cha'ersen Reservoir, Sanmenxia Reservoir, Yunmeng Lake, Yutan Reservior, Laoshan Reservoir, Mopanshan Reservoir, Luban Reservoir, Erwangzhuang Reservoir, Shanmei Reservoir, Wangyao Reservior, Baiguishan Reservoir, Xiaolangdi Reservior, Bailianhe Reservoir, Nianyushan Reservior, Fushui Reservoir
Grade IV standard	Taihu Lake, Chaohu Lake, Dianchi Lake	Honghu Lake, Longgan Lake, Yangcheng Lake, Baiyangdian Lake, Xiannv Lake, Hongze Lake, Baima Lake, Nanyi Lake, Shahu Lake, Xiaoxingkai Lake, Jiaogang Lake, Poyang Lake, Wabu Lake, Dongting Lake, Bosten Lake	Lianhua Reservoir, Songhua Lake, Zhaopingtai Reservior
Grade V standard	——	Yilong Lake, Dianshan Lake, Gaoyou Lake, Datong Lake, Xingkai Lake	——
Inferior to Grade V standard*	——	Ebinur Lake, Qilu Lake, Hulun Lake, Xingyun Lake, Chenghai Lake, Ulungur Lake, Namsto Lake, Yamdrok Lake	——

*Ebinur Lake, Ulungur Lake and Namtso Lake have relatively high fluoride natural background value; Yamdrok Lake has relatively high pH natural background value; Chenghai Lake has relatively high pH and fluoride natural background value; and Hulun Lake has relatively high COD_{Cr} and fluoride natural background value.

In the 107 lakes (reservoirs) under the monitoring of nutritional status, 9.3% were under oligotrophic status; 62.6% were under mesotrophic status; 22.4% were under slight eutrophication, and 5.6% were under intermediate eutrophication.



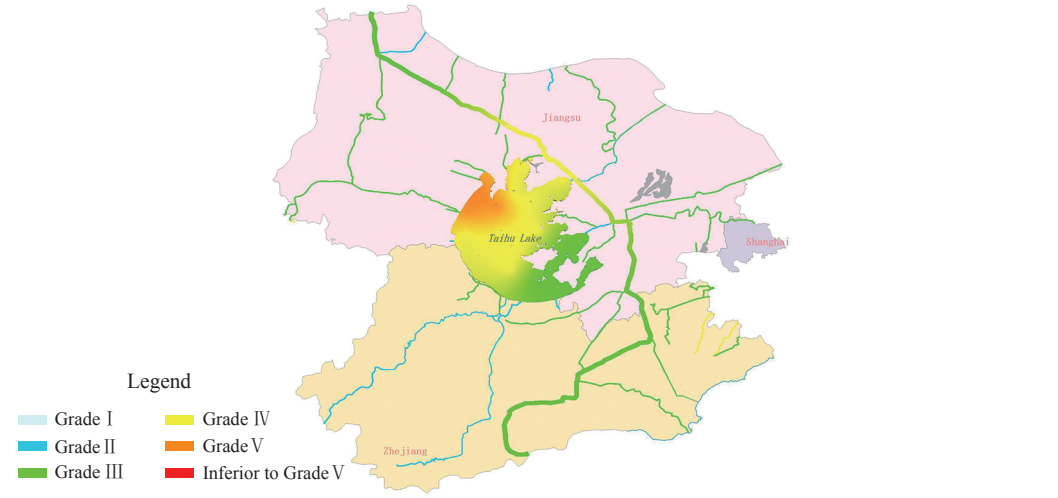
Trophic Level Index of major lakes in 2019



Trophic Level Index of major reservoirs in 2019

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

The rivers surrounding the Taihu Lake were of excellent water quality. In 55 water sections under national monitoring program, 27.3% met Grade II standard, down by 5.4 percentage points compared with that of 2018; 63.6% met Grade III



Map of waters at different quality levels of Taihu Lake in 2019

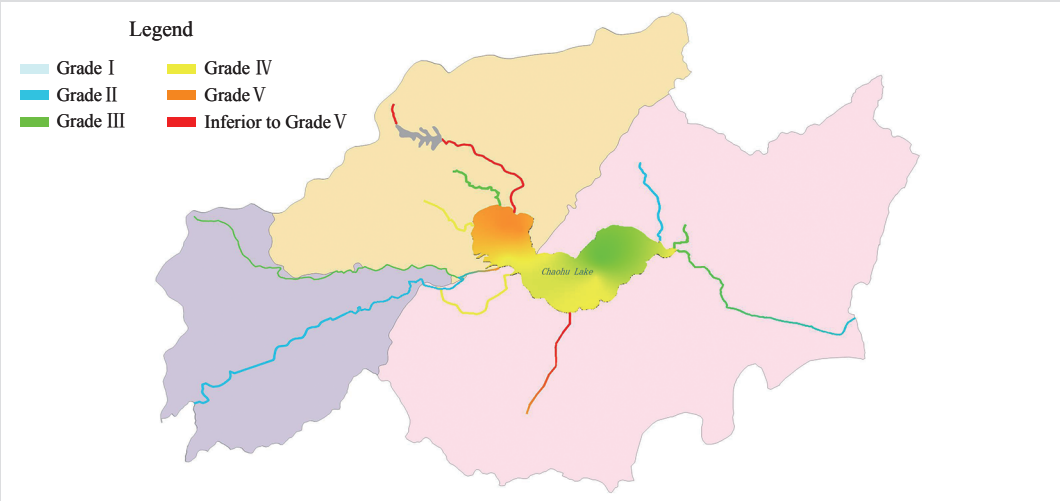
standard, up by 16.3 percentage points; 9.1% met Grade IV standard, down by 10.9 percentage points; no section met Grade I standard, Grade V standard or failed to meet Grade V standard, remaining unchanged compared with that of 2018.

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

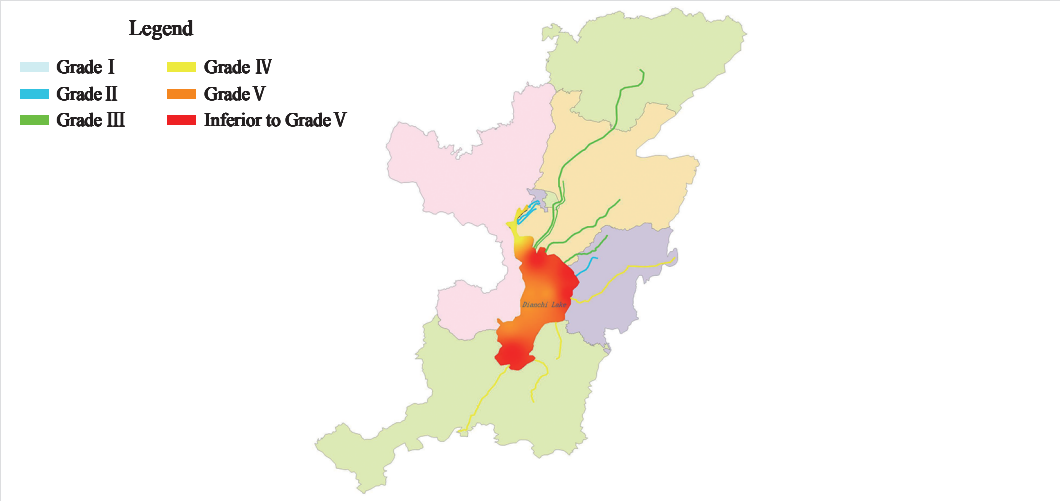
The rivers surrounding the Chaohu Lake were slightly polluted. In 14 water sections under national monitoring program, 28.6% met Grade II standard, up by 7.2 percentage points compared with that of 2018; 28.6% met Grade III standard, down by 28.5 percentage points; 14.3% met Grade IV standard, up by 14.3 percentage points; 14.3% met Grade V standard, up by 7.2 percentage points. No sections met Grade I standard, and there was no change of percentage points for water sections meeting Grade I standard and failing to meet Grade V standard in 2019.

The Dianchi Lake was of slight water pollution. The major pollution indicators were COD and TP. In specific, Caohai Lake was slightly polluted, and the Waihai area of Dianchi Lake was moderately polluted. The lake as a whole was under slight eutrophication; in specific, both Caohai Lake and the Waihai area were under slight eutrophication.

The rivers surrounding the Dianchi Lake were of slight water pollution. In 12 water sections under national monitoring program, 33.3% met Grade II standard, up by 33.3 percentage points; 33.3% met Grade III standard, down by 33.4 percentage points; 33.3% met Grade IV standard, up by 25.0 percentage points; No sections met Grade I standard, the same as that of 2018, and no sections met Grade V or failed to meet Grade V standard, down by 8.3 and 16.7 percentage points respectively compared with that of 2018.



Map of waters at different quality levels of Chaohu Lake in 2019



Map of waters at different quality levels of Dianchi Lake in 2019

Water bodies of key water conservancy projects

The Three Gorges Reservoir area In 2019, the water quality of the Three Gorges Reservoir area was of excellent quality, and that of the 38 main tributaries of the Yangtze River flowing into Three Gorges Reservoir area were also excellent in terms of water quality. Among the 77 sections under water quality monitoring, sections meeting Grade I~III standard took up 98.7%, up by 2.6 percentage points compared with that of 2018; sections meeting Grade IV standard took up 1.3%, down by 2.6 percentage points compared with that of 2018. No section met Grade V or failed to meet Grade V, being the

same as 2018. Indicators like TP and COD exceeded relevant standard with the ratio of such sections taking up both 1.3% of the total.

The comprehensive trophic state index of 77 monitoring sections was within the range of 24.5~60.9, among which 1.3% were under oligotrophic state, 77.9% under mesotrophic state, and 20.8% under eutrophic status.

South-North Water Diversion Project (East Route) The intake of the Yangtze River was of excellent quality. The water quality of the Liyun section, Baoying section, Suqian section, Bulao section, Hanzhuang section, and Liangji section of the Beijing-Hangzhou Canal were all excellent and good. In specific, the Baoying section, Suqian section, Hanzhuang section, and Liangji section are the diversion sections of the Beijing-Hangzhou Canal during the period of water diversion. The Nansi Lake and Dongping Lake were under mesotrophic status, and Hongze Lake and Luoma Lake were under light eutrophication.

South-North Water Diversion Project (Central Route) The water quality of the intake was excellent and that of the transferring lines was also excellent. All 9 tributaries flowing into the Danjiangkou Reservoir were of excellent and good water quality, and Danjiangkou Reservoir was of mesotrophic status.

Centralized drinking water source areas of APL cities

In 2019, among the 902 sections (sites) of the centralized drinking water source in 336 APL cities across the country*, 830 sites met the water quality standard throughout the year, taking up 92.0% of the total. In specific, 590 sections (sites) were surface drinking water source sections (sites), 565 of which met the water quality standard throughout the year, taking up 95.8%. Major pollution indicators that went beyond the standard value were TP, sulfate and permanganate index. There were 312 groundwater drinking water source sites, 265 of which met the water quality standard throughout the year, taking up 84.9% with major pollutants of manganese, iron and sulfate exceeding standard value, mainly caused by the relatively high natural background value.

Groundwater

In 2019, among the 10,168 national groundwater quality monitoring sites nationwide, 14.4% met Grade I~III water quality standards, 66.9% met Grade IV standard, and 18.8% met Grade V standard.

Among the 2,830 shallow groundwater wells under monitoring across the country, 23.7% met Grade I~III water quality standards, 30.0% met Grade IV standard, and 46.2% met Grade V standard. The indicators exceeding standard were manganese, total hardness, iodide, total dissolved solids, iron, fluoride, ammonia nitrogen, sodium, sulfate and chloride.

Inland fishery waters

In 2019, the leading indicators of key fishery water basins in rivers exceeding standard value were TN and TP. Compared with 2018, the standard-exceeding range of TP, permanganate index and volatile phenol increased slightly, that of TN, non-ionic ammonia, petroleum and copper narrowed down at different degrees. The leading standard-exceeding indicators of key fishery water basins in lakes (reservoirs) were TN, TP and permanganate index. Compared with 2018, the standard-exceeding range of permanganate index and petroleum grew slightly, and that of TN, TP and copper narrowed down slightly. The key standard-exceeding indicator in the water bodies of 41 national aquatic germplasm resources conservation areas (inland) was TN.

Agricultural non-point sources

In 2019, the utilization rate of fertilizers for the three major food crops of rice, corn and wheat was 39.2%, 1.4 percentage points higher than that of 2017. The utilization rate of pesticides was 39.8%, 1.0 percentage point higher than that of 2017.

*The Boltara Mongolian Autonomous Prefecture in Xinjiang Uygur Autonomous Region was changed from a drinking water source to a backup water source due to planning adjustments and was not included in the 2019 list of cities in prefecture level and above.

Marine Environment

Sea areas under jurisdiction of China

In 2019, the sea areas meeting Grade I standard took up 97.0% of the total area under jurisdiction, 0.7 percentage point higher than that of 2018; 28,340 km^2 were inferior to Grade IV standard, 4,930 km^2 less than that of 2018. The main pollution indicators were inorganic nitrogen and activate phosphate.

Bohai Sea The sea area failing to meet Grade I standard was 12,740 km^2, a decrease of 8,820 km^2 compared with that of 2018; and that failing to meet Grade IV standard was 1,010 km^2, a decrease of 2,320 km^2 compared with that of 2018.

Yellow Sea The sea area failing to meet Grade I standard was 11,550 km^2, a decrease of 14,540 km^2 compared with that of 2018; and that failing to meet Grade IV standard was 760 km^2, a decrease of 1,220 km^2 compared with that of 2018.

East China Sea The sea area failing to meet Grade I standard was 52,610 km^2, an increase of 8,250 km^2 compared with that of 2018; and that failing to meet Grade IV standard was 22,240 km^2, an increase of 130 km^2 compared with that of 2018.

South China Sea The sea area failing to meet Grade I standard was 12,770 km^2, a decrease of 5,010 km^2 compared with that of 2018; and that failing to meet Grade IV standard was 4,330 km^2, a decrease of 1,520 km^2 compared with that of 2018.

The sea areas under jurisdiction of China failing to meet Grade Ⅰ standard in 2019

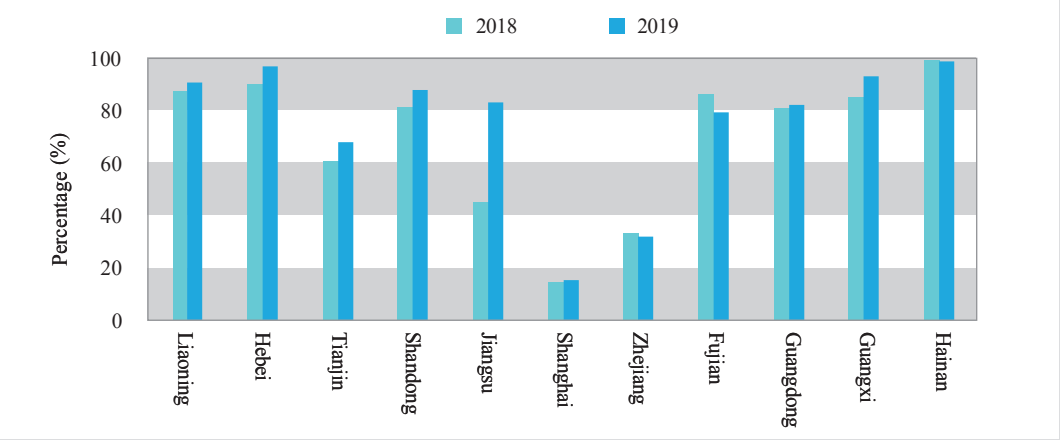
Sea area	Marine area (km^2)				
	Grade Ⅱ	Grade Ⅲ	Grade Ⅳ	Inferior to Grade Ⅳ	Total
Bohai Sea	8,770	2,210	750	1,010	12,740
Yellow Sea	4,890	5,410	490	760	11,550
East China Sea	15,820	8,270	6,280	22,240	52,610
South China Sea	4,850	2,550	1,040	4,330	12,770
Sea area under jurisdiction	34,330	18,440	8,560	28,340	89,670

Water quality of sea areas under jurisdiction of China in 2019

Nearshore sea areas

In 2019, the water quality of nearshore sea areas* in China was steadily improved. The water quality is relatively good. Major pollution indicators were inorganic nitrogen and active phosphates. 76.6% of the total sea areas met Grade I & II water quality standards, up by 5.3 percentage points compared with that of 2018; 11.7% failed to meet Grade IV standard, down by 1.8 percentage points compared with that of 2018.

Coastal Provinces The nearshore water quality of coastal provinces of Hebei, Guangxi and Hainan province was excellent; that of Liaoning, Shandong, Jiangsu and Guangdong provinces was good; that of Tianjin and Fujian province was relatively good; and that of Shanghai and Zhejiang was extremely poor.



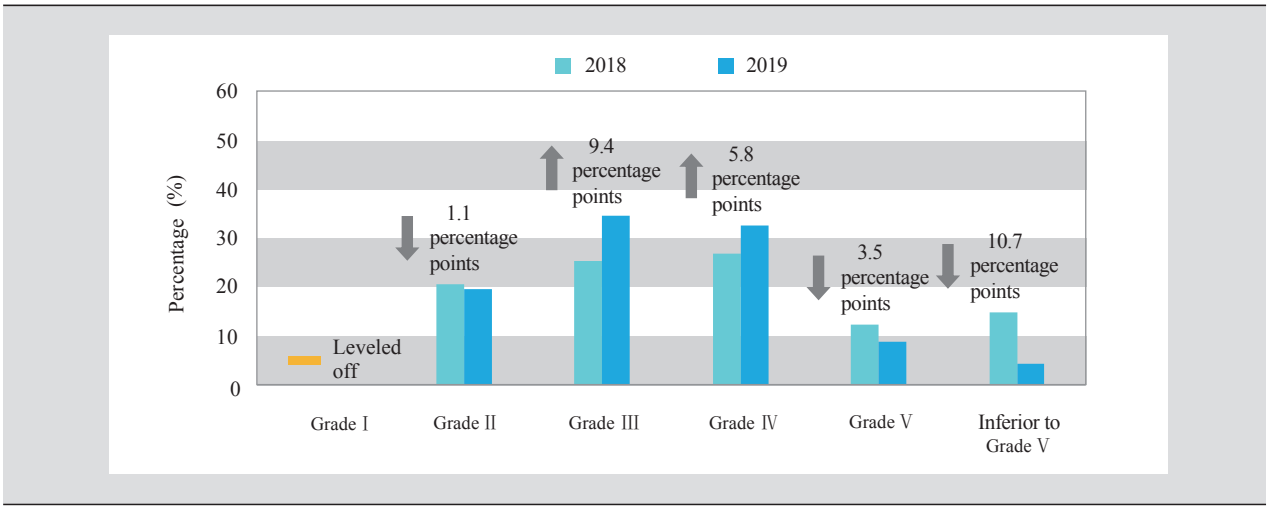
Comparison of the percentage of excellent and good seawater in nearshore waters of coastal provinces between 2018 and 2019

Major gulfs Among the 44 gulfs covering the area of more than 100 km^2, the water quality of 13 gulfs under monitoring failed to meet Grade IV standard in the time of spring, summer and autumn.

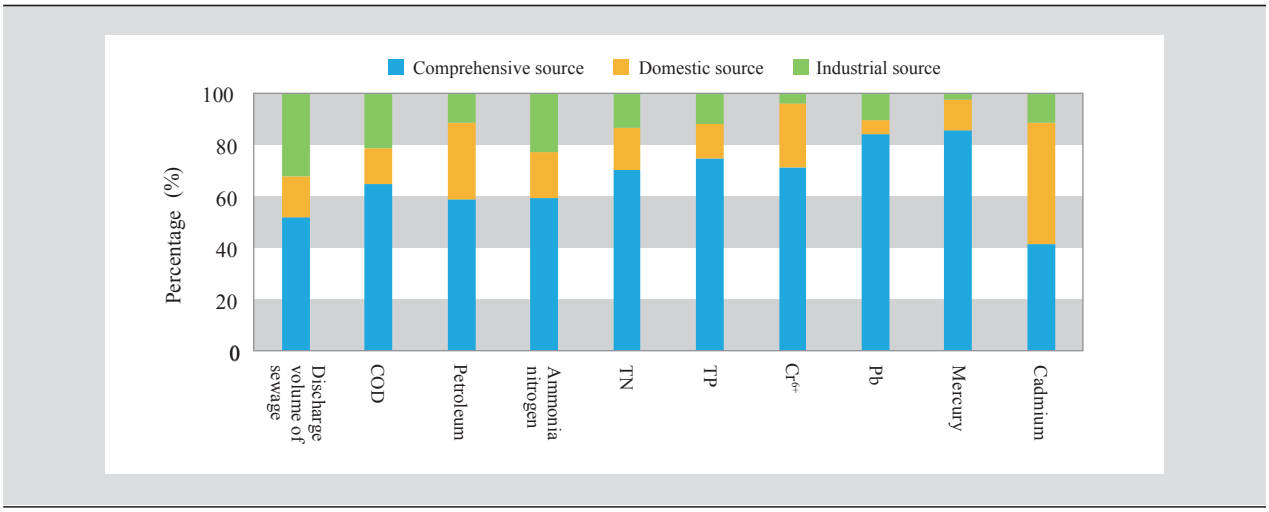
Sea-going rivers In 2019, out of the 190 monitoring sections of the rivers flowing into sea, no section met Grade Ⅰ standard. Sections meeting Grade II standard took up 19.5%; Grade III standard 34.7%; Grade IV standard 32.6%; Grade V standard 8.9%; and those failing to meet Grade V standard took up 4.2%. The main pollution indicators were COD, permanganate index, TP, ammonia nitrogen and BOD_5.

Water pollution sources directly discharged into the sea The monitoring results of 448 sources with daily discharge volume exceeding 100 m^3 showed that the total discharge volume of effluent was about 8.01089 billion ton. Among the different types of pollution sources, the comprehensive drain outlets made the largest amount of sewage discharge, followed by industrial pollution sources and domestic sources discharge as the smallest amount. The comprehensive drain outlets also made the largest volume of discharge for all pollutants except for cadmium.

*Nearshore waters: refers to the sea area stipulated in the *National Marine Functional Zoning (2011-2020)*.



Comparison of water quality of sea–going rivers between 2018 and 2019



The percentage of discharge of pollutants from different types of pollution sources in 2019

Marine fishery waters

In 2019, the major pollution indicator in key spawning grounds, feeding grounds, migration channels as well as in nature reserve areas for key fishery resources were inorganic nitrogen. There was a bit decrease in water area with inorganic nitrogen, active phosphate, petroleum and COD concentration exceeding the standard value compared with that of 2018. The primary pollution indicator was inorganic nitrogen in key marine culture areas. There was a bit decrease in area with inorganic nitrogen, active phosphate, petroleum and COD concentration exceeding the standard value compared with that of 2018. The major pollution indicator in 7 national aquatic germplasm resource protection areas (seas) was inorganic nitrogen, and the sediments of 27 key marine fishery waters were in a good state.

Land Environment

Soil environmental quality

The detailed survey results on soil pollution of agricultural land show that the overall soil environmental conditions of agricultural land in the country were generally stable. The main pollutant affecting the soil environmental quality of agricultural land was heavy metals, of which cadmium was the primary pollutant.

Quality of arable land

In 2019, 1.550 billion mu of permanent basic farmland was demarcated nationwide.

As of the end of 2019, the average grade of arable land quality nationwide was 4.76*. Among them, the areas with the Grade 1~3 was 632 million mu, accounting for 31.24% of the total arable land; that with Grade 4~6 was 947 million mu, accounting for 46.81%; and that with Grade 7~10 was 444 million mu, accounting for 21.95%.

Water loss and soil erosion

According to the results of dynamic monitoring of water and soil erosion in 2018**, there were 2.7369 million km^2 land subject to water and soil erosion in China. In specific, 1.1509 million km^2 were under water erosion and 1.586 million km^2 were under wind erosion. Compared with the findings of the water and soil conservation of the First National Census on Water Resources (2011), the area of land subject to water and soil erosion in China decreased by 212,300 km^2.

Desertification and sandification

The monitoring results of the Fifth National Monitoring of Desertification Land and Sandy Land*** showed that there were 2.6116 million km^2 desertification land and 1.7212 million km^2 sandy land across the country. According to the results of the Third Monitoring of Rocky Desertification in the karst area, the existing rocky desertification land area in the karst area of China is 100,700 km^2.

*Based on *Arable Land Quality Grading (GB/T 33469-2016),* arable land is classified into 10 grades in terms of quality, with Grade 1 the best and Grade 10 the poorest. In general, Grade 1~3 indicates excellent, Grade 4~6 moderate, and Grade 7~10 poor.

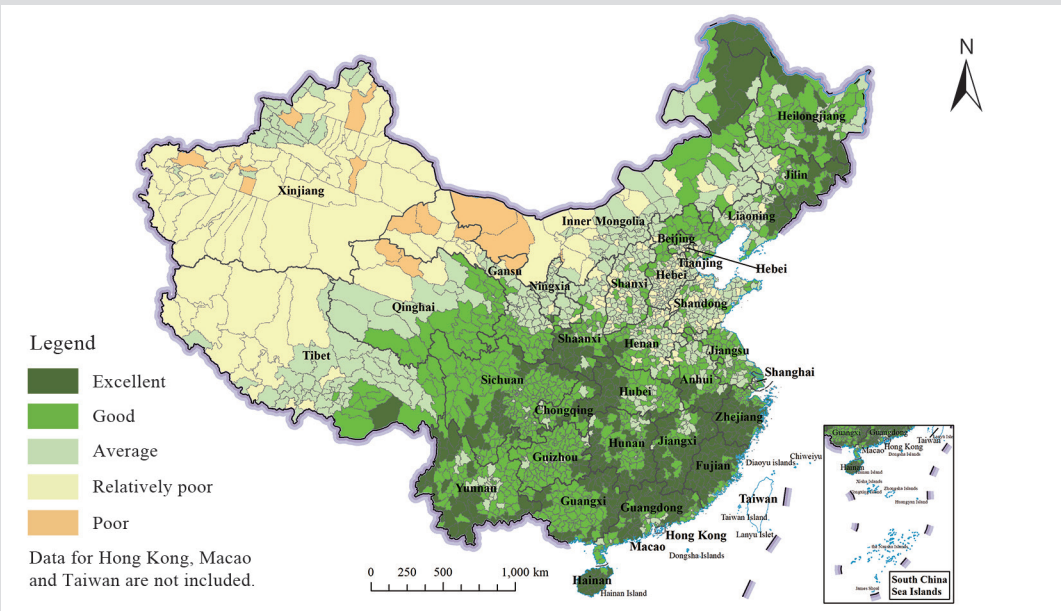
**Up to the time this Report was published, the results of dynamic monitoring of water and soil erosion in 2018 remained to be the latest data.

***Up to the time this Report was published, the monitoring results of the Fifth National Monitoring of Desertification Land and Sandy Land and the Third Monitoring of Rocky Desertification remain to be the latest.

Natural and Ecological Environment

Ecological environment quality

In 2019, the national Ecological Index (EI)* was 51.3, indicating a moderate eco-environmental quality, with no obvious change compared with that of 2018. The total area of counties with "excellent" or "good" eco-environmental quality took up 44.7% of total land area, mainly distributed in the region east to Tibetan Plateau, south to Qinling Mountain and the Huaihe River, Daxing'anling and Xiaoxing'anling Mountain areas as well as Changbai Mountain region in Northeast China. The total area of counties with moderate eco-environmental quality took up 22.7%, mainly distributed in regions such as North China Plain, HuangHuaiHai Plain, central and western parts of Northeast China Plain and central part of Inner Mongolia. The total area of counties with relatively poor or poor eco-environmental quality took up 32.6% of the total, mainly distributed in western part of Inner Mongolia, central and western part of Gansu, western part of Tibet and most parts of Xinjiang.



Map of countywide eco–environmental quality of China in 2019

*Eco-environmental quality is assessed according to the *Technical Criterion for Ecosystem Status Evaluation (HJ 192-2015)*. Ecological Index ⩾ 75 indicates excellent environment with high vegetation coverage, rich biodiversity and stable ecosystems. Ecological Index ranging between 55~75 indicates good environment with relatively high vegetation coverage, relatively rich biodiversity and being suitable for human living. Ecological Index within the range of 35~55 refers to moderate eco-environment with intermediate vegetation coverage, general biodiversity and being relatively suitable to human living but with some factors constraining human life. Ecological Index within 20~35 refers to relatively poor eco-environment with poor vegetation coverage, severe drought, less species and factors evidently constraining human life. Ecological Index < 20 refers to poor eco-environment with bad conditions and constraints on human life.

In 2019, assessment over the dynamic change of ecological environment of 817 counties with key ecological functions show that, eco-environmental quality of 12.5% of the counties improved, 78.0% remained basically stable, and 9.5% deteriorated compared with that of 2017.

Biodiversity

Ecosystem diversity China boasts all the types of terrestrial ecosystems on earth including 212 types of forest, 36 types of bamboo forest, 113 types of shrubs, 77 types of meadows, 55 types of grassland, 52 types of deserts and 30 types of natural wetlands. China is also home to various marine ecosystems including the mangroves, coral reefs, sea grass beds, islands, gulfs, estuaries and upwelling as well as such artificial ecosystems as cropland, artificial forest, artificial wetland, artificial grassland and urban ecosystem.

Biodiversity A total of 106,509 species and subspecies have been discovered in China covering 49,044 animalia species, 44,510 botanical species, 469 bacteria species, 2,375 pigment species, 7,386 fungi, 1,920 protogenesis animalia and 805 viruses. A total of 406 rare and endangered wildlife species are included in the National Catalogue of Wildlife under Key State Protection, and several hundred animal species are unique to China including giant panda, golden monkey, Tibetan antelope, crossoptilon mantchuricum and Yangtze alligator. A total of 246 species of 8 categories of rare and endangered plants are included in the National Catalogue of Wildlife under Key State Protection, and a total of 9,302 types of macro-fungi have been identified.

Genetic resource diversity China has 1,339 cultivated varieties of 528 species of cultivated crops with over 1,000 economic tree species. A total of 7,000 varieties of ornamental plants and 576 varieties of domestic animals are originated from China.

Endangered species

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

Invasive alien species

More than 660 invasive alien species have been found across the country, among which, 71 species that caused or had potential threat to natural ecosystems have been included in the *List of China's Invasive Alien Species*. The survey results on invasive alien species covering 67 national nature reserves showed that 215 species of invasive alien species have invaded national nature reserves, and 48 of them were included in the *List of China's Invasive Alien Species*.

Nature protected areas

Up to the end of 2019, a total of more than 11,800 protected areas* at all levels and of different categories were established with national parks as a major component. The protected areas accounted for 18.0% of the national land area and 4.1% of the jurisdictional sea area. Among them, 10 national park pilot areas for Northeast Tiger Leopard, Qilian Mountain, the Giant Panda and so on were established, involving 12 provinces including Jilin, Heilongjiang, Sichuan and other provinces. The total area covers more than 220,000 km^2, accounting for about 2.3% of the total national land area.

In the first and second half of year 2019, new and

*The statistics of nature reserves has been changed to the statistics of nature protected areas since 2019.

increasing anthropogenic activities were respectively found in 1,019 and 2,785 national nature reserves, with a total area of 8.98 km^2 and 6.42 km^2 respectively.

Forest

According to the results of the 9th National Inventory of Forest Resources (2014-2018)*, the national forest area was 220 million hectares, the forest coverage rate was 22.96%, and the forest stock was 17.56 billion m^3.

Grassland

The grassland area in China was nearly 400 million hectares, accounting for about 41.7% of the country's land area, making it the largest terrestrial ecosystem and ecological barrier in China. The grassland area of the six pastoral areas of Inner Mongolia, Sichuan, Tibet, Gansu, Qinghai and Xinjiang was 293 million hectares, accounting for about 3/4 of the country's grassland area. Grasslands in the southern region were dominated by grass hills and slope grass land, mostly located in mountains and hills, with an area of about 67 million hectares.

*Up to the time this Report was published, the results of 9th National Inventory of Forest Resources were the latest data.

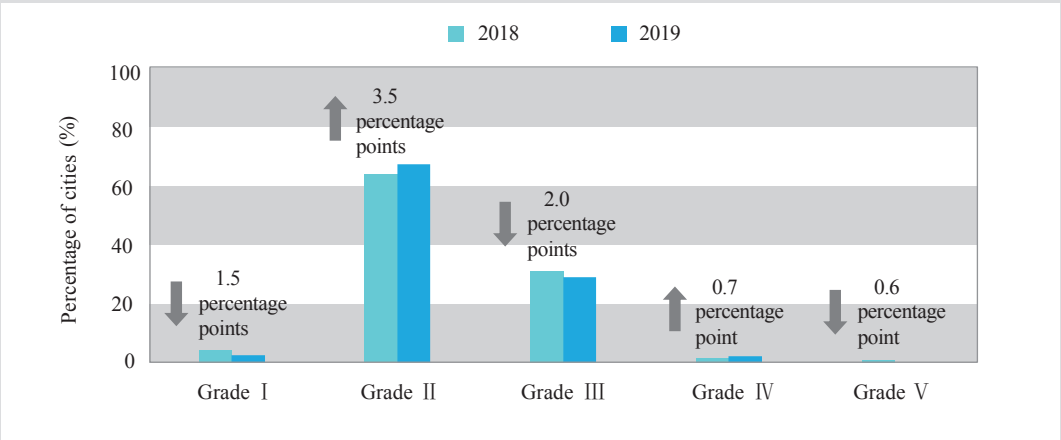
Acoustic Environment

Regional acoustic environment

In 2019, regional daytime acoustic environment of 321 APL cities has been monitored, and the average equivalent sound level was 54.3 dB(A). Among them, 8 cities met Grade I daytime environmental noise standard, taking up 2.5%; 215 cities met Grade II standard, taking up 67.0%; 92 cities met Grade III standard, taking up 28.7%; 6 cities met Grade IV standard, taking up 1.9%; and no city met Grade V standard*.

Acoustic environment of traffic noise

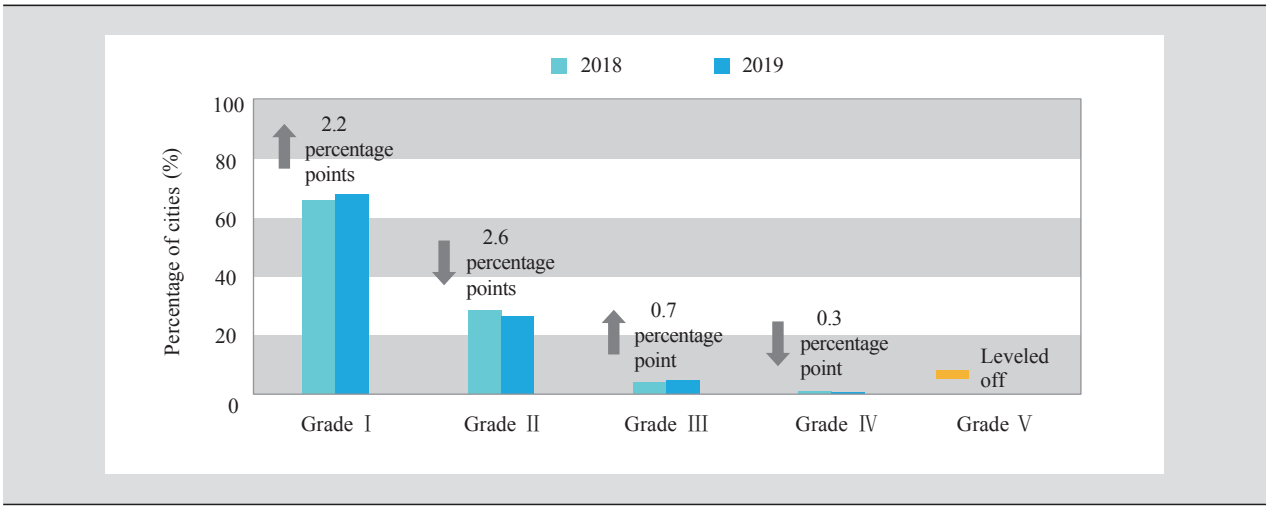
In 2019, the acoustic environment of traffic noise of 322 APL cities had been monitored in the daytime, and the average equivalent sound level was 66.8 dB(A). Among them, 221 cities met Grade I daytime traffic noise standard, taking up 68.6%; 84 cities met Grade II standard, taking up 26.1%; 15 cities met Grade III standard, taking up 4.7%; and 2 cities met Grade IV standard, taking up 0.6%; and no city met Grade V standard**.



Comparison of the percentage of cities with various grades of urban daytime regional acoustic environmental noise across China between 2018 and 2019

*The average equivalent sound level of regional daytime acoustic environment ≤ 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).

**The average equivalent sound level of traffic acoustic environment in the 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).



Comparison of the percentage of cities with various grades of urban daytime regional acoustic environmental traffic noise across China between 2018 and 2019

Acoustic environment of urban functional zones

In 2019, acoustic environment of urban functional zones* of 311 APL cities has been monitored, the daytime attainment rate of which was 92.4%, and the nighttime attainment rate was 74.4%.

Comparison of attainment rate of different functional zones of cities across China between 2018 and 2019 (Unit: %)

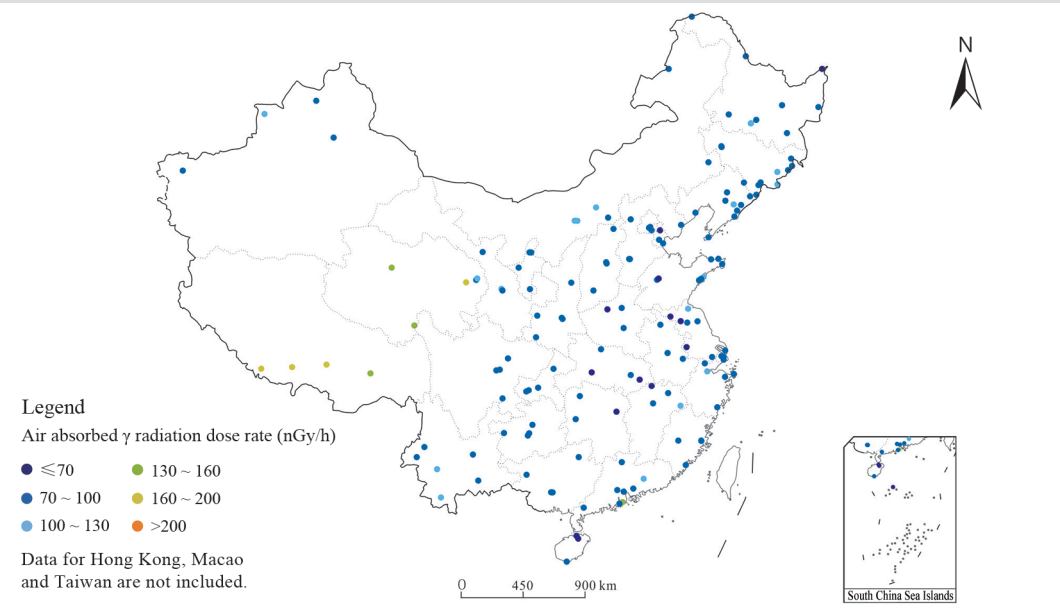
Year	Type 0		Type 1		Type 2		Type 3		Type 4a		Type 4b	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
2019	74.0	55.0	86.1	71.4	92.5	83.8	97.1	88.8	95.3	51.8	95.8	83.3
2018	71.8	56.3	87.4	71.6	92.8	82.2	97.5	87.6	94.0	51.4	100.0	78.4

*Type 0 function area refers to the areas requiring special quiet environment such as rehabilitation and recuperation area. Type 1 function area refers to the areas with residential community, health care, culture and education, scientific research and design, administration and offices as the main functions, which need quiet environment. Type 2 function area refers to the areas with commerce, finance and market as main functions or areas mixing residential communities, commerce and industries, which need to maintain quiet residential environment. Type 3 function area refers to the areas dominated by industrial production, warehouse and logistics and in need of prevention of the strong impacts of industrial noise on surrounding environment. Type 4a function area refers to the areas along highways. Type 4b function area refers to the areas along railways.

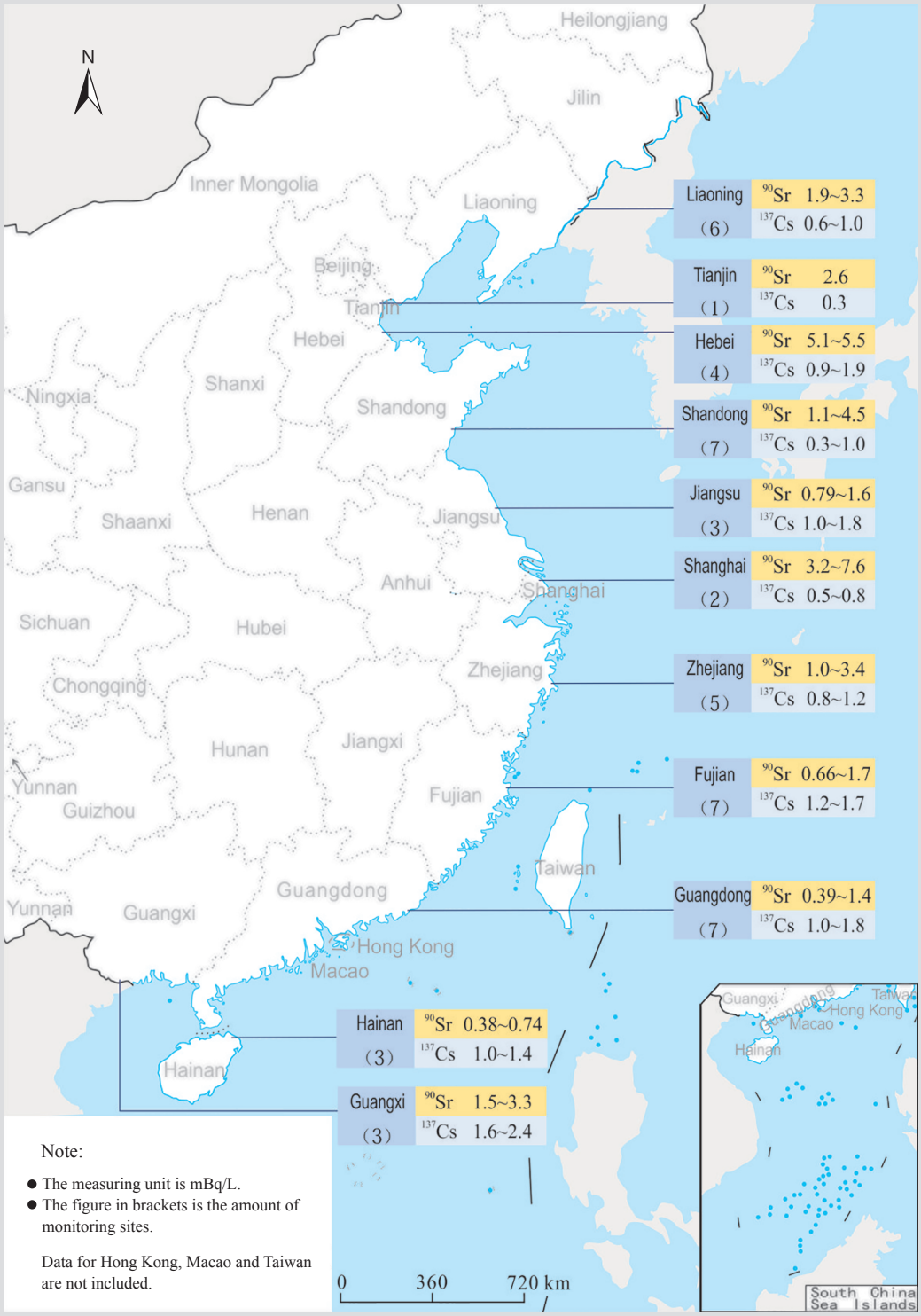
Radiation Environment

Ionizing radiation

The environmental ionizing radiation level in China remained within the fluctuation range of natural background level in 2019. The real-time continuous air absorbed γ radiation dose rate and accumulated dose rate 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 abnormal situation of artificial radionuclide activity concentrations in the air. The activity concentration of natural radionuclides of the Yangtze River, Yellow River, Pearl River, Songhua River, Huaihe River, Haihe River, Liaohe River, rivers in Zhejiang and Fujian, rivers in Northwest China, rivers in Southwest China and major lakes (reservoirs) remained at the baseline level, and there was no abnormal situation of the activity concentration of artificial radionuclides. 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 radionuclides of nearshore marine water and organisms was at the baseline level. There was no abnormal situation of the activity concentration of artificial radionuclides. In specific, the activity concentration of artificial radionuclides of marine water 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 there was no abnormal situation of the activity concentration of artificial.



Map of the real–time consecutive air absorbed γ radiation dose rate monitored at radiation environment automatic monitoring stations in China in 2019



Map of the activity concentration of Sr–90 and Cs–137 of nearshore water in China in 2019

Environment ionizing radiation in the vicinity of in-service nuclear power plants In 2019, no abnormal real-time consecutive air absorbed γ radiation dose rate caused by operational nuclear power plants had been monitored in the surrounding areas of in-service nuclear power bases. There was no abnormal activity concentration of radionuclides in air, water, soil and organisms in the vicinity of Hongyanhe Nuclear Power Base, Sanmen Nuclear Power Base, Fuqing Nuclear Power Base, Haiyang Nuclear Power Base, Yangjiang Nuclear Power Base and Changjiang Nuclear Power Base. There was certain degree of rise of activity concentration of tritium in some environmental media in the vicinity of Tianwan Nuclear Power Base, Qinshan Nuclear Power Base, Ningde Nuclear Power Base, Dayawan Nuclear Power Base, Taishan Nuclear Power Base and Fangchenggang Nuclear Power Base compared with the background value before the operation of those nuclear power plants. The assessment findings showed that the radiation dose of the above-mentioned nuclear power bases to the public was far below the national limit.

Environment ionizing radiation in the vicinity of civil research reactors In 2019, there was no detected abnormal situation of air absorbed γ radiation dose rate and activity concentration of radionuclides in aerosol, sediments, water and soil in the vicinity of research facilities such as Institute of Nuclear and New Energy Technology of Tsinghua University and miniature neutron source reactor in Shenzhen University. There was some rise of activity concentration of Sr-90 and cobalt-60 in the vicinity of the production and research areas of China Institute of Atomic Energy Science and Nuclear Power Institute of China. The assessment findings showed that the radiation dose of the above-mentioned civil research reactors and production and research areas to the public was far below relevant national limit.

Environment ionizing radiation in the vicinity of nuclear fuel cycle facilities and waste disposal facilities In 2019, the γ radiation air absorbed dose rate of vicinity environment of CNNC Lanzhou Uranium Enrichment Co. Ltd., CNNC Shaanxi Uranium Enrichment Co. Ltd., CNNC North China Nuclear Fuel Element Co. Ltd., CNNC Jianzhong Nuclear Fuel Element Co. Ltd., CNNC 272 Uranium Limited Liability Company and CNNC 404 Co. Ltd., and Northwest Disposal Site for Low and Medium Level Radioactive Waste and Beilong Disposal Site for Low and Medium Level Radioactive Waste was within the fluctuation range of natural baseline value. There was no detected abnormal activity concentration of radionuclides in environmental media in relation to the activities of the above enterprises.

Environment ionizing radiation in the vicinity of uranium mines and metallurgical plants In 2019, the overall radiation environment quality in the vicinity of uranium mines and smelting facilities was stable. The air absorbed γ radiation dose rate in ambient environment, radon activity concentration in air, total uranium and gross α activity concentration of aerosol, total uranium and Ra-226 concentrations in surface water and in soil were within the historical fluctuation range. The total uranium, Pb-210, polonium-210 and Ra-226 concentrations in the drinking water of surrounding environment were lower than relevant limits specified in the *Regulations for Radiation and Environmental Protection in Uranium Mining and Milling (GB 23727-2009)*.

Electromagnetic radiation

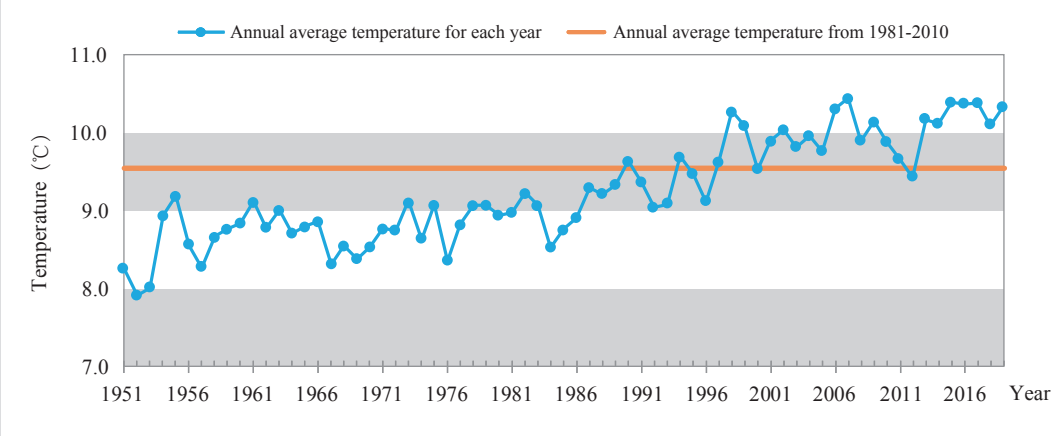
In 2019, the environment electromagnetic radiation level of state monitoring sites in 31 provinces (autonomous regions and municipalities), and that of radio and television signal emitting facilities, power transmission and transformation facilities and antenna of mobile communication base stations were 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 2019, the national average air temperature was 10.34°C, 0.79°C higher than the historical average and 0.25°C higher than that of 2018, being the fifth warm year since 1951. The temperature in each month of the year was higher than historical average, of which the temperature in April was 1.8°C higher, marking the second highest compared with the same period in historical records.

The average temperature in the six major regions of the country was higher than the historical average. Among them, the temperature in Northeast China was 1.1°C higher, the second highest in historical records; that in South China was 0.7°C higher, the third highest in historical records. Except for the slightly lower temperature in some places like Guizhou, Chongqing and Xinjiang, the temperature of other parts was higher than the historical average, among which the temperatures were 1~2°C higher in most of Northeast China, southeastern part of North China, most of Huanghuai, eastern Inner Mongolia, northeast of Xinjiang, eastern part of Yunnan, southern part of Sichuan and Hainan.



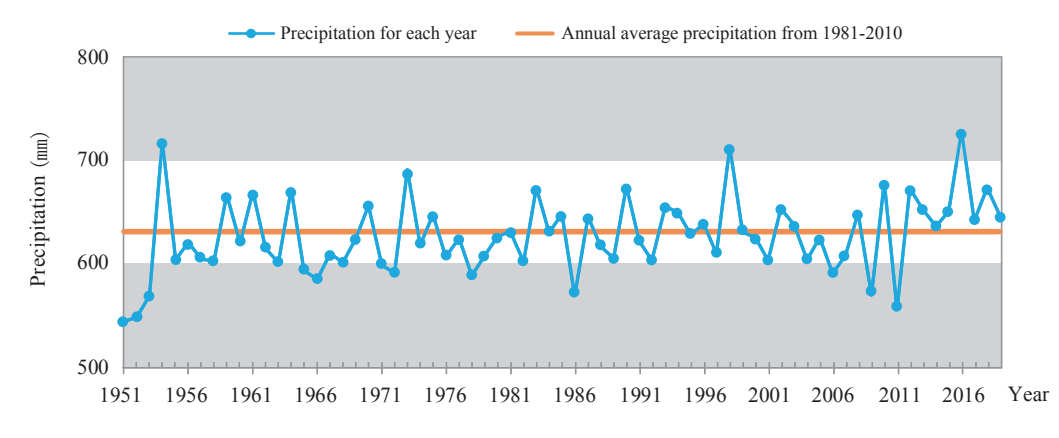
Annual change of national average air temperature from 1951–2019

Precipitation The national average precipitation was 645.5 mm in 2019, up by 2.5% compared with the historical average and down by 4.2% compared with that of 2018, being the eighth consecutive rainy year since 2012. The precipitation was higher than the historical average during January to April, July to August, October and December. In specific, the precipitation in February was 32% more than the historical average; the precipitation in September and November was less than the historical average, with November 28% less than average; while the precipitation in May and June was close to the same period of the historical average.

The annual precipitation in Yangjiang of Guangdong province (3,055.2 mm) and Dongxing of Guangxi province (2,984.7 mm) were the highest and second-highest in the

country, while Turpan of Xinjiang autonomous region (1.9 mm) and Toksun of Xinjiang autonomous region (3.3 mm) were the lowest and second lowest in the country.

Compared with average year, the precipitation in North China was higher, and that in South China was similar to or less than the historical average. Among them, the precipitation in the central and northern part of Northeast China, the central and eastern part of Northwest China, the western part of Inner Mongolia, the southwestern part of Xinjiang, the western part of Tibet, the northern part of Sichuan and the eastern part of Zhejiang was 20% to 50% more than historical average; that of northeast Heilongjiang, western Gansu, western Inner Mongolia, northern Qinghai was 50% to 100% more than historical average; that of the central and western Huanghuai, the majority of Jianghuai, the majority of Jianghan, the central and southern Yunnan and the eastern part of Xinjiang was 20%~50% less than historical average; the precipitation in most other parts of the country was close to the historical average.



Annual change of national average precipitation from 1951–2019

Distribution of precipitation in China in 2019

Precipitation (mm)	Distribution areas
>2,000	Parts of Northeastern Guangxi, Southern Guangdong, Northern Fujian
1,200～2,000	Most parts of the region south of the Yangtze River, South China, northeastern Sichuan, northwestern Chongqing, southern Guizhou, western Yunnan
400～1,200	Northeast China, most parts of North China, southeastern part of Northwest China, Huanghuai, Jianghuai, Jianghan, north of the Yangtze River, most parts of the central and eastern Southwest China, northeastern Inner Mongolia
100～400	Most parts of Inner Mongolia, central and northern Ningxia, central and western Gansu, central Qinghai, central and western Tibet, northern Xinjiang
<100	Central and southern Xinjiang, northwestern Qinghai

Sea level The sea level in China's coastal areas has been going upward with fluctuations. In 2019, China's coastal sea level was 72 mm higher than the historical average, marking the third highest since 1980. The sea level in the past 10 years had been at a high level in the past four decades. From 1980 to 2019, the sea level rising rate in China's coastal areas stood at 3.4 mm/year.

Carbon intensity Based on preliminary calculations, the CO_2 emissions per unit GDP in 2019 has decreased by 4.1% compared with that of 2018, completing the set annual target.

Greenhouse gas In 2018*, the average concentrations of CO_2, CH_4 and N_2O in Qinghai Waliguan Station were 409.4±0.3 ppm, 1,923±2 ppb and 331.4±0.1 ppb respectively. The annual average absolute increments over the past 10 years were 2.32 ppm, 7.7 ppb, and 0.94 ppb respectively.

Natural disaster

Meteorological disaster In 2019, China in general suffered lighter meteorological disasters than historical average.

In 2019, heavy rains and flood disasters were generally lighter than the historical average. A total of 43 heavy rains occurred throughout the country, 4 more than the historical average (39 times), and there was no large-scale heavy rain and flood disaster in any of the river basins.

In 2019, drought across the country was lighter than that of historical average, but regional and periodic droughts were evident. North China, Huanghuai and Jianghuai suffered periodic droughts in spring, Yunnan was hit by continuous droughts from spring to summer, and the middle and lower reaches of the Yangtze River stricken by serious and continuous droughts from mid-summer to autumn.

There were several typhoons in 2019, but the landing typhoon was generally weak. Only the Typhoon "Lekima" caused heavy losses. There were 29 typhoons in the northwestern Pacific Ocean and South China Sea, 3.5 more than the historical average. Among them, 5 landed in China, 2.2 less than historical average. Typhoon "Lekima" was the strongest typhoon landed in China in 2019.

There were less strong convective weather in 2019 and therefore caused less losses. A total of 37 severe convective weather had occurred throughout the country, less than the average of the past 5 years. The strong convective weather mainly occurred during April to August, accounting for more than 80% of the total number of the year.

In 2019, there were more days recorded with high temperature, with strong regional characteristics. There were 10.0 days with national average high temperature (daily maximum temperature ⩾ 35°C), 3.1 days more than the same period of the historical average. The number of days with high temperature in Huanghuai, Jianghuai, Jianghan, regions south of the Yangtze River, South China, eastern Southwest China, Xinjiang and other places stood between 15 to 30, part of which even exceeding 30.

In 2019, the low temperature damages and snow disasters were lighter than the historical average. At the beginning of 2019, there were frequent snowfalls in Yushu Prefecture and Guoluo Prefecture of Qinghai province. Yushu Prefecture experienced 12 heavy snowfalls in a row. Both the volume of snowfall and the number of heavy snowfall days reached the highest compared to the same period in history. In mid-February, North China experienced the largest snowfall in winter, and nearly 1/7 of the country's land area experienced snowfall.

In the spring of 2019, there was a few sand and dust weather in northern China with relatively lighter impact. There was a total of 10 occurrence of sand and dust weather in northern China, 7 less than that of the same period of previous years (17 times). The average number of dusty days in northern China was 3.2 days, 1.8 days less than the same period of previous years. The first sand and dust weather in 2019 took place on March 19th, 31 days later than the 2000-2018 average (February 16th) and 39 days later than 2018 (February 8th).

Earthquake disaster In 2019, there were 32 earthquakes at or above 5.0 Richter Scale (20 happened in Mainland China, and 12 happened in Taiwan and in the Straits). The strongest earthquake at 6.7 Richter Scale occurred on April 18th in the sea areas close to Hualien County of Taiwan province. 13 earthquake disasters happened in Mainland China, mainly in Sichuan, Jilin, Hubei, Guangxi, Gansu, Tibet and Guizhou provinces.

Geological disaster In 2019, 6,181 geological disasters had happened across the country, among which 25 were super-large geological disasters, 37 large ones, 262 mid-sized ones and 5,857 small ones.

Marine disaster In 2019, marine disasters were dominated by storm surges, waves and red tides. Altogether 11 storm surges occurred in 2019, 5 of which led to disasters; 39 disastrous waves took place with an effective wave height of

*Up to the time this Report was published, the monitoring results of the greenhouse gas in 2018 were the latest data.

4.0 meters or higher; and 38 red tides occurred in total.

Forest disaster In 2019, a total of 12.3677 million hectares of forests were affected by forestry pests, up by 1.93% compared with that of 2018, among which 8.1146 million hectares forests were affected by insect pest hazards, down by 2.73% compared with that of 2018; 2.2954 million hectares forests were affected by forest disease, up by 29.74%; 1.7803 million hectares forests were affected by forest rat and rabbit hazards, down by 3.02%; 177,400 hectares forest were affected by hazardous plants, leveling off that of 2018.

In 2019, a total of 2,345 cases of forest fire took place across the country, and there were 8 big forest fires and 1 especially big forest fire, damaging the forest area of 13,505 hectares.

Grassland disaster A total of 47.87 million hectares of grassland across the country had been affected by grassland rat and insect pest hazards. In specific, a total of 37.49 million hectares of grassland across the country had been affected by grassland rat hazards, and 10.38 million hectares had been affected by grassland insect pest hazards.

In 2019, 45 cases of grassland fires took place across the country, and there were 1 big forest fire and 2 especially big forest fires (all caused by fires originating from the outside of the national borders), damaging 66,705 hectares of grassland. No casualties were caused.

Infrastructure and Energy

Infrastructure

Industrial waste gas In 2018*, out of the 112,559 gas-related enterprises surveyed by the National Environmental Statistics, 88,585 enterprises had installed waste gas treatment facilities. There were 368,999 sets of waste gas treatment facilities installed nationwide, an increase of 6.9% compared with that of 2017. In specific, there were 41,746 sets of desulfurization facilities with an average desulfurization efficiency of 95.3%; 21,816 sets of denitrification facilities with an average denitration efficiency of 79.1%; 130,019 sets of dust removal facilities with an average dedusting efficiency of 99.5%.

Industrial wastewater In 2018**, out of the 71,323 water-related enterprises surveyed by the National Environmental Statistics, 59,708 enterprises had installed wastewater treatment facilities. There were 72,952 sets of wastewater treatment facilities installed nationwide, an increase of 3.7% compared with that of 2017. The capacity of wastewater treatment facilities was 223.7 million ton/day.

Sewage By the end of 2019, the urban sewage treatment capacity across the country reached 177 million m^3/day, and the accumulative sewage treatment volume reached 53.2 billion m^3. There were 2,899 black and odorous water bodies found in cities at prefecture-level and above nationwide, 2,513 of which were treated, with a treatment rate of 86.7%.

Solid Waste By the end of 2019, the decontamination capacity of urban solid waste across the country was 870,800 ton/day, and the decontamination rate reached 99.2%. 24,000 informal and unauthorized solid waste dumping sites were identified nationwide, with 90% of which treated.

Energy

Based on preliminary accounting, the total consumption of primary energy*** across the country in 2019 was 4.86 billion tons coal equivalent, up by 3.3% compared with that of 2018. Among them, coal consumption went up by 1.0%, crude oil up by 6.8%, natural gas up by 8.6%, and electricity up by 4.5%****. Coal consumption took up 57.7% of total energy consumption, down by 1.5 percentage points compared with that of 2018. The consumption of clean energy such as natural gas, hydropower, nuclear power and wind power took up 23.4% of the total energy consumption volume, up by 1.3 percentage points compared with that of 2018. The energy consumption per 10,000 yuan GDP***** went down by 2.6% compared with that of 2018.

*Up to the time this Report was published, the indicators in relation to industrial waste gas in 2018 were preliminary data.

**Up to the time this Report was published, the indicators in relation to industrial wastewater in 2018 were preliminary data.

***According to the results of the 4th National Economic Census, historical data on relevant indicators such as total consumption of primary energy had been revised.

****Data source is from China Electricity Council.

*****The energy consumption per 10,000 yuan GDP is calculated at the 2015 price, and the historical data had been revised according to the results of the 4th National Economic Census.

The output and growth rate of major energy products in 2019

Product name	Unit	Output	Increase from 2018 (%)
Total output of primary energy	100 million t coal equivalent	39.7	5.1
Raw coal	100 million t	38.5	4.0
Crude oil	million t	19,101.4	0.9
Natural gas	100 million m^3	1,761.7	10.0
Power generation	100 million kW·h	75,034.3	4.7
Thermal	100 million kW·h	52,201.5	2.4
Hydro	100 million kW·h	13,044.4	5.9
Nuclear power	100 million kW·h	3,483.5	18.3

Data Sources and Explanations for Assessment

The data in the current report is mainly from the monitoring data of Environmental Monitoring Network of Ministry of Ecology and Environment, and supplemented by environment data provided by relevant ministries and commissions.

As of 2019, Environmental Monitoring Network of Ministry of Ecology and Environment includes 1,436 monitoring sites on national ambient air quality covering 337 APL cities; around 1,000 precipitation monitoring sites in 469 cities (districts and counties) (including 337 APL cities and some county-level cities); the assessment, examination and ranking of 1,931 water sections (sites) covering 978 rivers and 112 lakes (reservoirs); 902 centralized drinking water source monitoring sections (sites) in 336 APL cities; 1,434 national environmental monitoring sites for seawater environmental quality; 448 pollution sources directly discharged into the sea with a daily discharge volume of more than 100 m^3; 2,583 ecological and environmental quality monitoring counties in 31 provinces (autonomous regions and municipalities); around 80,000 urban acoustic environment monitoring sites in 337 APL cities; 1,416 environmental ionizing radiation monitoring sites in 337 APL cities and 44 environmental electromagnetic radiation monitoring sites in 31 municipalities and provincial capital cities.

The information about water quality of 10,168 state-level groundwater monitoring sites, total area of permanent basic farmland, sea level, geological disasters and marine disasters is provided by Ministry of Natural Resources. The data on sewage treatment and solid waste disposal are provided by Ministry of Housing and Urban-Rural Development. The data on water quality of 2,830 shallow groundwater monitoring wells, water and soil erosion, part of meteorological disasters are provided by Ministry of Water Resources. The data on the inland fishery water quality, marine fishery water quality, agricultural non-point sources and the quality of cultivated land are provided by Ministry of Agriculture and Rural Affairs. The data on part of the meteorological disasters, earthquake disasters, geological disasters, forest fires and grassland fires are provided by Ministry of Emergency Management. The data on energy are provided by National Bureau of Statistics. Most data on the temperature, precipitation, greenhouse gases and meteorological disasters are provided by China Meteorological Administration. And the data on desertification and sandification, nature protected areas, forest status, grassland status, forest biological disasters and grassland biological disasters are provided by National Forestry and Grassland Administration.

In the current Report, the assessment of urban ambient air quality is based on the *Ambient Air Quality Standard (GB 3095-2012)*, *Technical Specifications for Environmental Air Quality Assessment (Trial) (HJ 663-2013)* and *the Supplementary Provisions on Urban Air Quality Assessment Affected by Sandstorm Weather Process* and *Letter on Issues Related to Excluding the Impact of Sandy and Dusty Weather Process* with assessment indicators including SO_2, NO_2, PM_{10}, $PM_{2.5}$, CO and O_3. The assessment of surface water quality is based on *Environmental Quality Standards for Surface Water (GB 3838-2002)* and the *Measures on assessment of Surface Water Quality (Trial)* with 21 assessment indicators of pH, dissolved oxygen, permanganate index, COD, BOD_5, ammonia nitrogen, TP, copper, zinc, cyanide, selenium, arsenic, mercury, cadmium, hexavalent chromium, Pb, cyanide, volatile phenol, petroleum, anionic surfactant and sulfide. The indicators assessing trophic status of lakes (reservoirs) include chlorophyll-a, TP, TN, transparency and permanganate index. The assessment of water quality of centralized drinking water source areas of cities at or above prefecture level is based on *Environmental Quality Standards for Surface Water (GB 3838-2002)* and *Quality Standard for Groundwater (GB/T 14848-2017)*. The assessment of the quality of groundwater is based on *Quality Standard for Groundwater (GB/T 14848-2017)* and the assessment indicators are 37 conventional indicators except the total coliforms and total bacteria specified in Table 1 of the *Quality Standard for Groundwater (GB/T 14848-2017)*. The seawater quality assessment of the sea under jurisdiction is based on the *Technical Regulations for Seawater Quality Assessment (Trial)* and the *Sea Water Quality Standard (GB 3097-1997)* and the assessment indicators are inorganic nitrogen (nitrite-nitrogen, nitrate-nitrogen and ammonia nitrogen), active phosphate, petroleum, COD and pH; The assessment of the quality of offshore marine waters is based on *Sea Water Quality Standard (GB 3097-1997)* and *Specification for Sea Water Quality Assessment (Trial)* with 10 assessment indicators of pH, dissolved oxygen, COD, inorganic nitrogen, active phosphate, petroleum, copper, mercury, lead and cadmium. The assessment of eco-environment quality is based on *Technical Criterion for Ecosystem Status Evaluation (HJ 192-2015)*. The assessment of acoustic environment is 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 is based on *Basic Standards for Protection of Ionizing Radiation and Radiation Sources (GB 18871-2002)*, *Electromagnetic Environment Control Limits (GB 8702-2014)*, and *Standards for Drinking Water Quality (GB 5749-2006)* and *Sea Water Quality Standard (GB 3097-1997)*. The rounding off for data is based on the *Rules of Rounding off for Numerical Value and Expression and Judgment of Limiting Values (GB/T 8170-2008)*.

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

Contributors to the 2019 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