2017

# Report on the State of the Ecology and Environment in China

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

***The 2017 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.***

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the People's Republic of China

May 22, 2018

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## Summary

The year 2017 is a milestone in the development of the Communist Party of China (CPC) and the People's Republic of China. It is also an important year for the full implementation of the National 13th Five-Year Plan for Eco-environmental Protection. Under the strong leadership of the CPC Central Committee with Comrade Xi Jinping as the core and the guidance of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, especially the thought on ecological civilization, all regions and departments earnestly implemented the decisions and arrangements of the CPC Central Committee and the State Council. With improving environmental quality as the core and accelerating key measures for the development of ecological civilization as the breakthrough point, we have steadily promoted environmental protection in all aspects and made substantial progress.

First, we have continued taking actions in air, water and soil pollution prevention and control. The Battle in Defense of Blue Skies has achieved remarkable results. The average concentration of $PM_{10}$ in 338 cities at and above prefecture-level (APL cities) was 22.7%, lower than that of 2013. The average $PM_{2.5}$ concentrations in the Beijing-Tianjin-Hebei Region, Yangtze River Delta, and Pearl River Delta were 39.6%, 34.3% and 27.7% respectively, lower than those of 2013. The average concentration of $PM_{2.5}$ in Beijing dropped from 89.5 μg/$m^3$ (2013) to 58 μg/$m^3$. Air pollution improvement objectives and key tasks set in the *Action Plan for Prevention and Control of Air Pollution* were fulfilled. We have phased out small coal-fired boilers in urban built-up areas in almost all APL cities, and cumulatively phased out in urban built-up areas more than 200,000 coal-fired boilers with the capacity of less than 10 T/h. The coal-fired units of 700 million KW have undergone technical reform for ultra-low emission in coal-fired power plants. The China V emission standard and petroleum products standard of motor vehicle were implemented nationwide; the phase-out of yellow-labeled vehicles was basically completed; more than 1.8 million new energy vehicles have been put into use; and the plan of setting up ship and vessel emission control areas has been carried forward. We have launched the project of heavy atmospheric pollution cause analysis and control, and conducted comprehensive management of atmospheric pollution in autumn and winter in Beijing-Tianjin-Hebei Region and the surrounding areas. A total of 62,000 dispersed, disordered and dirty gas-related enterprises were sort out and rectified; and the annual tasks of replacing coal with gas and electricity were completed, cutting the consumption of coal by approximately 10 million tons. We have implemented the preferable pricing for clean heating policy and launched the first round of winter clean heating pilot projects in 12 cities in northern China. The off-peak production in the heating season were implemented in industrial enterprises; and coal transportation to and from all coal ports in Tianjin, Hebei, Shandong around the Bohai Sea Region

were changed to railway transportation. We have stepped up efforts in water pollution control. The proportion of surface water sections with excellent and good water quality has been continuously increasing across the country, with the quality of water bodies reaching Grade I, Grade II and Grade III standards accounting for 67.9%, and that inferior to Grade V dropping to 8.3%. The water quality of mainstream of major rivers has been steadily improved. The government has fully implemented *the Action Plan for Prevention and Control of Water Pollution*. 97.7% of APL cities have established signs of conservation zones for centralized drinking water sources; 93% of industrial agglomeration areas at and above provincial level have built concentrated sewage treatment facilities with newly added capacity of up to 10 million $m^3$/day; and 36 major urban built-up areas have basically eliminated black and odorous water bodies. We continued to carry out special actions of environmental protection law enforcement for drinking water sources in APL cities along the Yangtze River Economic Belt, and all 490 environmental problems identified in this process were addressed and rectified. The government has basically completed the national groundwater monitoring project. The monitoring of drinking water quality has covered all APL cities and 85% counties and towns across the country. A total of 28,000 villages have finished the task of environment-friendly renovation. Transformation of animal waste into resources has been achieved in 96 major livestock breeding counties. The use of pesticides has achieved negative growth for three consecutive years, and the use of chemical fertilizers achieved zero growth three years ahead of the target. The government has intensified water-saving management, and has launched the action to control both gross volume and intensity of water consumption. We have strengthened the prevention and control of pollution caused by ship and vessel at ports and wharfs. We have carried out investigations on the distribution of land-based pollution sources in the country, and thoroughly rectified illegal or unreasonable sewage outlets. The government has stepped up efforts in soil pollution prevention and control. The legislation of the *Soil Pollution Prevention and Control Law* has been carried out, and the draft has been submitted to the Standing Committee of the National People's Congress for the second review. *Measures for the Administration of Soil Environment for Agricultural Land (Trial)* was printed out and distributed. We have carried out comprehensive investigations on soil pollution. Special inspections have been conducted on the redevelopment and utilization of land once occupied by key industries and enterprise that had been relocated and closed down, and we have deployed and applied the national soil environmental management information system for polluted land. 106 major grain-and-oil-producing counties have formulated soil environmental protection work plan. Provinces like Jiangsu, Henan and Hunan have started pilot projects for classification of soil quality for arable land. We have fully completed the demarcation of permanent basic farmland. "Foreign waste and garbage" will be entirely banned from entering the country. We have issued the *Reform and Implementation Plan to Enhance Solid Waste Import Management System by Prohibiting the Entry of Foreign Waste* and publicized *the Catalogue for the Administration of the Import of Solid Waste* (2017). A special action was conducted to crack down environmental-law-violating activities by industries processing and utilizing imported wastes, and special rectification actions were taken for solid waste collection and distribution sites. The import volume of solid wastes has decreased by 9.2% year-on-year, among which, the import volume of restricted solid wastes decreased by 12%. The harmless treatment capacity of urban municipal solid waste (MSW) reached 638,000 tons/day, with a treatment rate of 97.14%; and the proportion of administrative villages with rural MSW disposal reached 74%. More than 27,000 unregulated waste dumps were identified.

Second, we strived to promote green development. We improved the planning system and supporting policies for the main functional areas, with a long-term monitoring and early-warning mechanism for the carrying capacity of resources and the environment, and the negative list system for industrial access to key ecological function areas. We have completed the strategic environmental impact assessment (EIA) in Beijing-Tianjin-Hebei region, the Yangtze River delta and the Pearl River delta, and launched pilot projects on "Three Lines and One List" (ecological protection red lines, environmental quality bottom lines, resource utilization upper limits, and environmental access negative list) in four cities including Lianyungang, and *the Technical Guide of the Preparation of "Three Lines and One List" (Trial)* was printed out and distributed. We have signed a strategic cooperation agreement with the People's Government of Hebei Province to promote the ecological and environmental protection work in Xiong'an New Area, for comprehensive environmental improvement in Xiong'an New Area. *The Ecological and Environmental Conservation Plan in the Yangtze River Economic Belt* was compiled and issued, to put the concept of "joint protection, no large-scale development" into practice. Information of EIA approval has been submitted and released in real time across the country. 185,000 EIA approvals were completed, involving a total investment of 28.24 trillion Yuan, of which environmental protection investment amounted to 800.7 billion Yuan. 787,500 registration forms were filed, accounting for about 81% of the total number of construction projects. We have accelerated the development of environmental protection equipment manufacturing industry and issued *the Catalogue of Major Environmental Protection Technology and Equipment Encouraged by the State (2017 Edition)*. In an active response to climate change, the government smoothly launched the national carbon emissions trading system, and coordinately promoted low-carbon development pilot demonstrations. The national carbon dioxide emissions per 10 thousand Yuan of GDP (hereinafter referred to as carbon intensity) decreased by 5.1% year-on-year, exceeding the annual target of 4%. We have carried out assessment and checkup of the target set for greenhouse gas emissions control conducted by provincial people's governments. The national ratio of carbon intensity decrease was included in the statistical bulletin on national economic and social development for the first time. The incorporation of the ratio of carbon intensity decrease into the green development evaluation index in each province, autonomous region and municipality further strengthened the responsibility on local governments to control greenhouse gas emissions. We have established and improved responsibility evaluation and assessment system for the control of total energy consumption and the control of energy intensity, and advocated the model activities of energy and water efficiency pacemaker. With the acceleration of clean and low-carbon energy development, the share of clean energy such as natural gas and hydropower rose by 1.3 percentage points.

Third, we have reinforced environmental supervision and law enforcement. Based on the Hebei Central Environmental Protection Inspection Pilot Project and the first and second rounds of inspections, the third and fourth rounds of 15 provincial inspections were completed in 2017, realizing the full coverage for the first round of central environmental protection inspection. During the inspections, more than 18,000 officials were held accountable and a total of 135,000 cases of complaint were received, addressing more than 80,000 environmental problems affecting people's living conditions. We have organized special inspections on ecological and environmental issues in the Qilianshan National Nature Reserve in Gansu Province. We issued supervision reports, and held 11 officials accountable, including three officials directly managed by the CPC Central Committee. Environmental protection supervision on government has also been strengthened. We held talks with government departments and institutions in 30 cities (counties and districts) in 2017, and suspended regional approvals for cities such as Linfen in Shanxi Province. The atmospheric environmental issues in Langfang, Hebei province were highlighted as a priority and strictly requested to be solved within the time limit. For typical cases of ineffective supervision and improvement of Nantong, Jiangsu Province and severe atmospheric pollution in Heilongjiang Province, we have conducted mobile and point-specific special inspections. We continued to carry out annual activities for the implementation of the Environmental Protection Law. Administrative punishment were carried out for 233,000 cases across the country with a total fine of 11.58 billion Yuan, an increase of 265% than that of 2014, the year before the implementation of the new environmental protection law. 679 monitoring points were installed at 278 domestic garbage incineration plants across the country, and all tasks of "installing, putting up, and networking" (installing automatic monitoring equipment according to law, putting up the electronic display at the entrance of the factory, and networking the real-time monitoring data with environmental protection departments) were completed. We dealt with environmental risks properly, having responded to 302 environmental emergencies, including 1 major incident (thallium pollution in the Guangyuan section of the Jialing River in Sichuan Province caused by the discharge of Hanzhong Zinc & Copper Mine in Ningqiang County, Shaanxi Province), 6 relatively big incidents and 295 general incidents. A total of 618,856 public complaints were received by the "12369" environmental reporting management platform across the country, and 618,583 cases have been properly addressed, concluding 99.9% of the total. We have implemented strict nuclear and radiation safety supervision. We launched the activity of "Year for the Improvement of Nuclear Power Safety Management" and special actions for radioactive source safety inspections, and successfully completed the task of tackling radiation environment safety risk in the northeastern border regions.

Fourth, we have deepened and implemented measures on ecological environmental protection reform. The Central Leading Group for Comprehensively Deepening Reforms has discussed and approved the pilot program for setting up environmental monitoring and administrative law enforcement agencies by river basins and setting up cross-regional environmental protection agencies. The General Office of the CPC Central Committee and that of the State Council issued *the Reform Plan for Environmental Damage Compensation System* and *the Opinions on Identifying and Observing Red Lines of Ecological Conservation,* etc. 9 provinces and municipalities including Jiangsu, Shandong, Hubei, Qinghai, Shanghai, Fujian, Jiangxi, Tianjin, and Shaanxi have newly added records for the implementation plan of the vertical management system for environmental protection agencies under provincial level. The government has promulgated *the Administrative Measures on Discharge Permit (Trial)* and the *Classified Management Catalogue for Discharge Permit of Stationary Sources* (2017 Edition). We have built up the management information platform of discharge permit, and basically completed the issuance of relevant permits for 15 industries including thermal power and papermaking. The General Office of the CPC Central Committee and that of the State Council issued the *Opinions on Deepening the Reform of Environmental Monitoring and Improving the Quality of Environmental Monitoring Data*, explicitly requesting that interference to environmental monitoring activities should be thoroughly investigated and dealt with. The authority of 2,050 surface water monitoring sections under national monitoring program has been taken back, responsibility of data monitoring and responsibility of data collecting and have been separated, and the monitoring data was shared throughout the country. Plans for the delineation of ecological protection red lines in 15 provinces, autonomous regions and municipalities including Beijing-Tianjin-Hebei region, Yangtze River Economic Belt and Ningxia Hui Autonomous Region have been approved by the State Council. The constructions of National Ecological Civilization Experimental Zone in Fujian Province, Jiangxi Province, and Guizhou Province were carried out smoothly. Pilots of national park systems such as Sanjiangyuan, Northeast Tiger and Northeast Leopard, Giant Panda, and Qilianshan were actively put forward, and *the Overall Plan for Establishing National Park System* was also promulgated.

Fifth, we have steadily promoted ecological protection. Six provinces and autonomous regions have carried out the second batch of pilot projects for the ecological protection and restoration of mountain, water, forest, farmland, lake and grass, and comprehensive management projects in key areas such as Sanjiangyuan, Karst Rocky Desertification Areas, Beijing-Tianjin Sandstorm Source Regions and Qilianshan Mountains in Qinghai have made steady progress. We continued to push forward a new round of key ecological projects such as returning farmland to forests and grasslands and construction of key shelterbelt systems, and completed the afforestation area of 235 million mu. Our efforts in natural forests protection have been intensified, with nearly 200 million mu of natural commercial forests incorporated into natural forest protection policies. We have implemented the thought of Qilianshan Mountain Bulletin by the General Office of the CPC Central Committee and the State Council, and conducted "Green Shield 2017" special action of supervision and inspection on national nature reserves. More than 20,800 clues on violations of laws and regulations were investigated and dealt with, holding more than 1,100 persons accountable. We have launched major projects of biodiversity conservation, establishing more than 440 observation sites of biological diversity, and carrying out field rescue and reproduction actions for rare and endangered wild plants with minimal population. The State Council has approved the construction of 17 national nature reserves, and the total number reached 463. A remote sensing survey and assessment of changes in the national ecological situation (2010-2015) was also conducted. We have suspended the release of the 2017 annual reclamation plan target for the year, and implemented special reclamation inspections on 11 provinces, autonomous regions and municipalities along the coast. Ecological restoration projects like "Blue Bay" and "Ecological Island and Reef" have been steadily put forward. A total of over 70 kilometers of shoreline have been rehabilitated and more than 2,100 ha of coastal wetlands have been repaired.

Sixth, we have consolidated various supporting measures for environmental protection. The central government has allocated 49.7 billion Yuan of its budget for the prevention and control of air, water, and soil pollution. We have completed the revision of laws and regulations such as *the Law on the Prevention and Control of Water Pollution*, *the Law on Nuclear Safety*, *the Regulations* *on the Implementation of Environmental Protection Tax Law*, and *the Environmental Protection Management Regulations for Construction Projects*, and issued four departmental regulations such as the *Measures for the Administration of Soil Environment for Agricultural Land*(*Trial*). The General Office of the State Council has approved and issued the Plan on the Second National Census on Sources of Pollution. We have launched a project on cause analysis and control of heavy atmospheric pollution, and set up a national center for joint prevention and control of air pollution. Key scientific and technological projects have been conducted for the prevention and control of water pollution, the causes of site soil pollution and related control technologies, the restoration and conservation of typical vulnerable ecosystems, etc. The State Environmental Protection Inspectorate Office was established, and six regional supervision centers were converted from public institutions to administrative agencies and renamed as the Supervision Bureau. We have issued 160 national environmental protection standards, 2 guidelines for available technologies for pollution prevention and control, 6 policies for pollution prevention and control technologies, and *the National Catalogue for Advanced Pollution Prevention and Control Technologies*. Documents like *the Cooperation Plan for Eco-environment Protection for the "Belt and Road Initiatives", Guiding Opinions on Promoting the Construction of Green "Belt and Road Initiatives"* and *Plan for Eco-Environmental Protection in the Yangtze River Economic Zone* were also issued. New progress was made in environmental economic policies. We have printed out and distributed *the Catalogue for Corporate Income Tax Discount on Special Equipment for Environmental Protection (2017 Edition)*, and *Comprehensive List on Environmental Protection (2017 Edition)*, and deepened the environmental pollution liability insurance pilot project. In 2017, enterprises insured amounted to over 16,000 times in China, and the amount of risk premium provided by insurance companies reached 30.6 billion Yuan. More than 10 provinces have established environmental protection credit evaluation systems and implemented cross-departmental joint rewards and punishments. We have established a joint supervision mechanism for environmental information disclosure of listed companies. All environmental protection departments in APL cities have registered official Weibo and WeChat accounts.

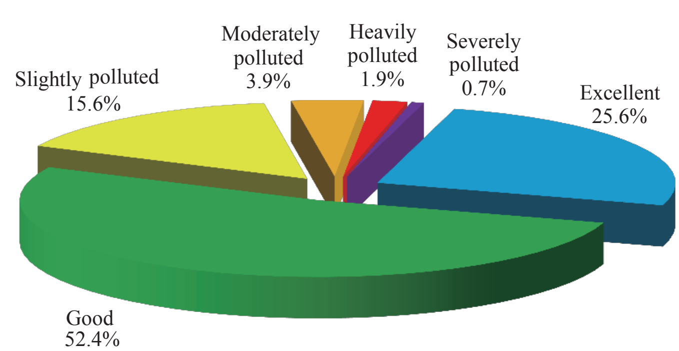
In 2017, China has made great achievements in the following aspects: the quality of atmospheric and water environment has been further improved; the soil environmental risks have been contained; the overall ecosystem has been stable in general; the safety of nuclear and radiation has been effectively guaranteed, and Chinese people have truly felt the positive changes in the quality of the ecological environment.

# Atmospheric Environment

## Air quality

**Cities at or above prefecture level** In 2017, all 338 APL cities* (hereinafter referred to as the 338 cities) across the country conducted environmental monitoring. The monitoring results showed that 99 cities met national air quality standard**, accounting for 29.3% of the total; 239 cities failed to meet national air quality standard, taking up 70.7%.

The average percent of attainment days on air quality*** of the 338 cities was 78.0%, down by 0.8 percentage points compared with that of 2016. The amount of non-attainment days**** took up 22.0%***** in average. The attainment rate was 100% for 5 cities, 80%~100% for 170 cities, 50%~80% for 137 cities, and less than 50% for 26 cities.




Percentage of 338 Cities with Different Air Quality Levels in 2017

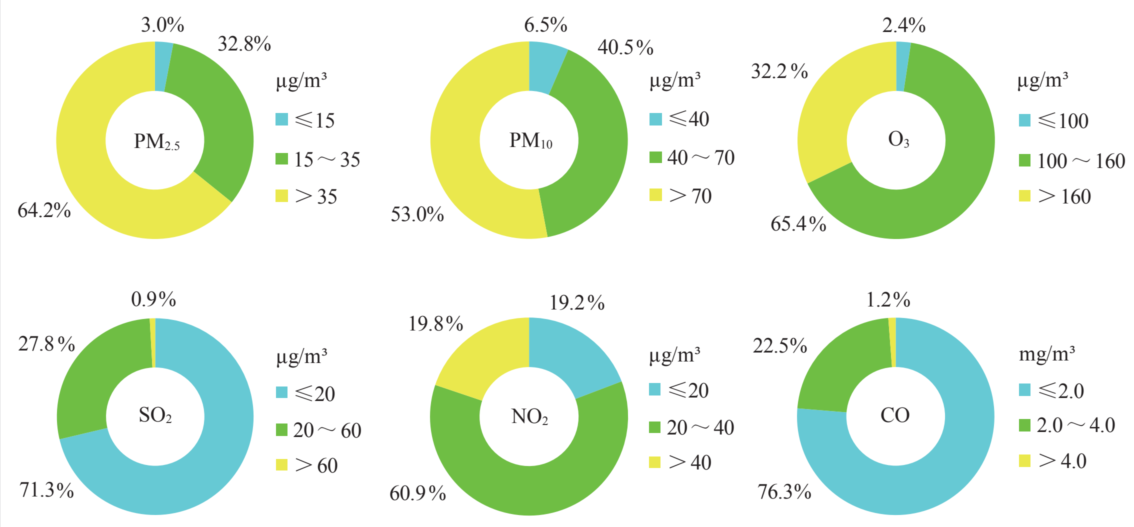
*Cities at or above prefecture level (APL cities): including municipality, cities or regions at prefecture level, autonomous prefectures and league.

**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, $SO_2$, $NO_2$, $PM_{10}$ and $PM_{2.5}$ were evaluated according to the annual average concentration, and CO and $O_3$ were evaluated according to the percentile concentration.

***The amount of attainment days: It refers to the amount of days with AQI at 0~100.

****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 serious pollution.

*****Calculation of the proportion of all categories and grades in this report is based on the number of a certain item 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)*. It may happen that the combined proportion of two or more categories does not equal the sum of the proportions of the various categories, that the sum of the proportions of all categories does not equal 100%, or that the sum of the year-on-year percentage changes does not equal 0.




Percentage of 338 Cities with Different Concentrations of Six Major Pollutants in 2017

In 338 cities, 2,311 days were under heavy pollution and 802 days were under severe pollution. Among them, days with $PM_{2.5}$ as the primary pollutant* took up 74.2%; those with $PM_{10}$ as the primary pollutant took up 20.4%; and those with $O_3$ as the primary pollutant took up 5.9%. There were 48 cities suffering from more than 20 days of heavy or severe pollution, distributed in 12 provinces like Xinjiang, Hebei, and Henan (some cities were influenced by sandstorm).

The range of annual average $PM_{2.5}$ concentration was 10~86 μg/$m^3$ with the average level of 43 μg/$m^3$, down by 6.5% compared with that of 2016. The number of days with daily average concentration failing to meet relevant standard took up 12.4% of the total, down by 1.7 percentage points compared with that of 2016. The range of annual average $PM_{10}$ concentration was 23~154 μg/$m^3$ with the average of 75 μg/$m^3$, down by 5.1% compared with that of 2016. The number of days with daily average concentration failing to meet relevant standard took up 7.1% of the total, down by 2.3 percentage points compared with that of 2016. The range of $90^{th}$ percentile concentration of $O_3$ daily maximum 8-hour average** was 78~218 μg/$m^3$ with the average at 149 μg/$m^3$, up by 8.0% compared with that of 2016. The number of days with daily average failing to meet the standard took up 7.6% of the total, up by 2.4 percentage points compared with that of 2016. The range of annual average $SO_2$ concentration was 2~84 μg/$m^3$ with the average at 18 μg/$m^3$, down by 18.2% compared with that of 2016. The number of days with daily average failing to meet the standard took up 0.3% of the total, down by 0.2 percentage points compared with that of 2016. The range of annual average $NO_2$ concentration was 9~59 μg/$m^3$ with the average at 31 μg/$m^3$, up by 3.3% compared with that of 2016. The number of days with daily average failing to meet the standard took up 1.5% of the total, down by 0.1 percentage point compared with that of 2016. The range of the $95^{th}$ percentile concentration of daily CO average was 0.5~5.1 mg/$m^3$ with the average at 1.7 mg/$m^3$, down by 10.5% compared with that of 2016. The number of days with daily average failing to meet the standard took up 0.3% of the total, down by 0.1 percentage point compared with that of 2016.

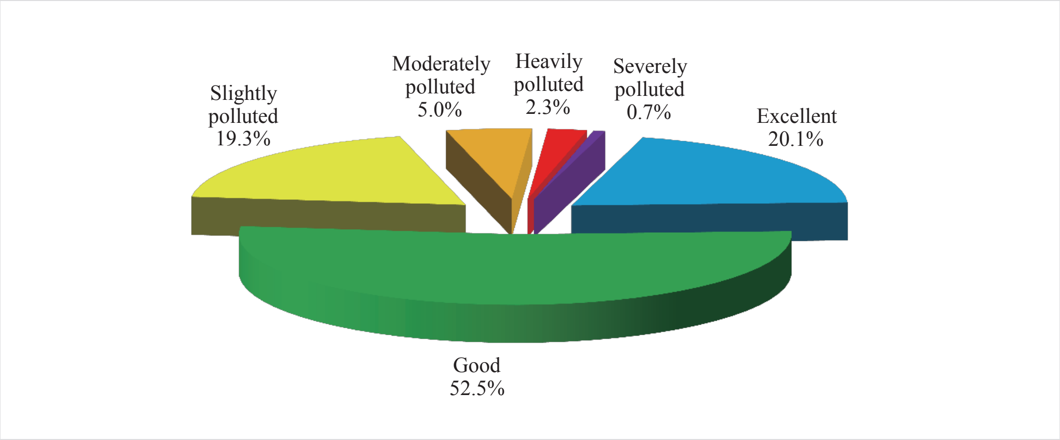
* Primary pollutant: When AQI >50, the pollutant with the biggest individual AQI is the primary pollutant.

**Percentile concentration: Based on the Technical Regulation for Ambient Air Quality Assessment (Trial) (HJ 663-2013), effective daily maximum 8-hour average values of $O_3$ concentrations and 24-hour average values of CO concentration in the calendar year are ranked from low to high respectively. We will compare the $90^{th}$ percentile value with the daily maximum 8-hour average of $O_3$ concentration of national standard date to judge if $O_3$ concentration meets the standard; and the standard 24-hour CO concentration limit is compared to the $95^{th}$ percentile value with the 24-hour average of CO concentration to judge if CO concentration meets the standard. The $O_3$ and CO concentrations in this publication refer to percentile concentrations.

If the impact of dust was not excluded, among the 338 cities, 27.2% cities met national air quality standard while 72.8% cities failed to meet national air quality standard; the average concentrations of $PM_{2.5}$ and $PM_{10}$ were 44 μg/m$^3$ and 80 μg/m$^3$ respectively, down by 6.4% and 2.4% compared with that of 2016.

**Cities under Stage I monitoring based on the newly amended ambient air quality standard** In 2017, the monitoring results of 74 cities under Stage I monitoring based on the newly amended ambient air quality standard (including APL cities in key regions such as Beijing-Tianjin-Hebei, the Yangtze River delta and Pearl River delta, municipalities, provincial capital cities and cities under separate plan of the State Council, hereinafter referred to as the 74 cities) showed that the percentage of days of the 74 cities meeting air quality standard was 72.7%, down by 1.5 percentage points compared with that of 2016. The average number of days failing to meet the standard took up 27.3%. The attainment rate was 80%~100% for 22 cities, 50%~80% for 42 cities and less than 50% for 10 cities. The number of days with $PM_{2.5}$ as the primary pollutant took up 47.0% of the total non-attainment days, the number of days with $O_3$ as the primary pollutant took up 43.1%, the number of days with $PM_{10}$ as the primary pollutant took up 7.8%, the number of days with $NO_2$ as primary pollutant took up 2.4%, and the number of days with $SO_2$ as primary pollutant took up less than 0.1%.

The evaluation results of air quality comprehensive index* showed that the top 10 cities with relatively poor air quality (from No.74 to No. 65) were Shijiazhuang, Handan, Xingtai, Baoding, Tangshan, Taiyuan, Xi'an, Hengshui, Zhengzhou, and Jinan. The top 10 cities with relatively good air quality (from No.1 to No.10) were Haikou, Lhasa, Zhoushan, Xiamen, Fuzhou, Huizhou, Shenzhen, Lishui, Guiyang and Zhuhai.

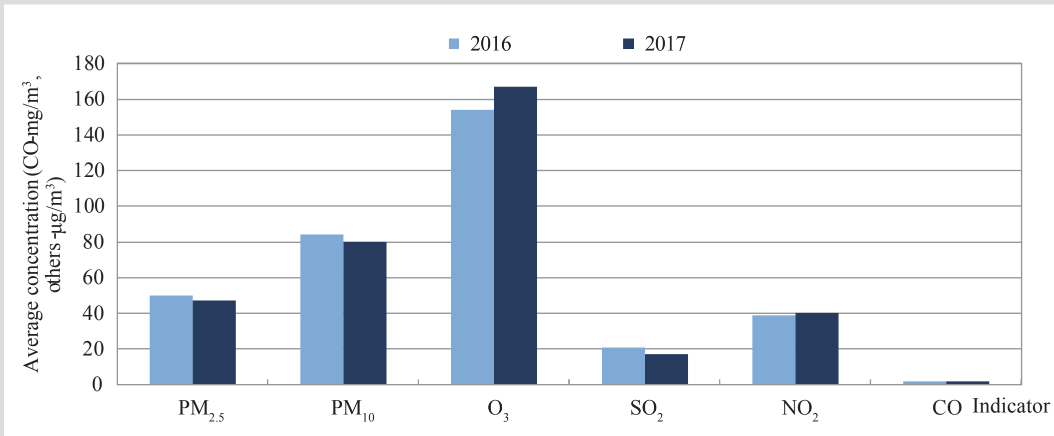



Percentage of Air Quality Levels of 74 Cities in 2017

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

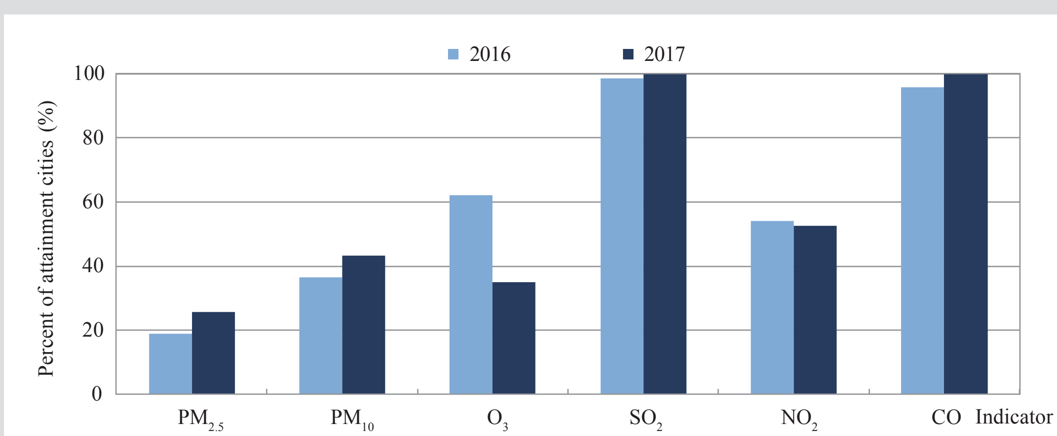
Air Quality Comprehensive Index and Primary Pollutants of 74 Cities in 2017

| No. | City | Comprehensive index | Maximum index | Primary pollutant | No. | City | Comprehensive index | Maximum index | Primary pollutant |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Haikou | 2.49 | 0.79 | $O_3$ | 38 | Hangzhou | 5.02 | 1.29 | $PM_{2.5}$ |
| 2 | Lhasa | 3.13 | 0.80 | $O_3$ | 39 | Chongqing | 5.04 | 1.29 | $PM_{2.5}$ |
| 3 | Zhoushan | 3.18 | 0.95 | $O_3$ | 40 | Xining | 5.11 | 1.19 | $PM_{10}$ |
| 4 | Xiamen | 3.37 | 0.80 | $NO_2$ | 41 | Nanjing | 5.18 | 1.18 | $NO_2$ |
| 5 | Fuzhou | 3.42 | 0.88 | $O_3$ | 42 | Huai'an | 5.18 | 1.43 | $PM_{2.5}$ |
| 6 | Huizhou | 3.48 | 0.89 | $O_3$ | 43 | Taizhou | 5.22 | 1.46 | $PM_{2.5}$ |
| 7 | Shenzhen | 3.49 | 0.92 | $O_3$ | 44 | Changchun | 5.22 | 1.31 | $PM_{2.5}$ |
| 8 | Lishui | 3.54 | 0.94 | $PM_{2.5}$ | 45 | Wuxi | 5.28 | 1.26 | $PM_{2.5}$ |
| 9 | Guiyang | 3.61 | 0.91 | $PM_{2.5}$ | 46 | Suqian | 5.34 | 1.57 | $PM_{2.5}$ |
| 10 | Zhuhai | 3.64 | 1.00 | $O_3$ | 47 | Changzhou | 5.41 | 1.37 | $PM_{2.5}$ |
| 11 | Taizhou | 3.65 | 0.94 | $PM_{2.5}$ | 48 | Wuhan | 5.46 | 1.49 | $PM_{2.5}$ |
| 12 | Kunming | 3.76 | 0.83 | $PM_{10}$ | 49 | Zhenjiang | 5.63 | 1.57 | $PM_{2.5}$ |
| 13 | Nanning | 3.95 | 1.00 | $PM_{2.5}$ | 50 | Hefei | 5.65 | 1.60 | $PM_{2.5}$ |
| 14 | Dalian | 4.15 | 1.02 | $O_3$ | 51 | Harbin | 5.71 | 1.66 | $PM_{2.5}$ |
| 15 | Zhongshan | 4.16 | 1.13 | $O_3$ | 52 | Yangzhou | 5.72 | 1.54 | $PM_{2.5}$ |
| 16 | Zhangjiakou | 4.18 | 1.08 | $O_3$ | 53 | Shenyang | 5.78 | 1.43 | $PM_{2.5}$ |
| 17 | Ningbo | 4.31 | 1.06 | $PM_{2.5}$ | 54 | Chengdu | 5.85 | 1.60 | $PM_{2.5}$ |
| 18 | Quzhou | 4.37 | 1.20 | $PM_{2.5}$ | 55 | Qinhuangdao | 5.86 | 1.26 | $PM_{2.5}$ |
| 19 | Dongguan | 4.37 | 1.06 | $O_3$、$PM_{2.5}$ | 56 | Beijing | 5.87 | 1.66 | $PM_{2.5}$ |
| 20 | Wenzhou | 4.40 | 1.09 | $PM_{2.5}$ | 57 | Hohhot | 5.93 | 1.36 | $PM_{10}$ |
| 21 | Jinhua | 4.44 | 1.20 | $PM_{2.5}$ | 58 | Yinchuan | 6.41 | 1.51 | $PM_{10}$ |
| 22 | Zhaoqing | 4.47 | 1.17 | $PM_{2.5}$ | 59 | Lanzhou | 6.45 | 1.59 | $PM_{10}$ |
| 23 | Yancheng | 4.58 | 1.23 | $PM_{2.5}$ | 60 | Tianjin | 6.53 | 1.77 | $PM_{2.5}$ |
| 24 | Jiangmen | 4.60 | 1.21 | $O_3$ | 61 | Urumchi | 6.55 | 2.00 | $PM_{2.5}$ |
| 25 | Guangzhou | 4.61 | 1.30 | $NO_2$ | 62 | Langfang | 6.61 | 1.71 | $PM_{2.5}$ |
| 26 | Shanghai | 4.63 | 1.13 | $O_3$ | 63 | Xuzhou | 6.78 | 1.94 | $PM_{2.5}$ |
| 27 | Jiaxing | 4.72 | 1.20 | $PM_{2.5}$ | 64 | Cangzhou | 6.89 | 1.89 | $PM_{2.5}$ |
| 28 | Shaoxing | 4.73 | 1.29 | $PM_{2.5}$ | 65 | Jinan | 7.04 | 1.86 | $PM_{2.5}$ |
| 29 | Foshan | 4.75 | 1.14 | $PM_{2.5}$ | 66 | Zhengzhou | 7.07 | 1.89 | $PM_{2.5}$ |
| 30 | Nanchang | 4.75 | 1.17 | $PM_{2.5}$ | 67 | Hengshui | 7.29 | 2.20 | $PM_{2.5}$ |
| 31 | Qingdao | 4.78 | 1.11 | $PM_{10}$、$PM_{2.5}$ | 68 | Xi'an | 7.72 | 2.17 | $PM_{2.5}$ |
| 32 | Lianyungang | 4.79 | 1.29 | $PM_{2.5}$ | 69 | TaiYuan | 7.79 | 1.89 | $PM_{2.5}$ |
| 32 | Nantong | 4.79 | 1.12 | $O_3$ | 70 | Tangshan | 7.97 | 1.89 | $PM_{2.5}$ |
| 34 | Huzhou | 4.80 | 1.20 | $PM_{2.5}$ | 71 | Baoding | 8.32 | 2.40 | $PM_{2.5}$ |
| 35 | Chengde | 4.86 | 1.17 | $PM_{10}$ | 72 | Xingtai | 8.57 | 2.29 | $PM_{2.5}$ |
| 36 | Suzhou | 4.97 | 1.20 | $NO_2$、$PM_{2.5}$ | 73 | Handan | 8.64 | 2.46 | $PM_{2.5}$ |
| 37 | Changsha | 4.98 | 1.49 | $PM_{2.5}$ | 74 | Shijiazhuang | 8.72 | 2.46 | $PM_{2.5}$ |




Comparison of the Average Concentration of Six Pollutants of the 74 Cities between 2016 and 2017

The annual $PM_{2.5}$ concentration was 20~86 μg/$m^3$ with the average at 47 μg/$m^3$, down by 6.0% compared with that of 2016. The number of days failing to meet national air quality standard was 14.1%, down by 2.5 percentage points compared with that of 2016. 19 cities reached Grade II national air quality standard, taking up 25.7% of the total. 55 cities failed to meet Grade II national air quality standard, taking up 74.3%. The annual range of average $PM_{10}$ concentration was 37~154 μg/$m^3$ with the average at 80 μg/$m^3$, down by 4.8% compared with that of 2016. The number of days failing to meet national standard was 8.4%, down by 2.7 percentage points compared with that of 2016. The annual average $PM_{10}$ concentration of 1 city reached Grade I national air quality standard, taking up 1.4%. 31 cities reached Grade II national air quality standard, taking up 41.9%. 42 cities failed to meet Grade II national air quality standard, taking up 56.8%. The $90^{th}$ percentile concentration of $O_3$ daily maximum 8-hour average was 117~218 μg/$m^3$ with the average at 167 μg/$m^3$,




Comparison of the Percentage of Cities with the Six Pollutants Meeting National Air Quality Standard in 74 Cities between 2016 and 2017 up by 8.4% compared with that of 2016. The number of days failing to meet the standard was 12.2%, up by 3.6 percentage points compared with that of 2016. The $O_3$ concentration of 26 cities reached Grade II national air quality standard, taking up 35.1%. 48 cities failed to meet Grade II national air quality standard, taking up 64.9%. The range of the annual average $SO_2$ concentration was 6~54 μg/m$^3$ with the average at 17 μg/m$^3$, down by 19.0% compared with that of 2016. The number of days failing to meet the standard was 0.2%, down by 0.1 percentage point compared with that of 2016. The annual average $SO_2$ concentration of 56 cities reached Grade I national air quality standard, taking up 75.7%. 18 cities reached Grade II national air quality standard, taking up 24.3%. The range of annual average $NO_2$ concentration was 12~59 μg/m$^3$ with the average at 40 μg/m$^3$, up by 2.6% than that of 2016. The number of days failing to meet the standard was 4.0%, down by 0.2 percentage point compared with that of 2016. The annual average $NO_2$ concentration of 39 cities reached Grade I national air quality standard (same as Grade II national air quality standard), taking up 52.7%. 35 cities failed to meet Grade II national air quality standard, taking up 47.3%. The 95$^{th}$ percentile concentration of daily average CO was 0.8~3.8 mg/m$^3$ with the average at 1.7 mg/m$^3$, down by 10.5 percentage points compared with that of 2016. The number of days failing to meet the national air quality standard was 0.4%, down by 0.2 percentage point compared with that of 2016. The average CO concentration of all 74 cities reached Grade I national air quality standard (same as Grade II national air quality standard).

If the impact of dust was not excluded, the average concentrations of $PM_{2.5}$ and $PM_{10}$ of the 74 cities were 47 μg/m$^3$ and 83 μg/m$^3$ respectively, down by 6.0% and 2.4% compared with that of 2016.

**Beijing-Tianjin-Hebei region** In 2017, the number of days of 13 APL cities in Beijing-Tianjin-Hebei of the whole year meeting air quality standard was within the range of 38.9%~79.7% with the average at 56.0%, down by 0.8 percentage point compared with that of 2016. The average number of non-attainment days accounts for 44.0% of the total, of which 25.9% was slight pollution, 10.0% moderate pollution, 6.1% heavy pollution and 2.0% severe pollution. The number of days meeting air quality standard accounted for 50%~80% for 8 cities and less than 50% for 5 cities. Among the non-attainment days, the number of days with $PM_{2.5}$, $O_3$, $PM_{10}$, and $NO_2$ as the primary pollutant took up 50.3%, 41.0%, 8.9% and 0.3% respectively. There was no occurrence of non-attainment days with CO and $SO_2$ as the primary pollutant.

The number of days with excellent and good air quality in Beijing reached 61.9%, up by 7.8 percentage points compared with that of 2016. The city experienced 19 days of heavy pollution and 5 days of very heavy pollution, 15 days less than that of 2016.

Average Concentration of Primary Pollutants in Beijing–Tianjin–Hebei Region in 2017

| Region | Indicator | Average concentration (CO: mg/m$^3$, others: μg/m$^3$) | Increase from 2016 (%) |
|---|---|---|---|
| Beijing-Tianjin-Hebei | $PM_{2.5}$ | 64 | -9.9 |
| | $PM_{10}$ | 113 | -4.2 |
| | $O_3$ | 193 | 12.2 |
| | $SO_2$ | 25 | -19.4 |
| | $NO_2$ | 47 | -4.1 |
| | CO | 2.8 | -12.5 |
| Beijing | $PM_{2.5}$ | 58 | -20.5 |
| | $PM_{10}$ | 84 | -5.6 |
| | $O_3$ | 193 | -3.0 |
| | $SO_2$ | 8 | -20.0 |
| | $NO_2$ | 46 | -4.2 |
| | CO | 2.1 | -34.4 |

Average Concentration of Primary Pollutants in the Yangtze River Delta in 2017

| Region | Indicator | Average concentration (CO: mg/m$^3$, others: μg/m$^3$) | Increase from 2016 (%) |
|---|---|---|---|
| The Yangtze River Delta | $PM_{2.5}$ | 44 | -4.3 |
| | $PM_{10}$ | 71 | -5.3 |
| | $O_3$ | 170 | 6.9 |
| | $SO_2$ | 14 | -17.6 |
| | $NO_2$ | 37 | 2.8 |
| | CO | 1.3 | -13.3 |
| Shanghai | $PM_{2.5}$ | 39 | -13.3 |
| | $PM_{10}$ | 55 | -6.8 |
| | $O_3$ | 181 | 10.4 |
| | $SO_2$ | 12 | -20.0 |
| | $NO_2$ | 44 | 2.3 |
| | CO | 1.2 | -7.7 |

**The Yangtze River delta** The number of days with excellent and good air quality in 25 cities ranged from 48.2% to 94.2%, with the average at 74.8%, down by 1.3 percentage points compared with that of 2016. The average number of days failing to meet air quality standard took up 25.2%; of which the number of days with slight pollution was 19.9%, the number of days with moderate pollution 4.4%, the number of days with heavy pollution 0.9%, and the number of days with severe pollution 0.1%. The attainment rate was within the range of 80%~100% for 6 cities, 50%~80% for 18 cities, and less than 50% for 1 city. Of all days failing to meet national air quality standard, the number of days with $PM_{2.5}$, $O_3$, $PM_{10}$ and $NO_2$ as the primary took up 44.5%, 50.4%, 2.3% and 3.0% respectively. There was no occurrence of non-attainment days with $SO_2$ and CO as the primary pollutants.

The number of days meeting air quality standard was 75.3% for Shanghai around the year, down by 0.1 percentage point compared with that of 2016. There were 2 days of heavy pollution and no occurrence of very heavy pollution, the same as that of 2016.

**The Pearl River Delta** The number of days of 9 APL cities in the Pearl River Delta meeting air quality standard was within the range of 77.3%~94.8% with the average at 84.5%, down by 5.0 percentage points compared with that of 2016. The average proportion of non-attainment days was 15.5%; 12.5% of which were of slight pollution, 2.4% of moderate pollution and 0.6% of heavy pollution. There was no occurrence of severe pollution. The attainment rate was within the range of 80%~100% for 6 cities and 50~80% for 3 cities. Among the non-attainment days, the number of days with $O_3$, $PM_{2.5}$ and $NO_2$ as the primary pollutants took up 70.6%, 20.4% and 9.2% respectively. There was no occurrence of non-attainment days with $PM_{10}$, $SO_2$ and CO as the primary pollutant.

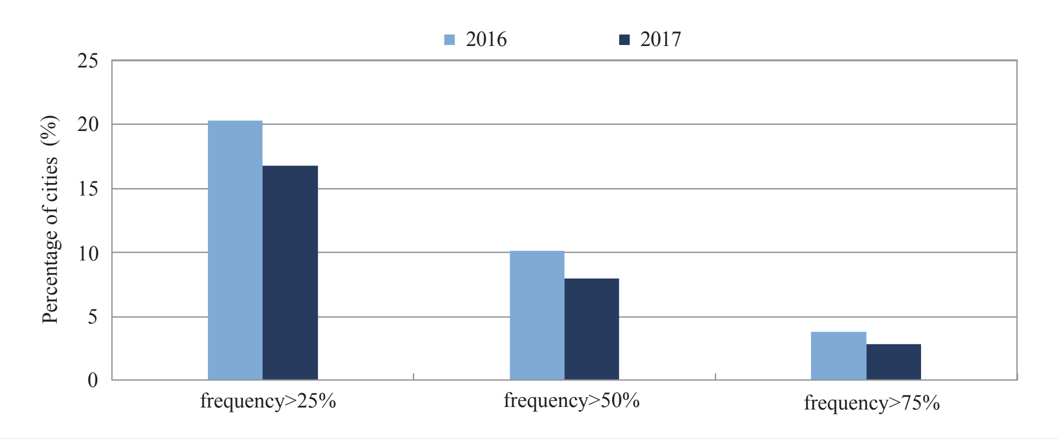
The attainment rate of Guangzhou was 80.5%, down by 4.2 percentage points compared with that of 2016. There were 2 days of heavy pollution and no occurrence of very heavy pollution, 1 day more than that of 2016.

Average Concentration of Primary Pollutants in the Pearl River Delta in 2017

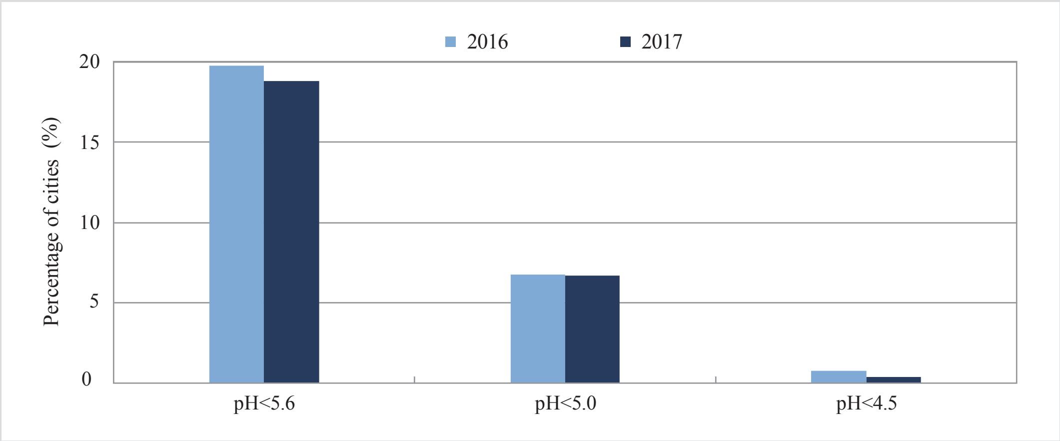
| Region | Indicator | Average concentration (CO: mg/m³, others: μg/m³) | Increase from 2016 (%) |
|---|---|---|---|
| The Pearl River Delta | $PM_{2.5}$ | 34 | 6.2 |
| | $PM_{10}$ | 53 | 8.2 |
| | $O_3$ | 165 | 9.3 |
| | $SO_2$ | 11 | 0 |
| | $NO_2$ | 37 | 5.7 |
| | CO | 1.2 | -7.7 |
| Guangzhou | $PM_{2.5}$ | 35 | -2.8 |
| | $PM_{10}$ | 56 | 0 |
| | $O_3$ | 162 | 4.5 |
| | $SO_2$ | 12 | 0 |
| | $NO_2$ | 52 | 13.0 |
| | CO | 1.2 | -7.7 |

## Acid Rain

**Acid rain frequency** In 2017, the average acid rain frequency of 463 cities, districts or counties under precipitation monitoring was 10.8%, down by 1.9 percentage points compared with that of 2016. The rate of cities with acid rain occurrence was 36.1%, down by 2.7 percentage points compared with that of 2016. 16.8% of the cities had acid rain frequency over 25%, down by 3.5 percentage points compared with that of 2016. 8.0% cities had acid rain frequency over 50%, down by 2.1 percentage points compared with that of 2016. 2.8% cities had acid rain frequency over 75%, down by 1.0 percentage point compared with that of 2016.



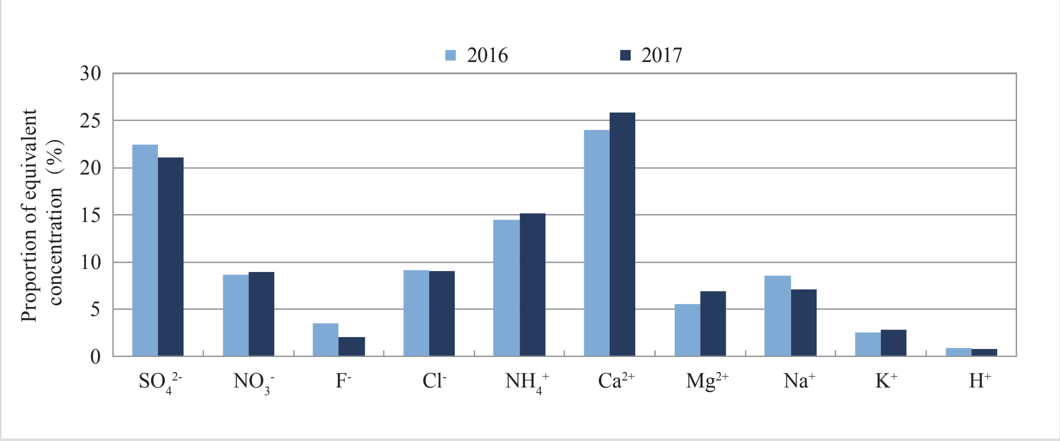

Comparison of the Percentage of Cities with Different Acid Rain Frequency between 2016 and 2017




Comparison of the Percentage of Cities with Different Annual pH Value of Precipitation between 2016 and 2017

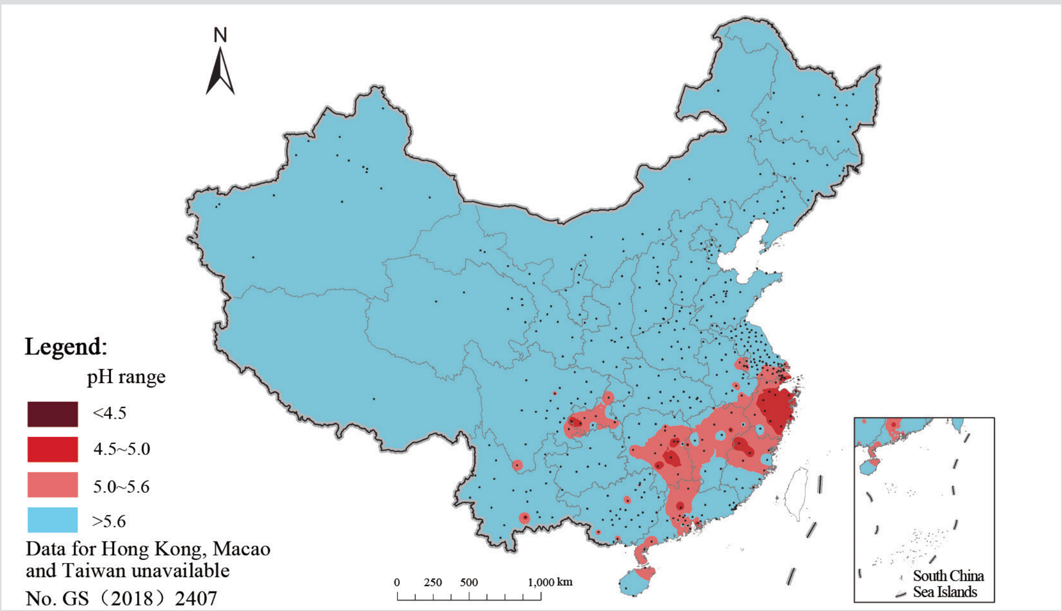
**Precipitation acidity** In 2017, the annual average pH value of precipitation across the country was 4.42 (Dazu county in Chongqing) ~8.18 (Bayan Nur City in Inner Mongolia Autonomous Region). Among them, the proportions of cities with acid rain (annual average pH value of precipitation < 5.6), relatively serious acid rain (annual average pH value of precipitation < 5.0) and serious acid rain (annual average pH value of precipitation < 4.5) was 18.8%, 6.7% and 0.4% respectively, down by 1.0, 0.1 and 0.4 percentage points respectively compared with that of 2016.

**Chemical composition** In 2017, the main cations in precipitation were calcium and ammonium, taking up 25.9% and 15.2% respectively of total ion equivalent. The key anion was sulfate radical, taking up 21.1% of the total ion equivalent, while nitrate radical took up 9.0% of the total ion equivalent. In general, the type of acid rain was still sulphuric acid. Compared with that of 2016, the percentage of concentration of sulfate radical, fluoride ion and sodium ion went down; the percentage of concentration of ammonium ion, calcium ion and magnesium ion went up; slightly and the




Comparison of Main Ion Equivalent Concentration Ratio of Precipitation between 2016 and 2017 percentage of concentration of other ion equivalents kept at a stable level.

**Acid rain distribution** The total area affected by acid rain was about 620,000 $km^2$, taking up 6.4% of the national territory, down by 0.8 percentage point compared with that of 2016. Among them, the percentage of land area with relatively serious acid rain was 0.9%. Acid rain was mainly distributed south to the Yangtze River and east to Yunnan-Guizhou Plateau, including most of Zhejiang and Shanghai, central and northern part of Jiangxi, central and northern part of Fujian, central and eastern part of Hunan, central part of Guangdong, southern part of Chongqing, southern part of Jiangsu and a small part of southern part of Anhui.




The Isoline of Annual Average pH Value of Precipitation in China in 2017

# Freshwater Environment

## Surface waters

In 2017, there were 1,940 surface water sections (sites) under national monitoring program. 1,317 water sections (sites) met Grade I~III water quality standard, taking up 67.9%; 462 water sections (sites) met Grade IV and V water quality standard, taking up 23.8%; 161 failed to meet Grade V standard, taking up 8.3%*; Compared with that of 2016, the ratio of sections meeting Grade I~III water quality standard went up by 0.1 percentage point, and those failing to meet Grade V standard went down by 0.3 percentage point.

## River basins

In 2017, out of the 1,617 water sections under national monitoring program in 7 major river basins, namely 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, 35 met Grade I standard, taking up 2.2%; 594 met Grade II standard, taking up 36.7%; 532 met Grade III standard, taking up 32.9%; 236 met Grade IV standard, taking up 14.6%; 84 met Grade V standard, taking up 5.2%; 136 were of the quality inferior to Grade V standard, taking up 8.4%. Compared with that of 2016, the percentage of water sections meeting Grade I was up by 0.1 percentage point; Grade II down by 5.1 percentage points; Grade III up by 5.6 percentage points; Grade IV up by 1.2 percentage points; Grade V down by 1.1 percentage points, and those inferior to Grade V down by 0.7 percentage point.

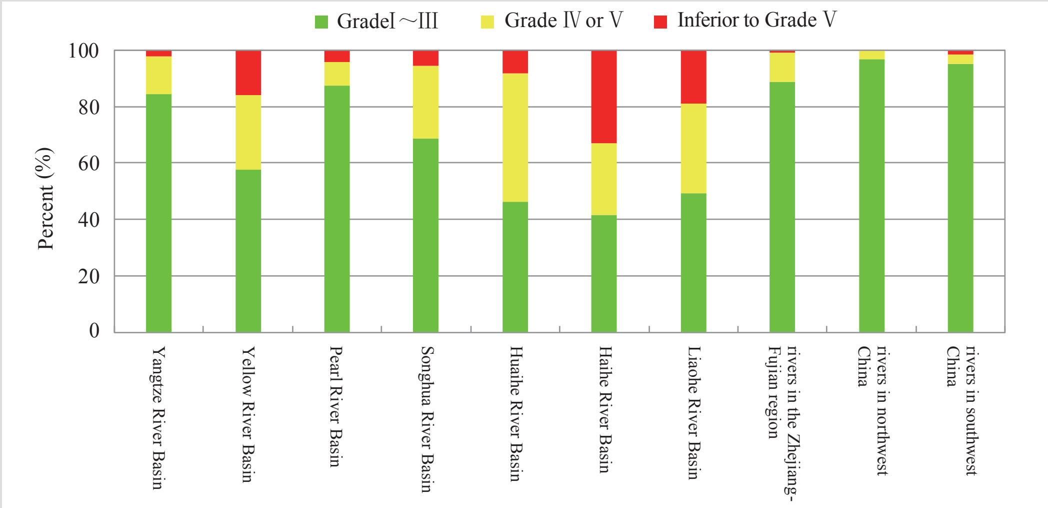
Rivers in northwest China and rivers in southwest China met excellent quality standard. Rivers in Zhejiang and Fujian, the Yangtze River and Pearl River met good quality standard. The Yellow River, Songhua River, Huaihe River and Liaohe River were of slight pollution, and Haihe River was under moderate pollution.

**The Yangtze River basin** witnessed sound water quality. In all the 510 water sections under national monitoring program, 2.2% met Grade I standard, 44.3% met Grade II standard; 38.0% met Grad III standard; 10.2% met Grade IV standard; 3.1% met Grade V and 2.2% were inferior to Grade V standard. Compared with that of 2016, the percentage of water sections meeting Grade I was down by 0.5 percentage point; Grade II down by 9.2 percentage points; Grade III up by 11.9 percentage points; Grade IV up by 0.6 percentage point; Grade V down by 1.4 percentage points and those inferior to Grade V down by 1.3 percentage points.

Water quality of the main stream of the Yangtze River was excellent. In 59 water sections under national monitoring program, 6.8% met Grade I standard; 40.7% met Grade II standard; and 52.5% met Grade III standard. There was no water section meeting Grade IV, Grade V or failing to meet Grade V standard. Compared with that of 2016, the percentage of water sections meeting Grade II standard was down by 10.1 percentage points, Grade III up by 15.2 percentage points, Grade IV down by 5.1 percentage points, and others kept unchanged.

The major tributaries of the Yangtze River were of good water quality. In 451 water sections under national monitoring program, 1.6% met Grade I standard, down by 0.6 percentage point compared with that of 2016; 44.8% met Grade II standard, down by 9.1 percentage points; 36.1% met Grade

*Twenty one indicators of Table 1 of Environmental Quality Standard for Surface Water (GB 3838-2002) except water temperature, total nitrogen (TN) and fecal coliform are employed to assess the water quality, based on each indicator's standard limits value. According to the single factor method, the highest water quality category is taken as the section water quality category. Grade I or II indicates the water could be used in the first-class protection zones for drinking water sources, habitats of rare aquatic species, fish and shrimp spawning grounds and feeding grounds of young fish and fish larvae. Grade III refers to water that could be used in the second-class protection zones for drinking water sources, fish and shrimp's overwintering ground, migration channels, aquaculture areas and swimming sites. Grade IV indicates the water is only suitable for industrial use and other amusement purposes that do not involve the liquid coming into contact with skin. Grade V indicates the water is only suitable for agriculture and landscape. Water failing to meet Grade V standard hardly has any function except regulating local climate.

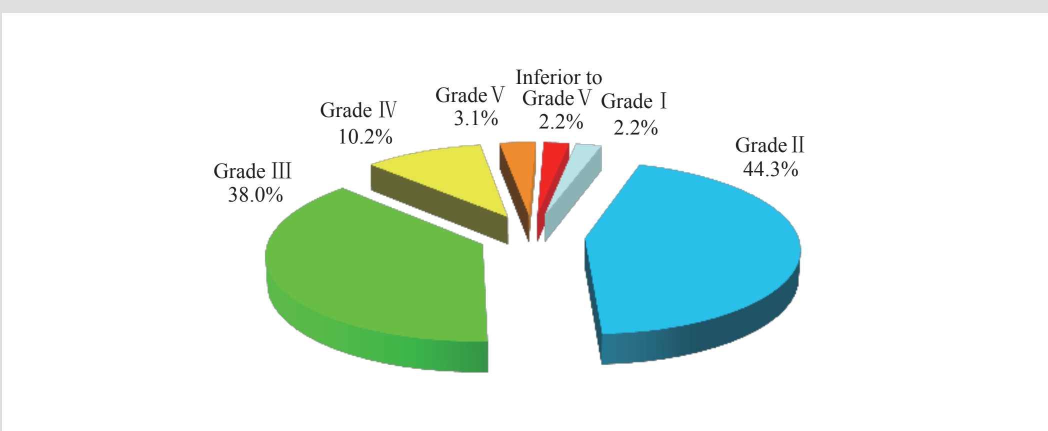



Water Quality of 7 Major River Basins, Rivers in Zhejiang and Fujian, Rivers in northwestern Part and Southwestern Part of China in 2017

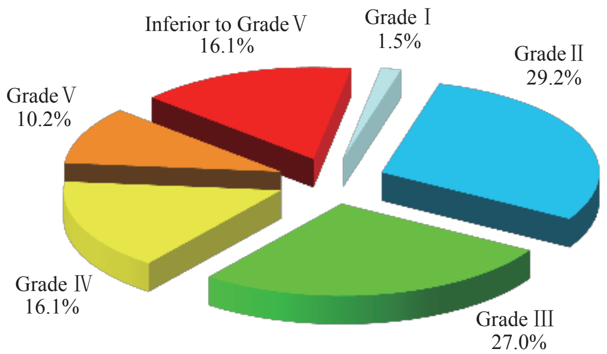
III standard, up by 11.5 percentage points; 11.5% met Grade IV standard, up by 1.3 percentage points; 3.5% met Grade V standard, down by 1.6 percentage points; 2.4% failed to meet Grade V standard, down by 1.6 percentage points.

**The Yellow River basin** was slightly polluted. The main pollution indicators were chemical oxygen demand (COD), ammonia nitrogen and total phosphorus (TP). Among the 137 water sections under national monitoring program, 1.5% met Grade I water quality standard, down by 0.7 percentage point compared with that of 2016; 29.2% met Grade II standard, down by 2.9 percentage points; 27.0% met Grade III standard, up by 2.2 percentage points; 16.1% met Grade IV standard, down by 4.3 percentage points; 10.2% met Grade V standard, up by 3.6 percentage points; and 16.1% failed to meet Grade V standard, up by 2.2 percentage points.

The mainstream of the Yellow River was of excellent water quality. Among 31 water sections under national monitoring program, 6.5% met Grade I standard, same as




Proportion of Water Quality Grade of the Yangtze River Basin in 2017

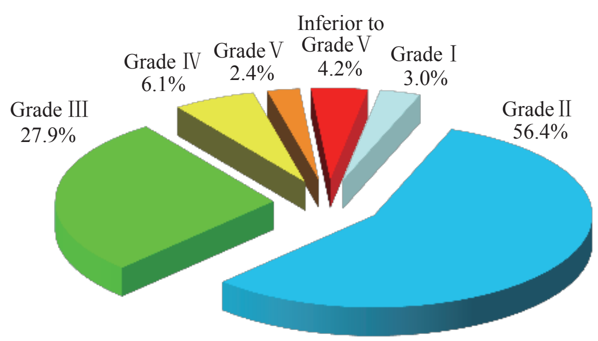



Proportion of Water Quality Grade of the Yellow River Basin in 2017

that of 2016; 58.1% met Grade II standard, down by 6.4 percentage points; 32.3% met Grade III standard, up by 9.7 percentage points; 3.2% met Grade IV standard, down by 3.3 percentage points; and there was no water sections meeting Grade V or failing to meet Grade V standard, same as that of 2016.

The major tributaries of the Yellow River were of intermediate pollution. Among 106 water sections under national monitoring program, there was no water sections meeting Grade I standard, down by 0.9 percentage point compared with that of 2016; 20.8% met Grade II standard, down by 1.8 percentage points; 25.5% met Grade III standard, same as that of 2016; 19.8% met Grade IV standard, down by 4.7 percentage points; 13.2% met Grade V standard, up by 4.7 percentage points; and 20.8% failed to meet Grade V standard, up by 2.9 percentage points.

**The Pearl River basin** was of good water quality. Among 165 water sections under national monitoring program, 3.0% met Grade I standard, up by 0.6 percentage point compared with that of 2016; 56.4% met Grade II standard, down by




Proportion of Water Quality Grade of the Pearl River Basin in 2017

6.0 percentage points; 27.9% met Grade III standard, up by 3.1 percentage points; 6.1% met Grade IV standard, up by 1.3 percentage points; 2.4% met Grade V standard, up by 0.6 percentage point; and 4.2% failed to meet Grade V standard, up by 0.6 percentage point.

The mainstream of the Pearl River was of good water quality. Among 50 water sections under national monitoring program, the proportions of water sections meeting Grade I, II, III, IV and V was 2.0%, 60.0%, 24.0%, 10.0% and 2.0% respectively, and 2.0% failed to meet Grade V standard. Compared with that of 2016, the percentage of water sections meeting Grade I was down by 2.0 percentage points, Grade II down by 12.0 percentage points, Grade III up by 12.0 percentage points and those inferior to Grade V up by 2.0 percentage points, and others kept unchanged.

The major tributaries of the Pearl River were of good water quality. Among 101 water sections under national monitoring program, 4.0% met Grade I standard, up by 2.0 percentage points compared with that of 2016; 50.5% met Grade II standard, down by 5.9 percentage points; 31.7% met Grade III standard, up by 1.0 percentage point; 5.0% met Grade IV standard, up by 2.0 percentage points; 3.0% met Grade V standard, up by 1.0 percentage point; and 5.9% failed to meet Grade V standard, same as that of 2016.

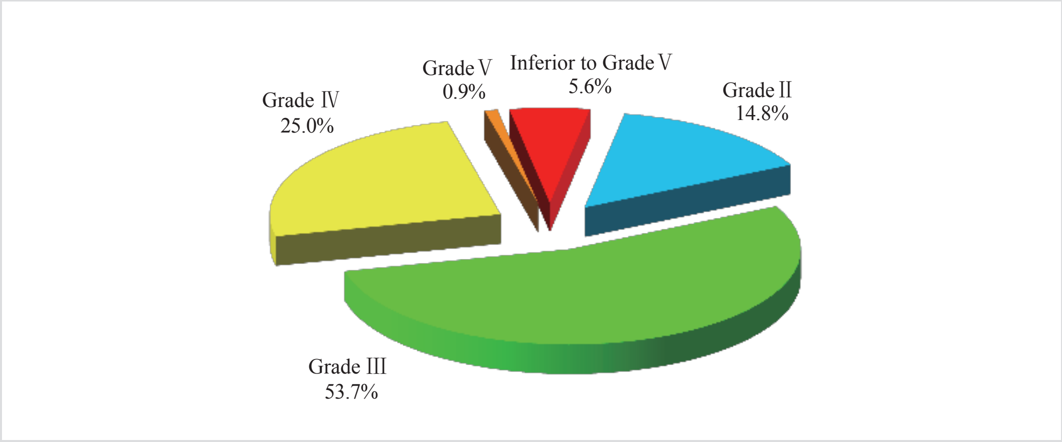
Rivers in Hainan Island were of excellent water quality. Among 14 water sections under national monitoring program, no water section met Grade I standard, and 85.7% met Grade II standard, up by 14.3 percentage points compared with that of 2016; 14.3% met Grade III standard, down by 14.3 percentage points; and no water sections fell within the categories of Grade I, IV, V or inferior to Grade V standard, keeping unchanged as that of 2016.

**The Songhua River basin** was slightly polluted. The main pollution indicators were COD, permanganate index and ammonia nitrogen. Among all 108 water sections under national monitoring program, no section met Grade I standard, same as that of 2016; 14.8% met Grade II standard, up by 0.9 percentage point; 53.7% met Grade III standard, up by 7.4 percentage points; 25.0% met Grade IV standard, down by 4.6 percentage points; 0.9% met Grade V standard, down by 2.8 percentage points; and 5.6% failed to meet Grade V standard, down by 0.9 percentage point.

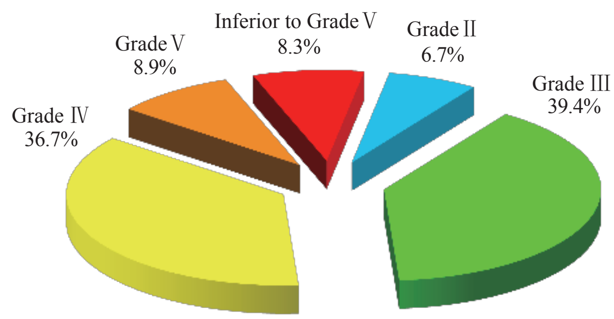
The mainstream of Songhua River was of good water quality. Among 17 water sections under national monitoring program, no section met Grade I standard, Grade V or failed to meet Grade V standard, same as that of 2016; 11.8% met Grade II standard, down by 11.7 percentage points; 76.5% met Grade III standard, up by 5.9 percentage points; 11.8% met Grade IV standard, up by 5.9 percentage points.

The waters of major tributaries of the Songhua River were of sight pollution. Among 56 water section under the national monitoring program, no sections met Grade I standard, same as that of 2016; 19.6% met Grade II standard, up by 5.3 percentage points; 48.2% met Grade III standard, up by 8.9 percentage points; 21.4% met Grade IV standard, down by 10.7 percentage points; 1.8% met Grade V standard, down by 3.6 percentage points; and 8.9% failed to meet Grade V standard, same as that of 2016.

The waters of Heilongjiang River were under slight pollution. Among 18 water sections under national monitoring




Proportion of Water Quality Grade of the Songhua River Basin in 2017




Proportion of Water Quality Grade of the Huaihe River Basin in 2017

program, no section met Grade I standard, same as that of 2016; 16.7% met Grade II standard, up by 11.1 percentage points compared with that of 2016; 44.4% met Grade III standard, up by 5.5 percentage points; 33.3% met Grade IV standard, down by 16.7 percentage points; no section met Grade V standard, down by 5.6 percentage points and 5.6% failed to meet Grade V standard, up by 5.6 percentage points.

The waters of Tumen River were of slight pollution. Among 7 water sections under national monitoring program, no section met Grade I, II, V or failed to meet Grade V standard; 57.1% met Grade III standard, same as that of 2016; 42.9% met Grade IV standard, up by 28.6 percentage points compared with that of 2016. Percentages of water sections meeting Grade V standard and inferior to Grade V standard fell by 14.3 percentage points respectively compared with that of 2016. Others kept unchanged as that of 2016.

The waters of Wusuli River were of slight pollution. Among 9 water sections under national monitoring program, no section met Grade I, II, V or was inferior to Grade V standard; 55.6% met Grade III standard, up by 11.1 percentage points; 44.4% met Grade IV standard, down by 11.1 percentage points compared with that of 2016. Others kept unchanged as that of 2016.

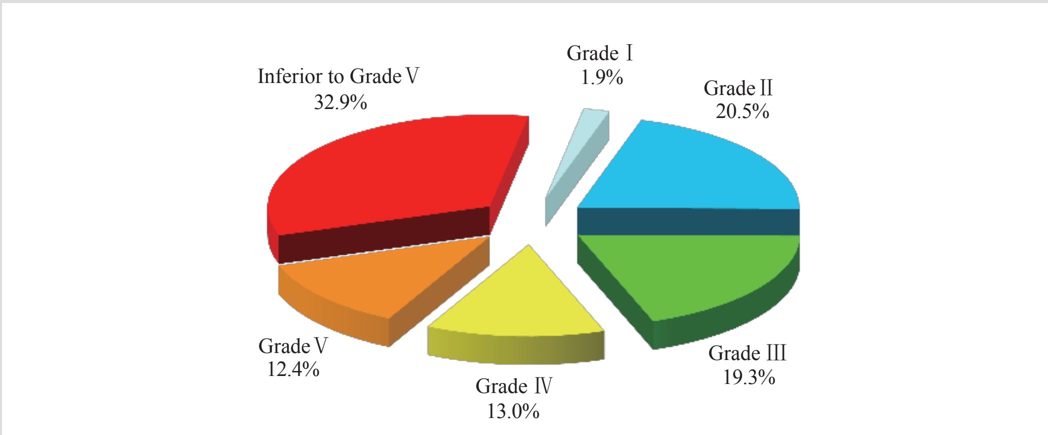
The waters of the Suifen River were of good water quality. 1 water section under national monitoring program met Grade III standard, witnessing no significant change compared with that of 2016.

**The Huaihe River basin** was slightly polluted. The main pollution indicators were COD, TP and fluoride. Among 180 water sections under national monitoring program, no section met Grade I standard, same as that of 2016; 6.7% met Grade II standard, down by 0.5 percentage point compared with that of 2016; 39.4% met Grade III standard, down by 6.7 percentage points; 36.7% met Grade IV standard, up by 12.8 percentage points; 8.9% met Grade V standard, down by 6.7 percentage points; and 8.3% failed to meet Grade V standard, up by 1.1 percentage points.

The mainstream of Huaihe River was of slight pollution. Among 10 water sections under national monitoring program, no section met Grade I, II or V standard, same as that of 2016; 70.0% met Grade III standard, down by 20.0 percentage points compared with that of 2016; 20.0% met Grade IV standard, up by 10.0 percentage points; 10.0% failed to meet Grade V standard, up by 10.0 percentage points.

The waters of major tributaries of Huaihe River were of slight pollution. Among 101 water sections under national monitoring program, no section met Grade I standard, same as that of 2016; 9.9% met Grade II standard, same as that of 2016; 33.7% met Grade III standard, down by 1.9 percentage points; 39.6% met Grade IV standard, up by 10.9 percentage points; 9.9% met Grade V standard, down by 8.9 percentage points; 6.9% failed to meet Grade V standard, same as that of 2016.

The Yihe-Shuhe-Sishui water system saw slight pollution. Among 48 water sections under national monitoring program, no section met Grade I standard, same as that of 2016; 2.1% met Grade II standard, up by 2.1 percentage points compared with that of 2016; 56.2% met grade III standard, down by 16.7 percentage points; 31.2% met Grade IV standard, up by 12.4 percentage points; 6.2% met Grade V standard, up by 4.1




Proportion of Water Quality Grade of the Haihe River Basin in 2017

percentage points; and 4.2% failed to meet Grade V standard, down by 2.1 percentage points.

The waters of rivers with sole estuary in Shandong Peninsula were of intermediate pollution. Among 21 water sections under national monitoring program, no section met Grade I standard, same as that of 2016; 4.8% met Grade II standard, down by 9.5 percentage points compared with that of 2016; 14.3% met Grade III standard, same as that of 2016; 42.9% met Grade IV standard, up by 23.9 percentage points; 14.3% met Grade V standard, down by 23.8 percentage points; and 23.8% failed to meet Grade V standard, up by 9.5 percentage points.

**The Haihe River basin** was moderately polluted. The major pollution indicators were COD, $BOD_5$ and TP. Among 161 water sections under national monitoring program, 1.9% met Grade I standard, same as that of 2016; 20.5% met Grade II standard, up by 1.2 percentage points compared with that of 2016; 19.3% met Grade III standard, up by 3.2 percentage points; 13.0% met Grade IV standard, same as that of 2016; 12.4% met Grade V standard, up by 3.7 percentage points; and 32.9% failed to meet Grade V standard, down by 8.1 percentage points.

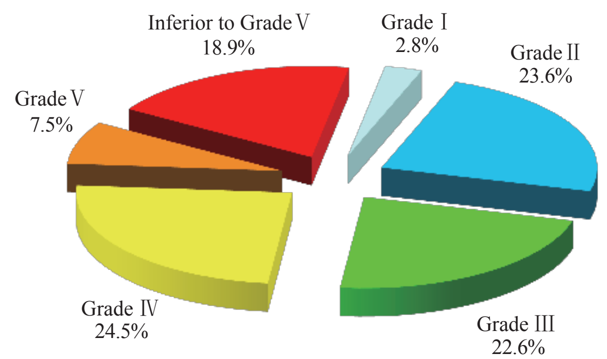
There are 2 water sections of the mainstream of Haihe River under national monitoring program. Sanchakou water section met Grade III standard which saw improved water quality compared with 2016; and the other section at the sluice of the River failed to meet Grade V standard, basically the same as that of 2016.

The waters of major tributaries of the Haihe River were of intermediate pollution. Among 125 water sections under national monitoring program, 2.4% met Grade I standard, same as that of 2016; 22.4% met Grade II standard, up by 4.0 percentage points compared with that of 2016; 15.2% met Grade III standard, up by 3.2 percentage points; 8.8% met Grade IV standard, down by 1.6 percentage points; 12.0% met Grade V standard, up by 4.8 percentage points, and 39.2% failed to meet Grade V standard, down by 10.4 percentage points.

The waters of Luanhe River were of slight pollution. Among 17 water sections under national monitoring program, no section met Grade I or was inferior to Grade V standard, same as that of 2016; 23.5% met Grade II standard, down by 17.7 percentage points compared with that of 2016; 41.2% met Grade III standard, down by 5.9 percentage points; 29.4% met Grade IV standard, up by 17.6 percentage points; 5.9% met Grade V standard, up by 5.9 percentage points compared with that of 2016.Others remained the same as that of 2016.

The waters of Tuhai River-Majia River were of slight pollution. Among 11 water sections under national monitoring program, no section met Grade I standard, 9.1% met Grade II standard, 18.2% met Grade III standard, 18.2% met Grade IV standard, 36.4% met Grade V standard and 18.2% failed to meet Grade V standard. Compared with that of 2016, the percentage of waters meeting Grade IV was up by 9.1 percentage points, and that inferior to Grade V down by 9.1 percentage points. Others remained the same as that of 2016.

The waters of rivers in east Hebei and coastal areas were of slight pollution. Among 6 water sections under national monitoring program, no sections met Grade I, II and V standard; 33.3% met Grade III, 50.0% met Grade IV, and




Proportion of Water Quality Grade of the Liaohe River Basin in 2017

16.7% failed to meet Grade V standard. Compared with that of 2016, the percentage of waters meeting Grade III was up by 16.6 percentage points, Grade IV down by 16.7 percentage points, and the sections of Grade I, II, V and that inferior to Grade V standard remained the same as that of 2016.

**The Liaohe River basin** was of slight pollution. The major pollution indicators were TP, COD, and $BOD_5$. Among 106 water sections under national monitoring program, 2.8% met Grade I standard, up by 0.9 percentage point compared with that of 2016; 23.6% met Grade II standard, down by 7.5 percentage points; 22.6% met Grade III standard, up by 10.3 percentage points; 24.5% met Grade IV standard, up by 1.9 percentage points; 7.5% met Grade V standard, down by 9.5 percentage points; and 18.9% failed to meet Grade V standard, up by 3.8 percentage points.

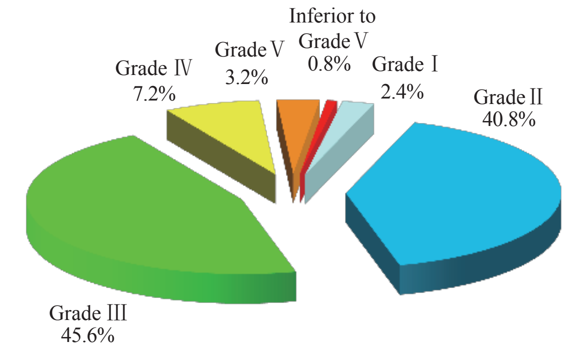
The waters of the mainstream of the Liaohe River were of slight pollution. Among 15 water sections under national monitoring program, no section met Grade I or Grade II standard, the same as that of 2016; 13.3% met Grade III standard, the same as that of 2016; 46.7% met Grade IV standard, the same as that of 2016; 26.7% met Grade V standard, down by 6.6 percentage points compared with that of 2016; and 13.3% failed to meet Grade V standard, up by 6.6 percentage points.

The waters of major tributaries of the Liaohe River were of heavy pollution. Among 21 water sections under national monitoring program, no section met Grade I standard, same as that of 2016; no section met Grade II standard, down by 9.5 percentage points compared with that of 2016; 14.3% met Grade III standard, down by 9.5 percentage points; 33.3% met Grade IV standard, up by 19.0 percentage points; 4.8% met Grade V standard, down by 19.0 percentage points; and 47.6% failed to meet Grade V standard, up by 19.0 percentage points.

The waters of the Daliaohe River System were of moderate pollution. Among 28 water sections under national monitoring program, no section met Grade I standard, same as that of 2016; 35.7% met Grade II standard, same as that of 2016; 25.0% met Grade III standard, up by 25.0 percentage points compared with that of 2016; 7.1% met Grade IV standard, down by 21.5 percentage points; 7.1% met Grade V standard, down by 10.8 percentage points; 25.0% failed to meet Grade V standard, up by 7.1 percentage points.

The waters of the Dalinghe River System were of slight pollution. Among 11 water sections under national monitoring program, no section met Grade I standard, the same as that of 2016; 27.3% met Grade II standard, down by 18.1 percentage points compared with that of 2016; 36.4% met Grade III standard, up by 27.3 percentage points; 36.4% met Grade IV standard, up by 27.3 percentage points; no section met Grade V standard or was inferior to Grade V standard, down by 27.3 and 9.1 percentage points respectively.

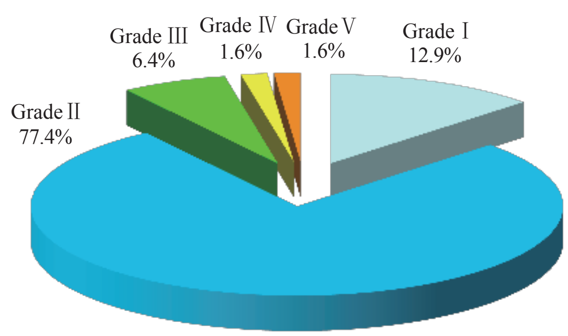
The waters of the Yalujiang River System were of excellent quality. Among 13 water sections under national monitoring program, 15.4% met Grade I standard; 69.2% met Grade II standard; 15.4% met Grade III standard; no section met Grade IV, V or was inferior to Grade V standard. Compared with that of 2016, the percentage of waters meeting Grade I were up by 7.7 percentage points, Grade II down by 15.4 percentage points, and Grade III up by 7.7 percentage points while other grades stood the same as that of 2016.



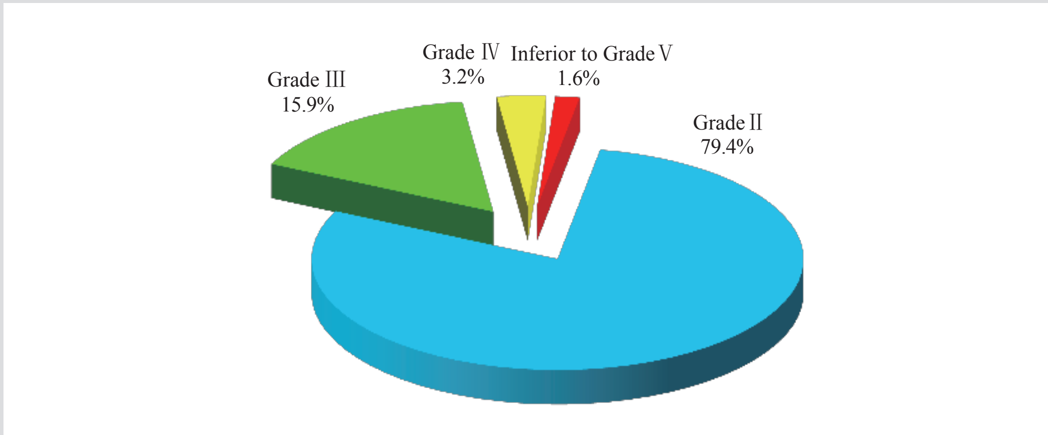

Proportion of Water Quality Grade of the Rivers in Zhejiang Province and Fujian Province in 2017

**Rivers in Zhejiang Province and Fujian Province** were of good water quality. Among 125 water sections under national monitoring program, 2.4% met Grade I standard, down by 0.8 percentage point compared with that of 2016; 40.8% met Grade II standard, down by 12.8 percentage points; 45.6% met Grade III standard, up by 8.0 percentage points; 7.2% met Grade IV standard, up by 4.0 percentage points; 3.2% met Grade V standard, up by 0.8 percentage point; and 0.8% failed to meet Grade V standard, up by 0.8 percentage points.

**Rivers in northwestern part of China** were of good water quality. Among 62 water sections under national monitoring program, 12.9% met Grade I standard, up by 8.1 percentage points compared with that of 2016; 77.4% met Grade II standard, up by 1.6 percentage points; 6.4% met Grade III standard, down by 6.5 percentage points; 1.6% met Grade IV standard, down by 3.2 percentage points; 1.6% met Grade V standard, the same as that of 2016; and no sections failed to meet Grade V standard, the same as that of 2016.




Proportion of Water Quality Grade of the Rivers in Northwestern Part of China in 2017

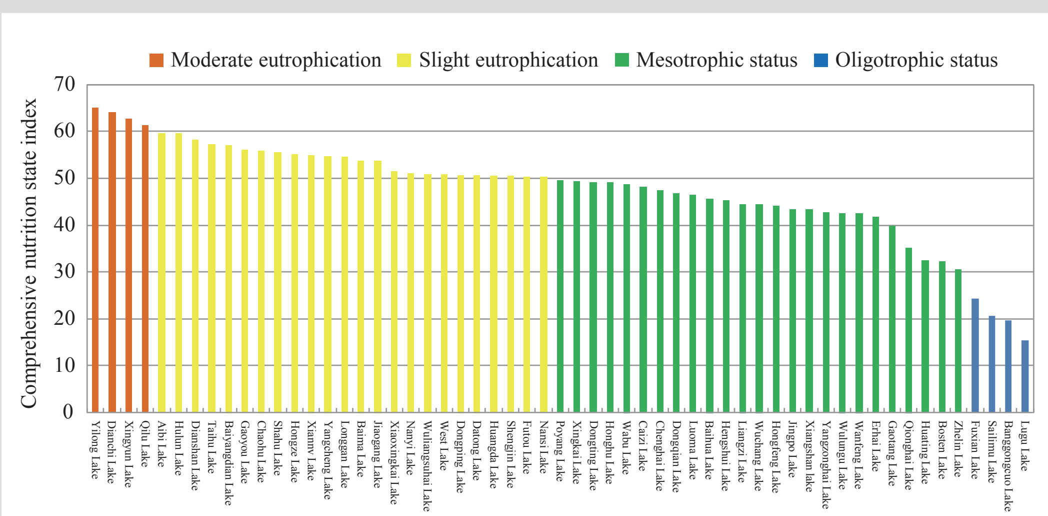



Proportion of Water Quality Grade of the Rivers in Southwestern Part of China in 2017

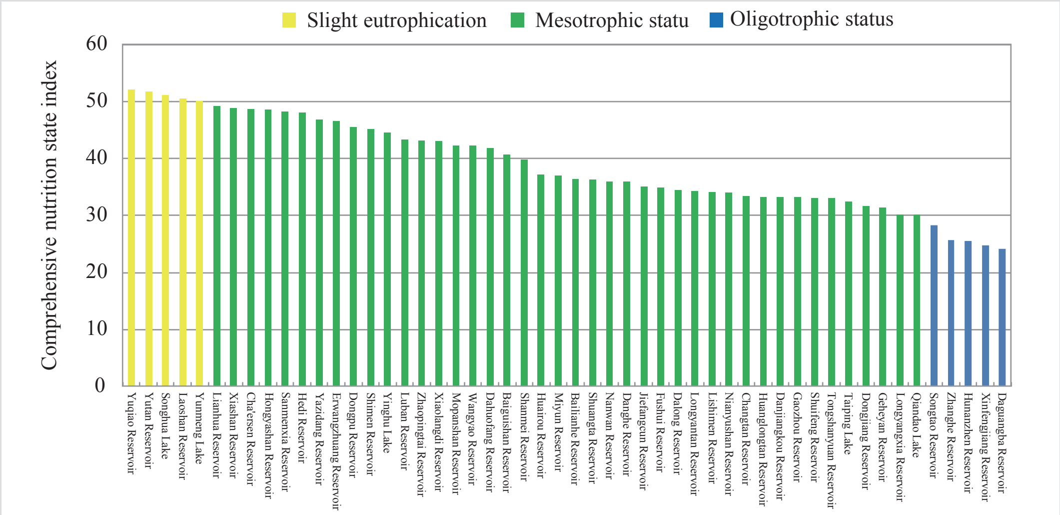
**Rivers in southwestern part of China** were of excellent water quality. In 63 water sections under national monitoring program, no section met Grade I standard, down by 1.6 percentage points compared with that of 2016; 79.4% met Grade II standard, the same as that of 2016; 15.9% met Grade III standard, up by 6.4 percentage points; 3.2% met Grade IV standard, down by 4.7 percentage points; no section met Grade V standard, the same as that of 2016; 1.6% failed to meet Grade V standard, the same as that of 2016.

## Lakes (reservoirs)

In 2017, among 112 major lakes (reservoirs) across the country, 6 lakes (reservoirs) met Grade I standard, taking up 5.4%; 27 met Grade II standard, taking up 24.1%; 37 met Grade III standard, taking up 33.0%; 22 met Grade IV standard, taking up 19.6%; 8 met Grade V standard, taking




Trophic Level Index of Major Lakes in 2017




Trophic Level Index of Major Reservoirs in 2017

up 7.1%; and 12 failed to meet Grade V standard, taking up 10.7%. The main pollution indicators were TP, COD and permanganate index. Among 109 lakes (reservoirs) under the monitoring of nutritional status, 9 were under oligotrophic status; 67 were under mesotrophic status; 29 were under slight eutrophication, and 4 were under intermediate eutrophication.

**The Taihu Lake** was of slight pollution. The main pollution indicator was TP. Among the 17 sites under national monitoring program, 2 met Grade III standard, taking up 11.8%, down by 11.7 percentage points compared with that of 2016; 9 met Grade IV standard, taking up 52.9%, down by 17.7 percentage points; 6 met Grade V standard, taking up 35.3%, up by 29.4 percentage points. No site met Grade I, II or failed to meet Grade V standard. Others remained the same as that of 2016.The Taihu Lake was under slight eutrophication.

The rivers surrounding the Taihu Lake were of slight pollution. The main pollution indicators were ammonia nitrogen, COD and TP. Among 55 water sections under national monitoring program, 9 met Grade II standard, taking up 16.4%, down by 5.4 percentage points compared with that of 2016; 30 met Grade III standard, taking up 54.5%, up by 7.2 percentage points; 12 met Grade IV standard, taking up 21.8%, down by 3.7 percentage points; and 4 met Grade V standard, taking up 7.3%, up by 1.8 percentage points. No section met Grade I or failed to meet Grade V standard. Others remained the same as that of 2016.

**The Chaohu Lake** was of moderate pollution. The main pollution indicator was TP. Among the 8 water sites under national monitoring program, 3 met Grade IV standard, taking up 37.5%, down by 25.0 percentage points compared with that of 2016; 5 met Grade V standard, taking up 62.5%, up by 25.0 percentage points. No site met Grade I, Grade II, Grade III or failed to meet Grade V standard. Others remained the same as that of 2016. The Chaohu Lake was under slight eutrophication on average.

The rivers surrounding the lake were under intermediate pollution. The main pollution indicators were ammonia nitrogen, TP and $BOD_5$. Among 14 water sections under national monitoring program, 1 met Grade II standard, taking up 7.1%. 9 met Grade III standard, taking up 64.3%. 1 met Grade IV standard, taking up 7.1%, up by 7.1 percentage points compared with that of 2016; 3 failed to meet Grade V standard, taking up 21.4%, down by 7.2 percentage points compared with that of 2016. No sections met Grade I or Grade V standard. Others remained the same as that of 2016.

**The Dianchi Lake** on average was of heavy pollution. The main pollution indicators were COD, TP and $BOD_5$. Among 10 sites under national monitoring program, 4 met Grade V standard, taking up 40.0%, down by 60 percentage points compared with that of 2016; 6 failed to meet Grade V, taking up 60.0%, up by 60 percentage points. No site met Grade I, II, III or IV standard, while others remained the same as that of 2016. The lake was under intermediate eutrophication on average.

The rivers surrounding the Dianchi Lake were of slight pollution. The main pollution indicators were TP, COD and ammonia nitrogen. Among 12 water sections under national

Water Quality of Major Lakes (Reservoirs) in 2017

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

*Ebinur Lake, Chenghai Lake, Ulungur Lake and Namtso Lake has relatively high fluoride natural background value; Chenghai Lake, Selin Lake and Yamdrok Lake have relatively high pH natural background value.

monitoring program, 1 met Grade II standard, taking up 8.3%; 3 met Grade III standard, taking up 25.0%; 6 met Grade IV standard, taking up 50.0%; 1 met Grade V, taking up 8.3%; 1 failed to meet Grade V standard, taking up 8.3%. No sections met Grade I standard. Compared with that of 2016, the percentage of sections meeting Grade III was up by 8.3 percentage points, Grade IV down by 8.3 percentage points, Grade V up by 8.3 percentage points, that inferior to Grade V down by 8.4 percentage points, and that of Grade I and II remained the same as that of 2016.

## Groundwater

In 2017, departments of the previous Ministry of Land and Resources carried out water quality monitoring of groundwater at 5,100 monitoring sites (1,000 of which were at national level) from 223 administrative regions at prefecture level in 31 provinces, autonomous regions or municipalities. The groundwater aquifer system was monitored as a unit, and the monitoring was carried out on shallow groundwater, mainly phreatic water, and on middle deep groundwater, mainly confined water. The assessment results show that 8.8%, 23.1%, 1.5%, 51.8% and 14.8% percent of them had excellent, good, relatively good, poor and very poor water quality respectively. The main pollution indicators that went beyond the standard limits included total hardness, manganese, iron, total dissolved solids, "three kinds of nitrogen" (nitrite nitrogen, nitrate nitrogen and ammonia nitrogen), sulfate, fluoride, chloride. Some monitoring sites saw indicators of heavy metals, including arsenic, hexavalent chromium, lead and mercury, exceeding the standard limits.

In 2017, the water conservancy authorities monitored the groundwater quality of key regions in Songliao Plain, the Huanghai-Huaihai Plain, Shanxi Province, the basin and plain areas of northwest China and Jianghan Plain. The monitoring was mainly carried out on shallow groundwater, which has basically covered areas with intensive development and utilization of groundwater, and serious pollution. The assessment results of 2,145 monitoring sites* show that the percent of monitoring sites with excellent, good, poor and very poor water quality was 0.9%, 23.5%, 60.9% and 14.6% respectively; there was no site with relatively good water quality. The main pollution indicators that went beyond the standard value, possibly due to relatively high background value of hydro-geological chemistry, included total hardness, total dissolved solids, manganese, iron and fluoride. In addition, the "three kinds of nitrogen" pollution was relatively heavy, and there was a certain degree of heavy metal and toxic organic pollution in some areas.

The Assessment Results of the Groundwater Quality of Different River Basins in 2017

| River basin | The percentage of monitoring sites (%) | | |
|---|---|---|---|
| | Excellent, good and relatively good | Poor | Very poor |
| Songhua River | 11.2 | 81.4 | 7.4 |
| Liaohe River | 8.8 | 81.0 | 10.2 |
| Haihe River | 31.4 | 52.8 | 15.7 |
| Yellow River | 26.8 | 45.7 | 27.5 |
| Huaihe River | 24.4 | 67.3 | 8.2 |
| Yangtze River | 14.3 | 80.0 | 5.7 |
| Inland rivers | 39.1 | 47.8 | 13.0 |
| Nationwide | 24.4 | 60.9 | 14.6 |

## Centralized drinking water source areas of APL cities

In 2017, among 898 monitoring sections (sites) of the centralized drinking water source in 338 APL cities across the country, 813 met water quality standard for the whole year, taking up 90.5% of the total. Among them, 569 were surface drinking water source monitoring section (sites), 533 of which met water quality standard for the whole year, taking up 93.7%. Major pollution indicators that went beyond

*The assessment method is based on the comprehensive evaluation standard from The Quality Standard of Groundwater (GB/T 14848-93). The microbiological indicators such as total coliform group and total bacterial number were not included.

the standard value were sulfate, iron and TP. There were 329 groundwater drinking water source monitoring section (sites), 280 of which met water quality standard for the whole year, taking up 85.1% with major pollutants of manganese, iron and ammonia nitrogen exceeding standard value.

## Key water conservancy projects

**Three Gorges Project Area** In 2017, among surface water monitoring indicators of main tributaries of Yangtze River in Three Gorges Project area, 7 indicators exceeded relevant quality standard. The percentage of the indices exceeding national quality standard for TP was 4.0%, COD 3.2%, ammonia nitrogen 1.5%, permanganate index 1.2%, $BOD_5$ 1.1%, anionic surfactant 0.1% and dissolved oxygen (DO) 0.2%.

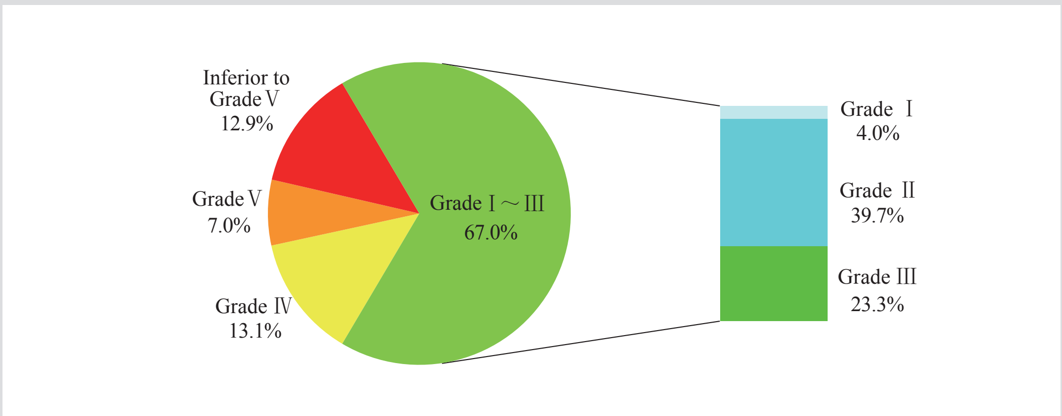
The comprehensive trophic state index of 77 monitoring sections was within the range of 23.1~79.6, among which 18.2% were at eutrophic status, 78.9% mesotrophic status and 2.9% oligotrophic status.

**South-North Water Diversion Project (East Route)** The Sanjiangying Section of the Jiajiang River, an intake of the East Route of South-North Water Diversion Project, met Grade III water quality standard. The Lunan Section of Beijing-Hangzhou Canal in the Middle Route met Grade IV standard. The Liyun Section, Baoying Section, Suqian Section, Hanzhuang Section and Liangji Section of Beijing-Hangzhou Canal in the Middle Route all met Grade III standard. Hongze Lake was of light eutrophication. Luoma Lake was at light eutrophication status, and Nansi Lake was at mesotrophic status, while Dongping Lake was of light eutrophication.

**South-North Water Diversion Project (Central Route)** Danjiangkou Reservoir was at mesotrophic status. Among the 17 water sections of 9 tributaries flowing into the Danjiangkou Reservoir, 1 section of the Hanjiang River met Grade I water quality standard; 5 sections met Grade II standard; 1 section of Danjiang River met Grade III standard, and 3 sections met Grade II standard. The inflow sections of the Tianhe River, Guanshan River and Langhe River met Grade III standard. 4 sections of Jinqian River, Duhe River, Laoguan River and Qihe River met Grade II standard. The intake of Taocha section met Grade III standard.

## Provincial boundary waters

In 2017, the monitoring results of 544 important provincial boundary water sections across the country show that the percentage of sections meeting Grade I, Grade II, Grade III, Grade IV, Grade V and inferior to Grade V standard was 4.0%, 39.7%, 23.3%, 13.1%, 7.0% and 12.9% respectively. Major pollution indicators were COD, ammonia nitrogen and TP. The percentage of sections meeting Grade I~III was almost the same as that of 2016 and 4.2 percentage points reduction was witnessed for sections failing to meet Grade V standard compared with that of 2016.




Proportion of Water Quality Grade of Provincial Boundary Water Sections Nationwide in 2017

## Inland fisheries water

In 2017, National Fishery Ecological Environment Monitoring Network monitored 80 important spawning sites for fish and shrimp, feeding grounds, migration waterways, spawning zones and nature reserves of the Heilongjiang River basin, Yellow River basin, Yangtze River basin and Pearl River basin covering a total monitoring area of 1.873 million ha. Major pollution indicator of important river fisheries water was TN. Water areas with concentration of TN, permanganate index, TP, copper, petroleum, volatile phenol and nonionic ammonia superior to the assessment standard* accounted for 4.0%, 58.0%, 60.9%, 86.3%, 99.1%, 99.2% and 99.95% of the total monitoring areas respectively. The areas with indicators of permanganate index and copper exceeding standard increased at different degrees, while that of TN, TP, nonionic ammonia and volatile phenol decreased slightly compared with that of 2016. Major pollution indicators of important fisheries water of lakes and reservoirs were TN, TP and permanganate index. Water areas with concentration of TN, TP, permanganate index, petroleum, copper and volatile phenol superior to the assessment standard accounted for 8.8%, 14.6%, 34.8%, 86.3%, 91.9% and 98.2% of the total monitoring areas respectively. Compared with that of 2016, the areas with standard-exceeded indicators of permanganate index, petroleum and volatile phenol increased at different degrees, while that of TN, TP and copper decreased at different degrees. 41 national aquatic germplasm conservation areas (inland) were under national monitoring, covering a total monitoring area of 3.722 million ha. The major pollution indicator was TN. Water areas with concentration of TN, nonionic ammonia, permanganate index, petroleum, volatile phenol and TP superior to the assessment standard accounted for 0.9%, 80.1%, 93.9%, 94.4%, 96.1% and 98.2% of the total monitoring areas respectively.

*The ratio of water areas superior to the assessment standard refers to the percentage taken up by the water area of a monitored item that is superior than the evaluation standard of the total area (fishery water quality standard/surface water environmental quality standard/seawater quality standard), similarly hereinafter.

# Marine Environment

## All Sea Areas

The marine areas meeting Grade I standard took up 96% of total marine area under jurisdiction of PRC in summer of 2017. The marine area failing to meet Grade IV standard was 3,700 $km^2$, less than that of 2016.

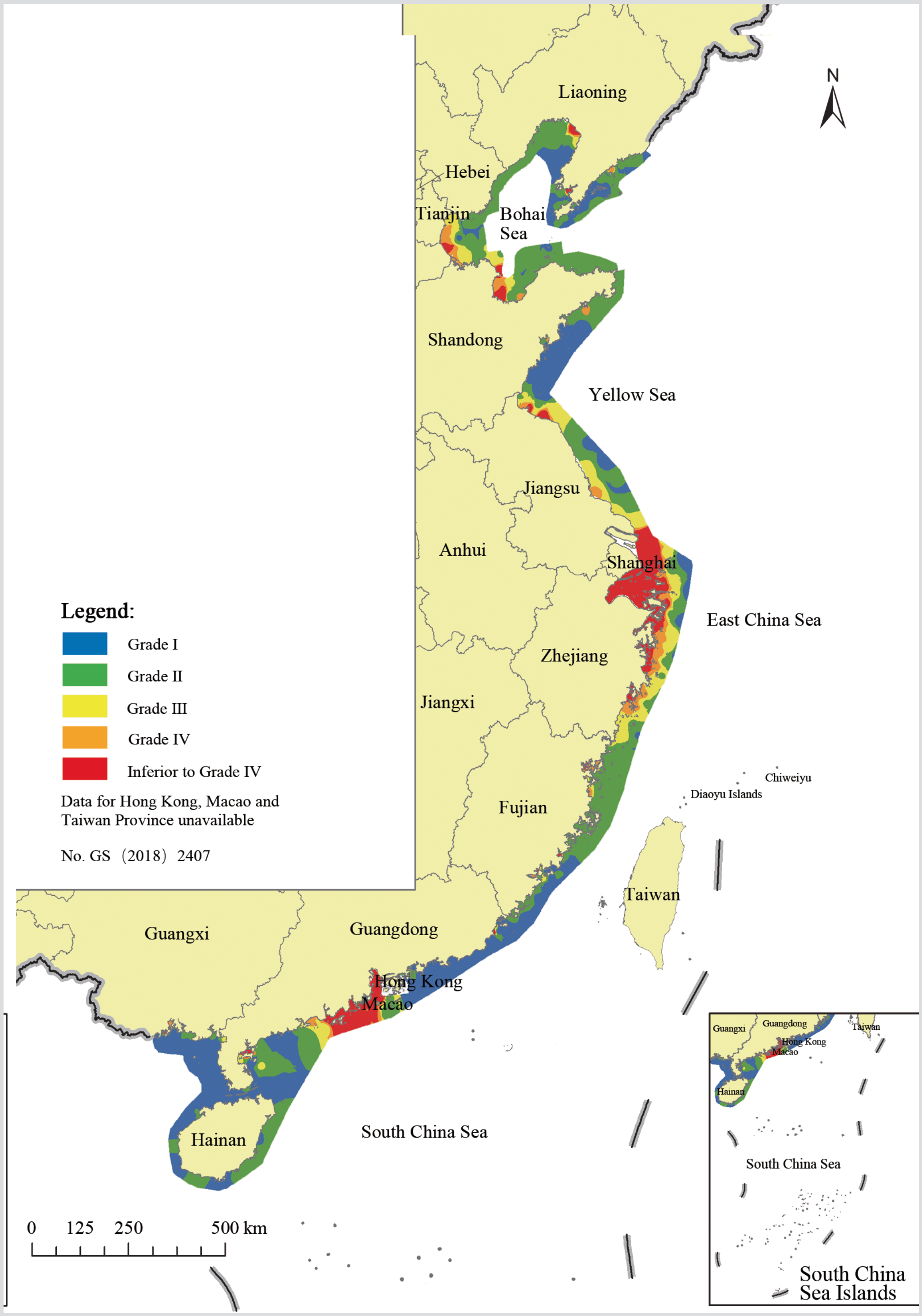
The Marine Areas Failing to Meet Grade I standard in 2017

| Marine area | Season | Marine area at different water quality grades ($km^2$) | | | |
|---|---|---|---|---|---|
| | | Grade Ⅱ | Grade Ⅲ | Grade Ⅳ | Inferior to Grade Ⅳ |
| Bohai Sea | Summer | 8, 940 | 3, 970 | 2, 120 | 3, 710 |
| | Autumn | 15, 710 | 8, 300 | 4, 780 | 3, 690 |
| Yellow Sea | Summer | 17, 280 | 7, 090 | 2, 610 | 1, 240 |
| | Autumn | 20, 980 | 10, 980 | 9, 440 | 3, 840 |
| Donghai Sea | Summer | 17, 610 | 9, 260 | 11, 400 | 22, 210 |
| | Autumn | 23, 380 | 10, 260 | 11, 850 | 34, 510 |
| South China Sea | Summer | 6, 000 | 8, 220 | 2, 110 | 6, 560 |
| | Autumn | 11, 900 | 8, 900 | 4, 210 | 5, 270 |
| All sea areas | Summer | 49, 830 | 28, 540 | 18, 240 | 33, 720 |
| | Autumn | 71, 970 | 38, 440 | 30, 280 | 47, 310 |

## Nearshore Marine Areas

In 2017, water quality of nearshore marine water remained stable. Major pollution indicators were inorganic nitrogen and active phosphates. Among 417 nearshore marine water monitoring sites under national monitoring program, 34.5% met Grade I* water quality standard, up by 2.1 percentage points compared with that of 2016; 33.3% met Grade Ⅱ standard, down by 7.7 percentage points; 10.1% met Grade III standard, down by 0.2 percentage point; 6.5% met Grade IV standard, up by 3.4 percentage points; 15.6% failed to meet Grade IV standard, up by 2.4 percentage points.

*Marine water percentage: The percentage of the number of certain types of marine water monitoring sites against the total number is marine water percentage.




Water Quality of Nearshore Marine Waters of China in 2017

**Bohai Sea** Nearshore marine water quality of Bohai Sea was relatively good. The major pollutant was inorganic nitrogen and petroleum. 19.8% of nearshore marine water met Grade I quality standard, down by 8.6 percentage points compared with that of 2016; 48.1% met Grade II standard, up by 3.7 percentage points; 14.8% met Grade III standard, down by 2.5 percentage points; 7.4% met Grade IV standard, up by 2.5 percentage points; and 9.9% failed to meet Grade IV standard, up by 5.0 percentage points.

**Yellow Sea** Nearshore marine water quality of Yellow Sea was good. The major pollutant was inorganic nitrogen. 37.4% of nearshore marine water met Grade I standard, down by 1.1 percentage points compared with that of 2016; 45.1% met Grade II standard, down by 5.4 percentage points; 9.9% met Grade III standard, up by 5.5 percentage points; 5.5% met Grade IV standard, same as that of 2016; and 2.2% failed to meet Grade IV standard, up by 1.1 percentage points.

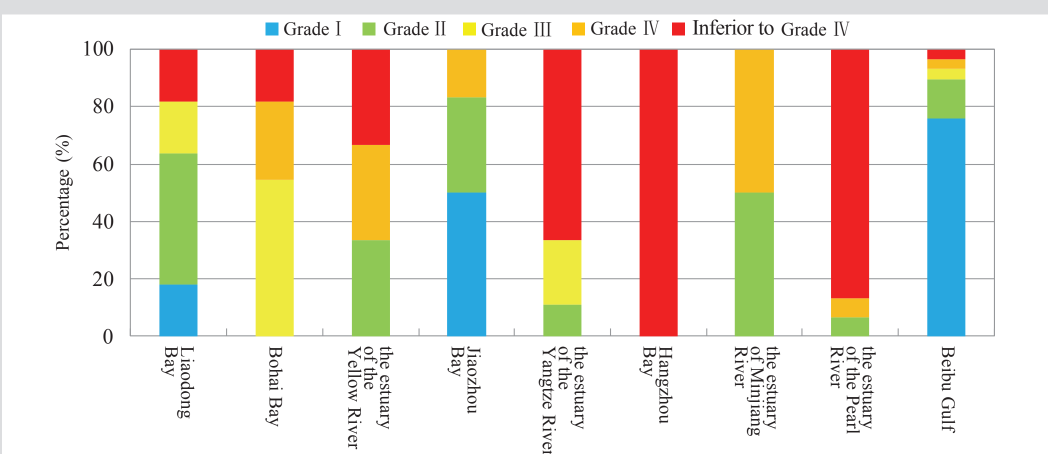
**East China Sea** Nearshore marine water of East China Sea was of poor quality, and the major pollution indicators were inorganic nitrogen and active phosphate.15.9% of nearshore marine water met Grade I standard, up by 3.5 percentage points compared with that of 2016; 31.0% met Grade II standard, down by 0.9 percentage point; 12.4% met Grade III standard, down by 2.6 percentage points; 9.7% met Grade IV standard, up by 6.2 percentage points; and 31.0% failed to meet Grade IV standard, down by 6.2 percentage points.

**South China Sea** Nearshore marine water of South China Sea was relatively good, and major pollution indicators were inorganic nitrogen, pH and active phosphate. 57.6% of nearshore marine water met Grade I standard compared with that of 2016, up by 9.9 percentage points; 18.2% met Grade II standard, down by 22.0 percentage points; 5.3% met Grade III standard, down by 0.8 percentage point; 3.8% met Grade IV standard, up by 3.8 percentage point; 15.2% failed to meet Grade IV standard, up by 9.1 percentage points.

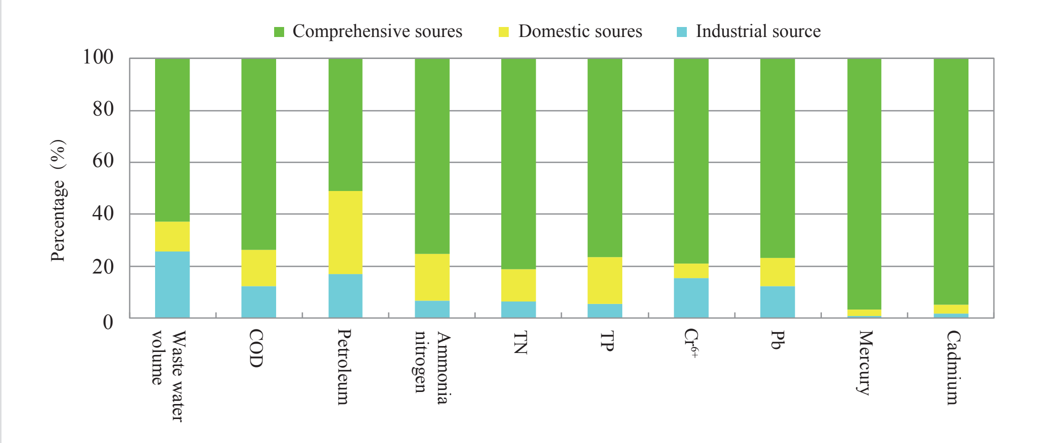
**Important estuaries and gulfs** Among 9 important bays, Jiaozhou Gulf and Beibu Gulf had good water quality. Liaodong Bay was of relatively good water quality; while the marine water quality of Bohai Gulf, estuary of Yellow River and the Minjiang River was poor. The estuary of the Yangtze River, Hangzhou Bay and estuary of the Pearl River had extremely poor water quality. The water quality of Jiaozhou Gulf and the estuary of the Minjiang River turned better; the water quality of estuary of the Yellow River, Pearl River and Beibu Gulf became worse, and water quality of other bays basically remained the same compared with that of 2016.

**Sea-going rivers** In 2017, among 195 monitoring sections of the rivers flowing into sea, no section met Grade I standard. 27 sections met Grade II standard, taking up 13.8%; 66 sections met Grade III standard, taking up 33.8%; 48 sections met Grade IV standard, taking up 24.6%; 13 sections met Grade V standard, taking up 6.7%; and 41 sections failed to meet Grade V standard, taking up 21.0%. The main pollution indicators were COD, TP, and permanganate index.

**Water pollution sources directly discharged into the sea** In 2017, as the monitoring results of the 404 industrial pollution sources, domestic pollution sources and comprehensive drain outlets directly discharged into the sea with daily discharge volume exceeding100 $m^3$ showed, the total discharge volume of effluent was about 6.36042 billion t, while the discharge volume of COD was 172,414 t, 906.3 t for




The Percentage of Water Quality Grade of Nearshore Marine Water of Important Estuaries and Gulfs in 2017




The Percentage of Discharge of Major Pollutants from Different Types of Pollution Sources in 2017

petroleum, 10,759 t for ammonia nitrogen, 56,625 t for TN, and 2,169 for TP. Some of the sources discharged pollutants such as mercury, hexavalent chromium, Pb, and cadmium into the sea.

## Marine fisheries water

In 2017, the National Fishery Ecological Environment Monitoring Network monitored 41 key spawning grounds, feeding grounds, migration channels, nature reserves and marine culture areas for fish, shrimp, shellfish and alga, which were distributed in the Yellow Sea, Bohai Sea, East China Sea and South China Sea, covering a total area of 5.606 million ha. The monitoring results showed that the major pollution indicators were inorganic nitrogen and reactive phosphate. Water areas with the monitoring concentration of inorganic nitrogen, reactive phosphate, COD and petroleum superior to the assessment standard accounted for 20.0%, 35.7%, 59.7% and 94.4% of the total monitoring area respectively. There was some increase in area with COD exceeded the standard value compared with that of 2016. The major pollution indicator was inorganic nitrogen in key marine culture areas. Water areas with the monitoring concentration of inorganic nitrogen, reactive phosphate, petroleum, and COD superior to the assessment standard accounted for 36.5%, 63.6%, 72.0% and 85.4% of the total monitoring area respectively. There was a bit decrease of area with inorganic nitrogen, reactive phosphate, petroleum, and COD exceeded the standard value compared with that of 2016. The monitoring of sediments of 33 important marine fisheries water showed that the area* with petroleum and copper exceeded the standard value accounted for 3.7% and 9.1% respectively, and the average concentration of zinc, Pb, cadmium, mercury, and arsenic was superior to the assessment standard. The monitoring of 8 national aquatic germplasm resource protection areas (seas) covering 323,000 ha showed that major pollution indicator was inorganic nitrogen. Water areas with the monitoring concentration of inorganic nitrogen, COD, petroleum, and reactive phosphate superior to the assessment standard accounted for 28.9%, 54.7%, 61.3% and 92.6% of the total monitoring area respectively.

*The ratio of nonattainment area refers to the percentage taken up by nonattainment waters under a certain measurement item of the total number of waters of that type.

# Land Environment

## Land resource and farmland

Up to the end of 2016*, there were 645.1266 million ha agricultural land across the country, 134.9210 million ha of which were farmland, 14.2663 million ha were garden plot, 252.9081 million ha were forest, 219.3592 million ha were pasture and grassland; and 39.0951 million ha were construction land. 31.7947 million ha construction land was used as urban village and industrial and mining land.

The average quality of farmland across the country in 2017 was at Grade 5.09**. Among which, a total of 555 million mu farmland were at high grade, taking up 27.4% of the total area; 912 million mu were at intermediate grade, taking up 45.0% of the total; and 559 million mu were at low grade, taking up 27.6% of the total.

**Agricultural non-point source** In 2017, the proportion of agricultural water consumption in the overallwater consumption was 62.4%, and the effective utilization coefficient of farmland irrigation water was 0.536. The utilization rate of fertilizers for the three major food crops of rice, corn and wheat was 37.8%, 2.6 percentage points higher than that of 2015. The utilization rate of pesticides was 38.8%, 2.2 percentage points higher than that of 2015. The comprehensive utilization rate of livestock and poultry manure was 64%. The comprehensive utilization of straw was about 82%.

## Water loss and soil erosion

According to the findings of the First National Census on Water***, there were 2.949 million km$^2$ of land subject to water and soil erosion in China, taking up 31.1% of the total area under the census. Among them, 1.293 million km$^2$ were under water erosion and 1.656 million km$^2$ were under wind erosion.

In 2017, 59,000 km$^2$ of land was added under the comprehensive management of soil and water erosion nationwide.

## 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$^2$ of desertification land and 1.7212 million km$^2$ of sandy land across the country up to 2014. Compared with that of 2009, there was a net decrease of 12,120 km$^2$ of desertification land with annual average drop of 2,424 km$^2$; 9,902 km$^2$ net reduction of sandification area with annual drop of 1,980 km$^2$ , over the past 5 years.

*By the time this Report was published, 2016 data was employed due to undergoing review of 2017 data.

**Based on *National Assessment of Quality of Farmland* (GB/T 33469-2016), there are 10 grades for assessing the quality of farmland. Grade 1 is the best and Grade 10 is the poorest. High grade refers to Grade 1~3 , intermediate grade refers to Grade 4~6 , and low grade refers to Grade 7~10 .

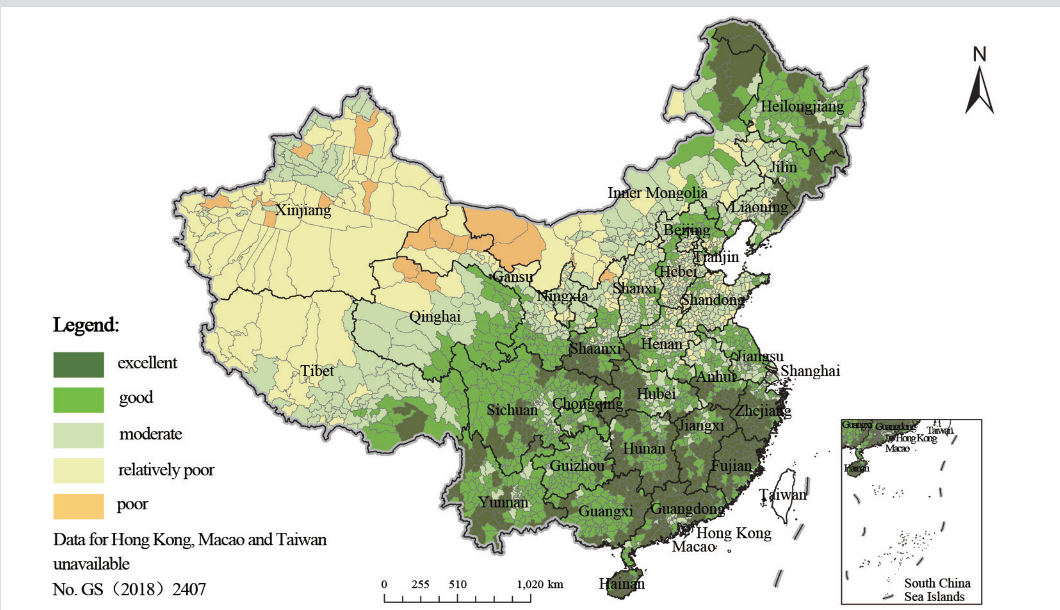
***By the time this Report was published, the findings of water and soil conservation of the First National Census on Water remain to be the latest data, so they are adopted here.

****By to the time this Report was published, the monitoring results of the Fifth National Monitoring of Desertification Land and Sandy Land remain to be the latest data, so they are adopted here.

# Natural and Ecological Environment

## Ecological environment quality

In 2016*, out of the 2,591 county cities, 534, 924, 766, 341 and 26 had excellent, good, average, relatively poor, and poor ecological environment quality** respectively. The total area of counties with excellent or good ecological environment quality took up 42.0% of total land area. They are mainly distributed in the region south to Qinling Mountain and the Huaihe River, Daxing'anling, Xiaoxing'anling areas and Changbai Mountain region in Northeast China. The total area of counties with moderate ecological environment quality took up 24.5%, mainly distributed in 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 ecological environment quality took up 33.5% 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–environment Quality of China in 2016

*By the time this Report was published, 2016 data was employed due to undergoing review of 2017 data.

**Eco-environment quality: It 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 at 55~75 indicates good environment with relatively high vegetation coverage, relatively rich biodiversity and suitable for human life. Ecological Index 35~55 refers to moderate eco-environment with intermediate vegetation coverage, general biodiversity and relatively suitable to human life but with some constraining factors . Ecological Index at 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.

Based on satellite remote sensing monitoring, environmental quality monitoring, comprehensive ecological environmental protection management evaluation, as well as detailed investigations of human-factor-induced environmental emergencies and natural ecological changes in local regions, etc., the monitoring of the ecological environment of 818 counties and regions enjoying government financial support in national key ecological functional areas was conducted, among which, the ecological environment changes in 723 counties and regions from 2015 to 2017 were assessed (Sansha City of Hainan Province, and 94 new-added counties were not included). Compared with that of 2015, among 723 counties, 57 counties witnessed improved ecological environment in in 2017, accounting for 7.9% of the total; 585 counties remained a stable ecological environment, accounting for 80.9%; 81 counties saw worsened ecological environment, accounting for 11.2%.

## Biodiversity

In terms of ecosystem diversity, China has all kinds of terrestrial ecosystems on Earth. There are 212 types of forest, 36 types of bamboo forest, 113 types of shrubs, 77 types of meadows, and 52 types of deserts. The freshwater ecosystems in China are complex. Natural wetlands include 4 types: marsh, nearshore and coastal wetland, riparian wetland, and lake wetland. For nearshore marine waters, there are 4 major marine ecosystems such as the Yellow Sea, East China Sea, South China Sea, and Kuroshio Basin, distributed in typical marine ecosystems such as coastal wetland, mangrove, coral reef, estuary, gulf, lagoon, island, upwelling, and seagrass bed; natural landscape and natural relics such as submarine ancient forest, marine-abrasion, and marine accumulation geomorphy, etc. There are also artificial ecosystems such as cropland ecosystem, artificial forest ecosystem, artificial wetland ecosystem, artificial grassland ecosystem, and urban ecosystem.

In terms of biodiversity, 92,301 species and subspecies have been discovered in China. Among them, 38,631 belong to animalia species, 44,041 belong to botanical species, 469 belong to bacteria species, 2,239 belong to pigment species, 4,273 belong to fungi, 1,843 belong to protogenesis animalia, and 805 belong to virus. A total of 420 rare and endangered wildlife species are included in *the National Catalogue of Wildlife under Key State Protection*. Several hundreds of animal species are unique in China including giant panda, crested ibis, golden monkey, South China tiger, and Yangtze alligator.

In terms of 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 3,767 species were endangered, taking up 10.9% of all the species assessed. 2,723 species belong to Near Threatened (NT) Grade and 3,612 belong to Data Deficient (DD) Grade. 10,102 species of higher plants are subject to special attention and protection, taking up 29.3% of the total.

The endangerment assessment results of the 4,357 identified vertebrates (marine fishes were not included) show that 932 vertebrates were endangered, taking up 21.4%; 598 vertebrates belong to NT Grade and 941 belong to DD Grade. 2,471 vertebrates are subject to special attention and protection, taking up 56.7% of the total assessment number.

## Nature reserves

Up to the end of 2017, 2,750 nature reserves of various kinds at different administrative levels had been established across the country with a total area of 1.4717 million $km^2$; 1.4270 million $km^2$ of which were land, taking up 14.86% of total land area. There were 463 national nature reserves with a total area of 974,500 $km^2$.

**Wetland** In 2017, the total number of national pilot wetland parks reached 898, and 64 new national pilot wetland parks were approved.

**Geopark** Up to the end of 2017, there were 6,228 major geological relic sites above the provincial level. There were 53 national key protection sites of fossil specimens, 35 UNESCO-approved world geoparks, 207 national geoparks, and 33 national mine parks. 8 new national geological parks have been added, with an area of 72,800 ha.

**Scenic spots** Up to the end of 2017, 244 scenic spots at national level had been established with total area of about 106,600 $km^2$, taking up 1.11% of the total land area of China. 807 scenic spots at provincial level covered an area of 107,400 $km^2$. Scenic spots at and above provincial level took up 2.23% of the total land area of China. 42 scenic spots at national level and 10 scenic spots at provincial level were added to the UNESCO World Heritage List.

Various Types of Nature Reserves of China in 2017

| Type | Amount | | | | | Area (ha) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | National | Provincial | Municipal | County –level | Total | National | Provincial | Municipal | County –level | Total |
| Forest | 212 | 384 | 225 | 613 | 1, 434 | 15, 431, 482 | 11, 747, 487 | 2, 202, 929 | 2, 411, 542 | 31, 793, 440 |
| Grassland and meadow | 4 | 12 | 3 | 22 | 41 | 731, 424 | 401, 243 | 39, 416 | 479, 606 | 1, 651, 689 |
| Desert | 13 | 13 | 0 | 5 | 31 | 36, 700, 178 | 3, 273, 486 | 0 | 80, 624 | 40, 054, 288 |
| Inland wetland | 55 | 172 | 63 | 91 | 381 | 20, 704, 601 | 6, 644, 232 | 1, 820, 263 | 1, 817, 870 | 30, 986, 966 |
| Sea coast | 17 | 13 | 14 | 24 | 68 | 512, 529 | 50, 592 | 116, 710 | 37, 007 | 716, 838 |
| Wild animals | 123 | 161 | 80 | 162 | 526 | 22, 248, 516 | 13, 389, 513 | 538, 223 | 2, 517, 663 | 38, 693, 915 |
| Wild plants | 19 | 41 | 16 | 75 | 151 | 782, 110 | 464, 772 | 142, 617 | 360, 645 | 1, 750, 144 |
| Geological relics | 13 | 40 | 11 | 21 | 85 | 172, 346 | 715, 844 | 14, 269 | 67, 975 | 970, 434 |
| Ancient biological relics | 7 | 19 | 4 | 3 | 33 | 168, 393 | 259, 148 | 120, 965 | 1, 051 | 549, 557 |
| Total | 463 | 855 | 416 | 1, 016 | 2, 750 | 97, 451, 579 | 36, 946, 317 | 4, 995, 392 | 7, 773, 983 | 147, 167, 271 |

## Forest Environment

**Forest Resource** According to the findings* of the Eighth National Investigation on Forest Resources (2009-2013), the total forest area of the country was 208 million ha with forest coverage at 21.63%. The total forest reserves were 15.137 billion $m^3$. According to the 2015 Global Forest Resources Assessment issued by the UN Food and Agriculture Organization, China ranked No.5 in forest area and No.6 in forest reserves in the world. The artificial forest area of China ranked No.1 in the world.

**Forest biological hazards** In 2017, 12.4016 million ha forests across the country were subject to relatively heavy impacts of forestry pest, up by 2.38% compared with that of 2016. A total of 8.95 million ha forests were under insect hazards, up by 4.43%. A total of 1.318 million ha forests were under tree disease, down by 1.74%. A total of 1.9349 million ha forests were subject to rat and rabbit hazards, down by 0.97% compared with that of 2016. A total of 198,800 ha forests were subject to hazardous plants, up by 3.60%. In 2017, the total area under prevention and control reached 16.1175 million ha. The disaster rate of major forestry pest was controlled under 4.5‰, and over 85% of total forests had no forestry pests.

The invasion of 43 alien species has caused serious damages to forestry. Among them, North American pinewood nematode (Bursaphelenchus xylophilus), American white moth (Hyphantria cunea), pine greedy scale (Hemiberlesia

*By the time this Report was published, the findings of the *Eighth National Investigation on Forest Resources* (2009-2013) remained to be the latest data, so they are adopted here.

pitysophila Takagi), Lobdelly Pine Mealybug (Oracella acuta (lobdell) Ferris), dendroctonus valens, matsucoccus matsumurae, Cydia pomonella, botryosphaeria laricina, corythucha ciliate, eriosoma Lanigerum, brontispa longissimi, lecanosticta acicola, leptocybe invasa Fisher et LaSalle, octodonta nipae, opisina arenosella walker, obolodiplosis robiniae, solenopsis invicta, cronartium flaccidum wint, rhabdoscelus lineaticollis, rhynchophorus ferrugineus, Quadrastichus erythrinae Kim, and pine sheathed mosquito affected forests of 166,700 ha.

**Forest fire** In 2017, there were a total of 3,223 forest fires across the country, among which 2,258 were of general incidence , 958 were of relatively big scale, 4 were serious forest fires, and 3 were devastating forest fires, affecting 24,502.43 ha of forests with 46 casualties (including 30 deaths). Compared with that of 2016, the number of forest fires, the area of damaged forests, and the number of casualties went up by 58.46%, 293.69%, and 27.78% respectively (the number of deaths up by 50%). Compared with the average of the previous three years (2014-2016), the number of forest fires and the area of damaged forests went up by 11.48% and 92.05%, and the number of casualties went down by 20.69% (the number of deaths down by 6.25%).

## Grassland Environment

**Grassland resource** In 2017, grassland area across the country was about 400 million ha, accounting for about 41.7% of total land area. It is the biggest terrestrial ecosystem and ecological security barrier in China. North China and West China are the main areas of natural grassland. The total grassland area of the 6 big pasture regions of Inner Mongolia, Xinjiang, Tibet, Qinghai, Gansu, and Sichuan was 293 million ha, accounting for 3/4 of total grassland area of China. The grassland in southern part of China was dominated by grass hills and slope grass land, mostly located in mountain and hill areas with total area about 67 million ha.

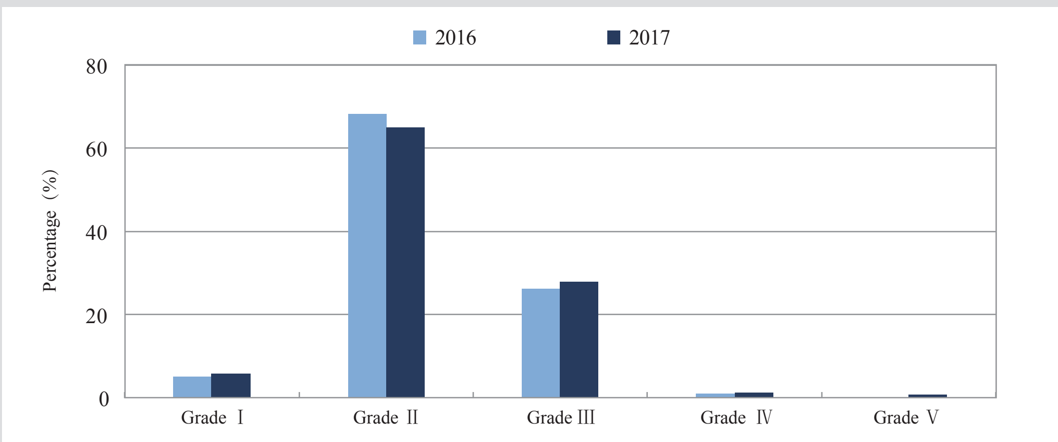
**Grassland productivity** In 2017, the comprehensive vegetation coverage rate of grassland was 55.3%, up by 0.7 percentage point compared with that of 2016. The total fresh grass output of natural grassland was 1,064.9118 million t, up by 2.53% and equivalent to 328.4193 million t dry grass; the carrying capacity for livestock was about 258.1422 million sheep, both up by 2.54% compared with that of 2016. The total fresh grass output of 23 major provinces (autonomous regions or municipalities) was 990.8463 million t, taking up 93.04% of the total and equivalent to 310.1029 million t dry grass, and the carrying capacity for livestock was about 243.6819 million sheep.

**Grassland disaster** In 2017, there were 58 grassland fires across the country. All of them were of general incidence , affecting 3,100 ha grassland in accumulation with 3.35 million Yuan of economic loss. No loss of livestock or casualties in these fires. The number of occurrences of serious grassland fire decreased by 1, fire affected area decreased by 34,000 ha and economic loss decreased by 2.72 million Yuan compared with that of 2016. A total of 28.447 million ha of grassland across the country was affected by rat, down by 1.3% and taking up about 7.2% of total grassland area. A total of 12.961 million ha of grassland across the country was affected by insect, up by 3.6% compared with that of 2016 and accounting for about 3.3% of total grassland area nationwide.

# Acoustic Environment

## Regional Acoustic Environment

In 2017, regional acoustic environment of 323 APL cities with 55,823 sites was under monitoring, and the average regional noise was 53.9 dB (A). Among them, 19 cities met Grade I daytime environmental noise standard, taking up 5.9%; 210 cities met Grade II daytime environmental noise standard, taking up 65.0%; 90 cities met Grade III noise standard, taking up 27.9%; 3 cities met Grade IV daytime noise standard, taking up 0.9%; and 1 city met Grade V daytime noise standard, taking up 0.3%*.



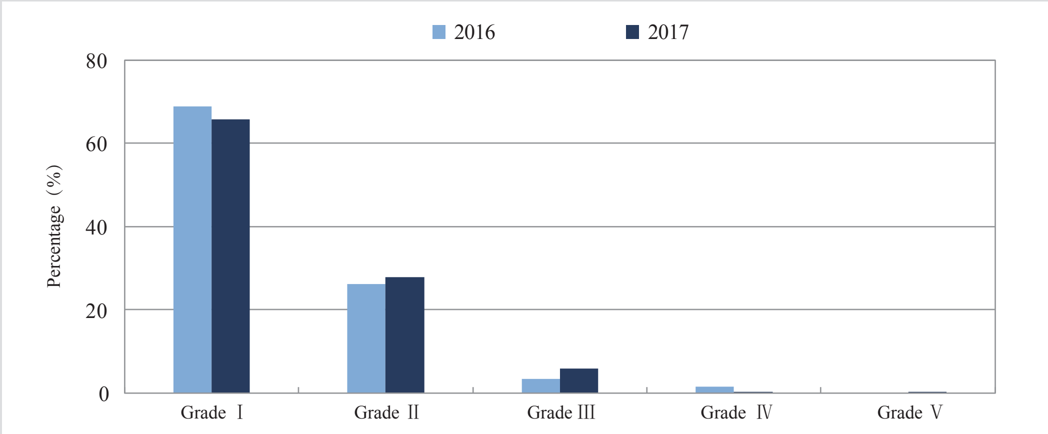

Annual Comparison of Urban Daytime Regional Noise of Cities across China between 2016 and 2017

## Traffic noise

In 2017, the average traffic noise of 324 APL cities with 21,115 monitoring sites on daytime noise monitoring was 67.1 dB (A). Among them, 213 cities met Grade I traffic noise standard, taking up 65.7%; 90 cities met Grade II traffic noise standard, taking up 27.8%; 19 cities met Grade III traffic noise standard, taking up 5.9%; 1 city met Grade IV traffic noise standard, taking up 0.3%; 1 city met Grade V traffic noise standard, taking up 0.3% of the total**.

*The average equivalent sound level of regional 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 is poor (Grade V).

**The average equivalent sound level of traffic noise ≤ 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).




Annual Comparison of Urban Daytime Traffic Noise of Cities across China between 2016 and 2017

## Acoustic environment of urban functional zones

In 2017, acoustic environment of urban functional zones of 311 cities at or above prefecture level was under monitoring, with 21,838 monitoring sites for different functional zones, among which10,919 sites are for daytime monitoring and night monitoring respectively. On average, 10,041 daytime monitoring sites met noise standard with the attainment rate of 92.0%; 8,075 night noise monitoring sites met noise standard with the attainment rate of 74.0%*.

The Annual Comparison of Noise Attainment Rate of Different Functional Zones of Cities across China between 2016 and 2017 (Unit: %)

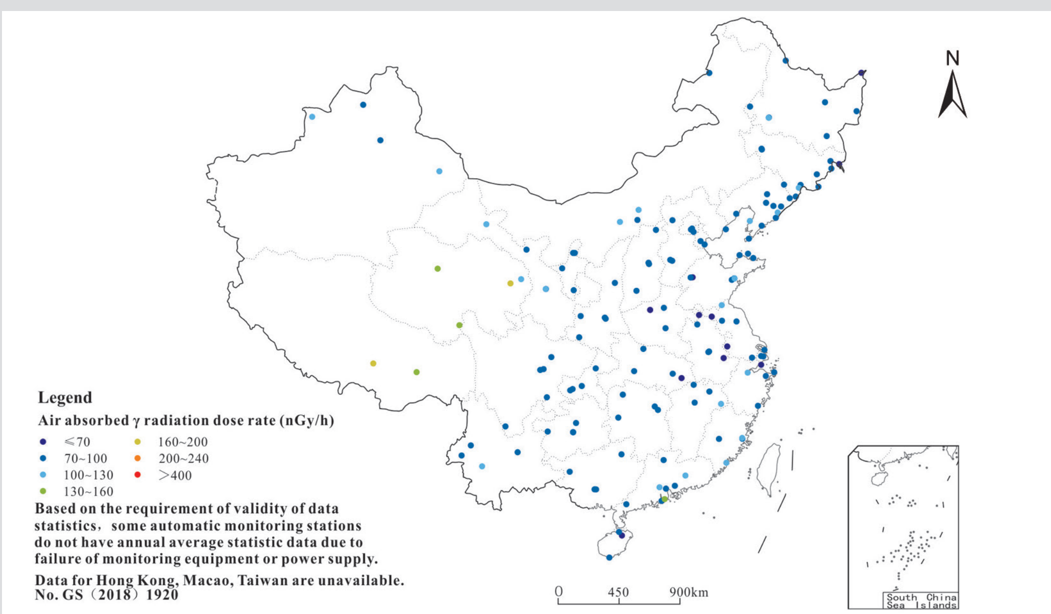
| Year | Type 0 | | Type 1 | | Type 2 | | Type 3 | | Type 4a | | Type 4b | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Day | Night | Day | Night | Day | Night | Day | Night | Day | Night | Day | Night |
| 2017 | 76.7 | 58.3 | 86.7 | 73.3 | 92.1 | 82.5 | 96.7 | 86.9 | 73.3 | 52.0 | 97.7 | 71.6 |
| 2016 | 78.6 | 57.3 | 87.4 | 72.8 | 92.5 | 83.4 | 97.2 | 88.3 | 92.6 | 50.5 | 95.3 | 72.1 |

*Type 0 function area refers to the areas requiring exceptionally 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.

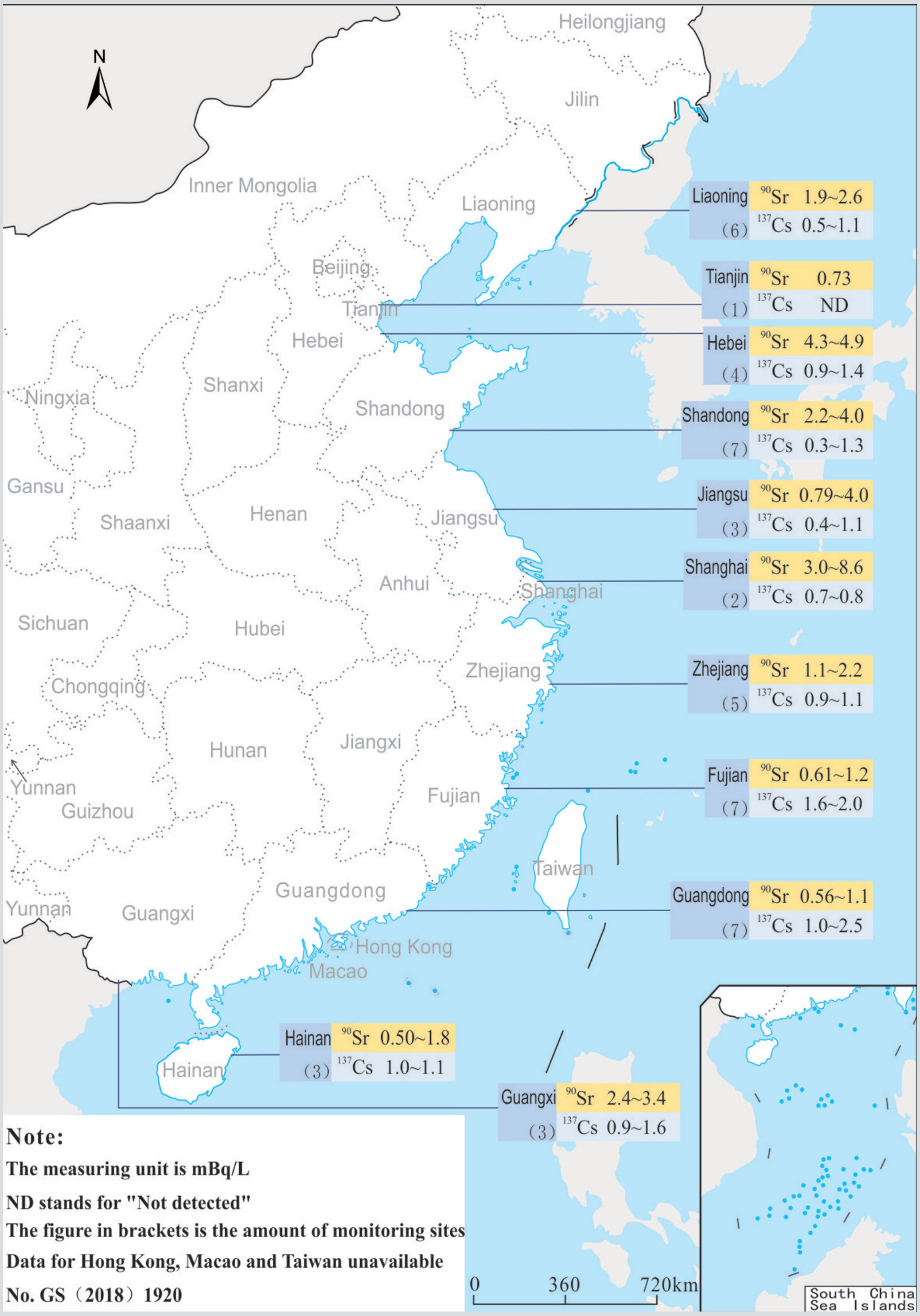
# Radiation Environment

## Ionizing Radiation

The environmental ionizing radiation level in China remained within the fluctuation range of natural background level in 2017. 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. Among them, 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.




The Real–time Consecutive Air Absorbed γ Radiation Dose Rate Monitored at Radiation Environment Automatic Monitoring Stations in China in 2017




Activity Concentration of Sr–90 and Cs–137 of Nearshore Water in China in 2017

**Environment ionizing radiation in the vicinity of in-service nuclear power plants** In 2017, there was no abnormal real-time consecutive air absorbed γ radiation dose rate caused by 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, Ningde Nuclear Power Base, Fuqing Nuclear Power Base, Fangchenggang Nuclear Power Base and Changjiang Nuclear Power Base. There was some rise of activity concentration of tritium in some environmental media in the vicinity of Qinshan Nuclear Power Base, Dayawan Nuclear Power Base, Yangjiang Nuclear Power Base and Tianwan Nuclear Power Base compared with the background value before the operation of those nuclear power plants. The assessment findings show 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 2017, there was no abnormal situation of air absorbed γ radiation dose rate and activity concentration of radionuclides in aerosol, sediments, water, and soil in vicinity of research facilities such as Institute of Nuclear and New Energy Technology of Tsinghua University and miniature neutron source reactor in Shenzhen University. Trace content of artificial radionuclides such as iodine-131 and cobalt-60 was detected in some environmental media in the vicinity of China Institute of Atomic Energy Science and Nuclear Power Institute of China. The assessment findings show that the radiation dose of the civil research reactors 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 2017, 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 404 Co., Ltd.; Northwest Disposal Site for Low and Medium Level Radioactive Waste and Beilong Disposal Site of Guangdong for Low and Medium Level Radioactive Waste was within the fluctuation range of natural baseline value. There was no 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 2017, 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, gross α activity concentration of aerosol, total uranium and Ra-226 concentrations in surface water were similar to the historical average. 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

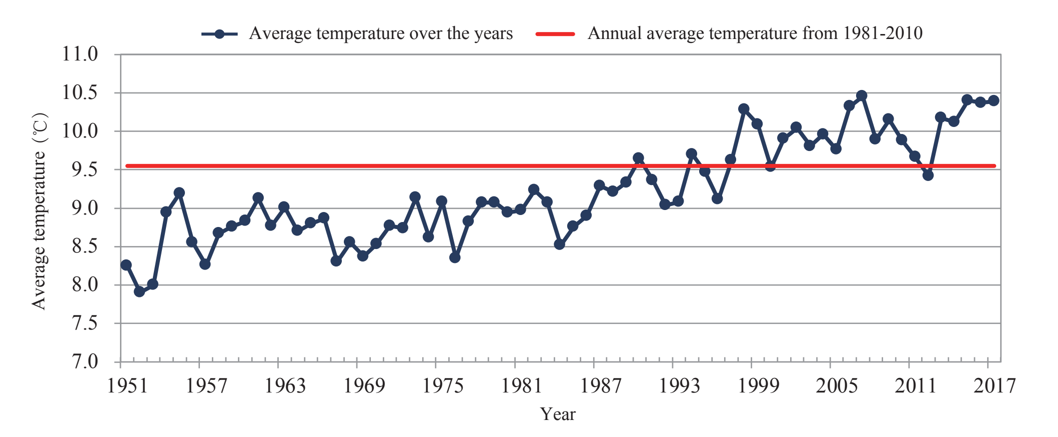
In 2017, the environment electromagnetic radiation level of municipal and provincial capital cites was far lower than the public exposure limit specified in the *Controlling Limits for Electromagnetic Environment (GB 8702-2014)*. The environmental electromagnetic radiation levels of radio and television signal emitting facilities and antenna of mobile communication base stations as well as the power frequency electric field strength and magnetic induction intensity of environmental sensitive sites under monitoring such as power transmission lines and transformer stations were lower than the public exposure limit specified in the *Controlling Limits for Electromagnetic Environment (GB 8702-2014)*.

# Climate and Natural Disasters

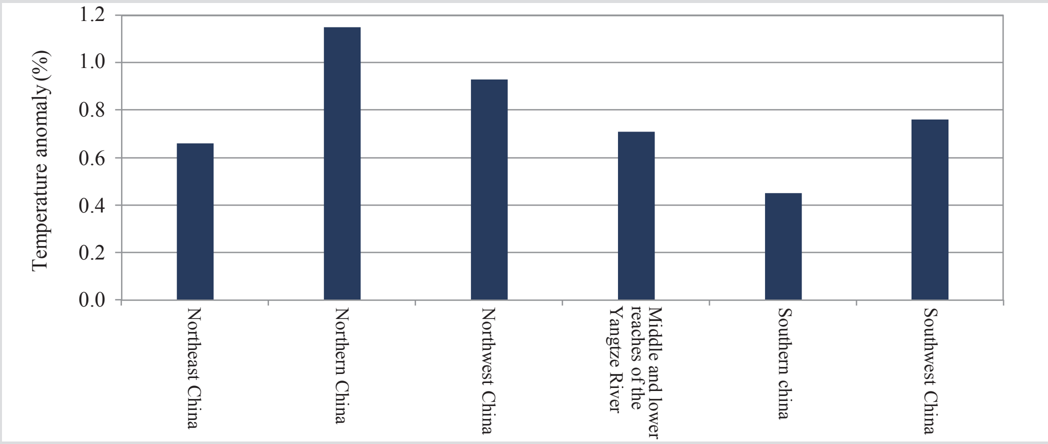
## Air temperature

In 2017, the national average air temperature was 10.39°C, 0.84°C higher than the historical average (9.55°C), the third warmest since 1951, only second to 10.45°C in 2007 and 10.40°C in 2015. The temperature in all 31 provinces (regions and cities) in the country was higher than usual. Except lower temperature in October compared with the same period all year around, the air temperature of the rest of months was higher than historical average, with 1.6°Cand 1.7°C higher in January and February. The air temperature in July and September reached the highest since 1951.

The average temperature in the six major regions of the country was higher than the historical average. Among them, the northern and northwestern parts of the country were 1.2°Cand 0.9°C higher respectively. The average temperature in the Northern China regions recorded the highest in history. In terms of spatial distribution, temperatures in most parts of the country were close to normal or a bit higher, among which, the temperatures were 1~2°C higher in central and southeastern parts of Northern China, most of Huanghuai, eastern Jianghuai, northeastern Jiangnan, western of southwest China, central and western parts of Inner Mongolia, eastern Xinjiang, central and western part of Gansu, central and southern part of Ningxia, southern Qinghai, central part of Liaoning and other places.




The Annual Change of the National Average Air Temperature from 1951–2017

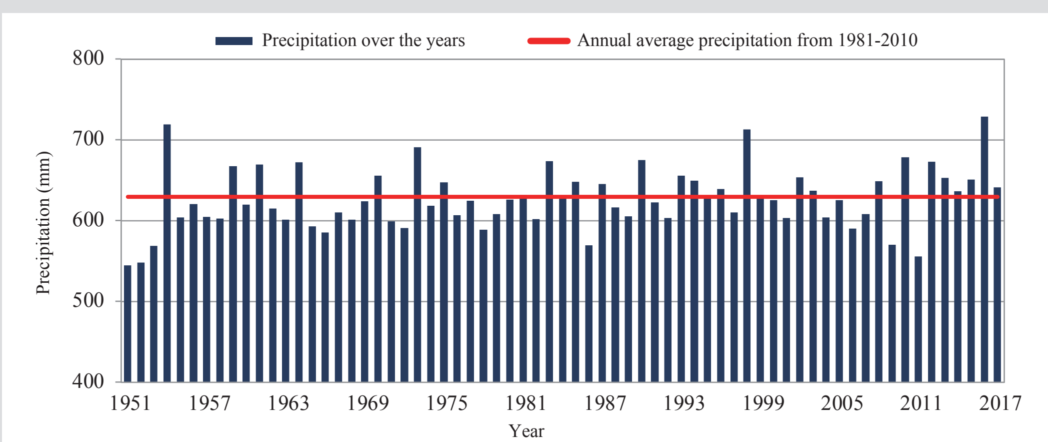



The Average Temperature Anomaly of all the Regions in 2017

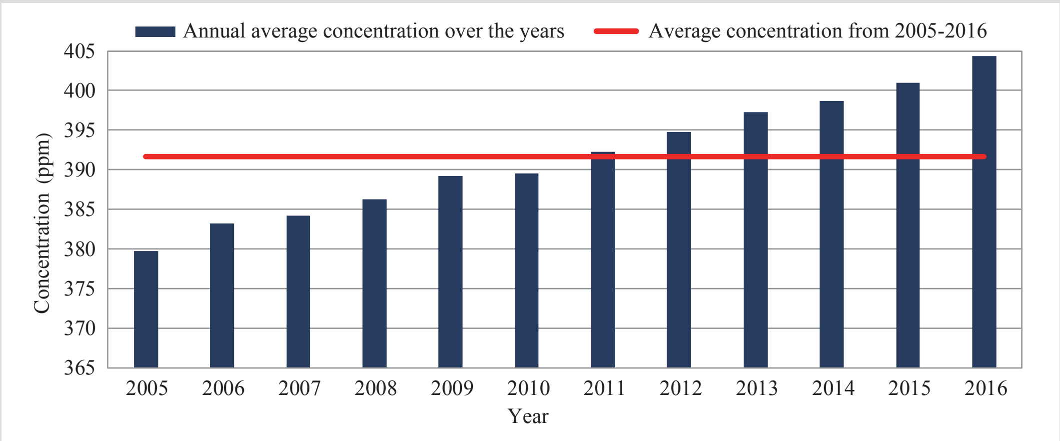
## Precipitation

The national average precipitation was 641.3 mm in 2017, up by 1.8% compared with the historical average (629.8 mm) and down by 12% compared with that of 2016 (728.5 mm). The precipitation went down in February, May, November and December, with a 49% decrease in December; the precipitation in March, June, August and October was higher, and the precipitation in the rest months was close to the historical period.

The precipitation was within the range of 1,200~2,000 mm in regions such as the south to the Yangtze River, most of Chongqing, southern part of Guizhou and the western and southern part of Yunnan, with the precipitation over 2,000 mm in some parts of the regions of northwestern part of Jiangxi and southern part of Guangxi. The precipitation was within the range of 400~1,200 mm in regions like most parts of Northeast China and Northern China, southeastern part of




The Annual Change of National Average Precipitation from 1951–2017




The Annual Change of Average $CO_2$ Concentration in China from 2005 to 2016

Northwest China, most parts of the Huanghuai and Jianghuai plains, Jianghan and most of Sichuan, Yunnan, central and northern parts of Guizhou, eastern parts of Tibet and southeastern part of Qinghai. The precipitation was within the range of 100~400 mm in regions like most parts of Inner Mongolia, Ningxia, central part of Gansu and Qinghai, central and western part of Tibet and northern part of Xinjiang. The precipitation was less than 100 mm in regions such as southern part of Xinjiang, northwestern part of Gansu and western part of Inner Mongolia. The annual precipitation in Guangxi Dongxing (3,473.7 mm) and Fangchenggang (3,205.5 mm) was the highest and second highest in the country, while Xinjiang Toksun (3.2 mm) and Turpan (7.4 mm) were the lowest and second lowest in the country.

Compared with the historical average, the precipitation of most parts of China was similar to the historical average. There was 20%~100% increase of precipitation in regions including the central part of Shanxi, northern part of Shaanxi, northern and western part of Hubei, northeastern part of Chongqing, northwestern part of Jiangxi, central and western part of Guangxi, northern part of Qinghai, central part of Gansu, western part of Xinjiang, and western part of Tibet, etc. There was 20%~50% decrease of precipitation in regions of central and eastern part of Inner Mongolia, central and southern part of Liaoning and eastern part of Xinjiang.

## Greenhouse gases

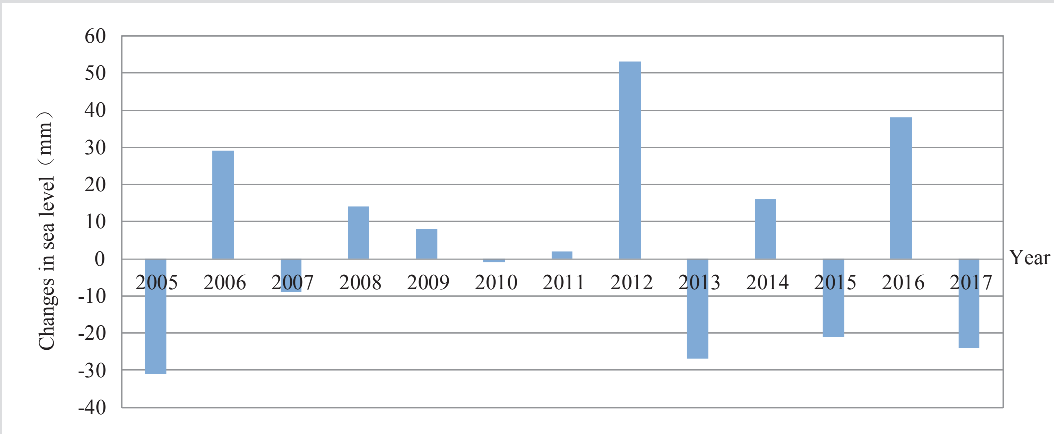
In 2016*, the national average concentration of carbon dioxide was 404.4 ppm, which was 12.69 ppm higher than the historical average (391.71 ppm) and 1.1 ppm higher than the global average (403.3 ppm). The average concentrations of methane and nitrous oxide were 1,907 ppb and 329.7 ppb respectively, 54 ppb and 0.8 ppb higher than the global average (1,853 ppb, 328.9 ppb).

## Sea level

In 2017, the sea level in China's coastal areas was 58 mm higher than the historical record (1993-2011), 24 mm lower than that of 2016, ranking the fourth highest level since 1980. The sea level in China's coastal areas has remained high** for past six years compared with the average over the past 30 years. The coastal sea levels of Bohai Sea, Yellow Sea, East China Sea and South China Sea were 42 mm, 23 mm, 66 mm and 100 mm higher compared with the historical record; com-

*The greenhouse gas concentration data for 2011-2016 was derived from the *China Greenhouse Gas Bulletin* (2011-2016). The carbon dioxide concentration data for other years was collected by the China Meteorological Administration based on its observation at the Waliguan station in Qinghai Province, which was the average of the reported data for the 12 months of the year. As of the publication of this bulletin, the 2017 data is still under review, so the 2016 data is used here.

**The data comes from the *Bulletin on China Sea Level* (2006-2016).




Changes in Sea Level in China's Coastal Areas from 2005 to 2017

pared with that of 2016, the sea level of Bohai Sea, Yellow Sea and East China Sea was 32 mm, 43 mm and 49 mm lower respectively. The sea level of the South China Sea was 28 mm higher than that of 2016.

## Meteorological disaster

**Rainstorm and flood** In the flood season of 2017, there were a total of 36 torrential rains across the country, usually with the same region stricken for several times and in a highly destructive manner. The direct economic loss of heavy rain, floods and geological disasters were high during the year. Among them, the southern part of the country suffered two consecutive large-scale heavy rainfall processes from June 22 to July 2, which led to regional floods in the middle and lower reaches of the Yangtze River. The southwest, southern Yangtze, and many rivers in southern China experienced ultra-historical flooding, resulting in severe floods and geological disasters in Hunan, Jiangxi, Guangxi, Sichuan and other provinces. From mid-late July to early August, heavy rainfall occurred successively in the northeast China, northwest China and other regions, among which the rainstorm in northern Shaanxi featured large amount of accumulated heavy rainfall, strong intensity and wide range. In Yulin, there were two consecutive heavy rainstorms with the maximum cumulative precipitation exceeding 250 mm. The ultra-historical flooding occurred in the Wuding River, a tributary of the Yellow River, resulting in a dam break in Yulin. The water levels of 471 rivers went higher than the warning level, among which the water level of 96 rivers were higher than the safety level and 20 rivers reached the highest level in history. There were 55.15 million people affected by the floods in the country, with 316 deaths, 39 missing, and 140,000 houses collapsing. The affected crop area was 81.22 million mu and the crop area of disasters was 45.33 million mu. The direct economic loss was 214.3 billion Yuan.

**Drought** In 2017, drought across the country was lighter than that of historical average, but regional and periodic droughts were evident. Continuous droughts from spring to summer occurred in the northern part of Northern China, the western part of the northeast China, and the eastern part of Inner Mongolia. Jianghuai and Jianghan regions were hit by drought in the hot summer days. There were 273 million mu of crops affected, 148 million mu with crop yields down by 10%, 66.66 million mu down by 30% , and 11.29 million mu with crop failure as a result of drought. There was a drought-related grain output reduction of 23.9 billion jin, the economic loss of economic crops of 11.7 billion Yuan, and the total direct economic loss of 43.8 billion Yuan. A total of 4.78 million people and 5.14 million livestock suffered from tentative difficulty in access to drinking water due to the drought. There was 36% reduction of drought affected cropland area, 49% reduction of damaged area, 43% reduction of grain loss and 78% reduction of population with difficulty in access to drinking water due to drought compared with that of the historical average since 2000.

**Typhoon** In 2017, the generation and landing times of typhoon were concentrated, and there was a high degree of overlapping of landing sites. There were 27 typhoons in the northwestern Pacific Ocean and South China Sea (the maximum wind strength near the center was ≥8 grades), which was 1.5 more than the historical average (25.5). Among them, 8 landed in China, which was slightly more (7.2) than historical average. The initial landing time of typhoon was 13 days earlier than usual, and the final landing time was 10 days later. The typhoon has caused 35 deaths and 9 missing throughout the year, with direct economic loss of 34.62 billion Yuan. Compared with the average value from 2007 to 2016, the direct economic loss caused by typhoon in 2017 were significantly less, but the Super Typhoon Hato was strong and caused heavy damage. Affected by the Super Typhoon Hato, heavy rainstorms occurred in the eastern coast and southwest of Guangdong, southern Guangxi, southeastern Yunnan and western Guizhou. According to statistics, the Super Typhoon Hato affected a total of 2.459 million people in Guangdong, Guangxi, Yunnan, Guizhou, Fujian and Hunan provinces (autonomous regions), causing 32 deaths or missing, and the direct economic loss amounted to 28.91 billion Yuan. In addition, the Super Typhoon Hato also caused the deaths of eight people in Macao.

**Strong convective weather** In 2017, strong convective weather such as heavy wind, hail, tornado, thunder and lightning occurred frequently across the country. According to preliminary statistics, a total of 1,601 counties (cities) suffered from hail or tornado. Compared with the annual average of 2001-2016, there was evidently more hails with severe damage caused by hail in North China, and less disaster-hit area, deaths and economic loss.

**High temperature** In the summer of 2017, there were 10.7 days with national average high temperature (daily maximum temperature ≥35°C), 3.8 days more than the same period of the historical average, ranking the highest in the same period since 1961. A total of five regional high-temperature periods occurred this year. From May 17 to 19, the first high-temperature period occurred in Northeast China, Northern China and Huanghuai regions, among which Northeast China and Northern China experienced the earliest high-temperature period since 1961; the daily maximum temperature of 68 stations reached or exceeded the historical extreme value of May, with Gaoliban of Inner Mongolia (43.6°C) and Jilin Taonan (42.7°C) exceeding 42°C. In the middle and late July, South China experienced large-scale continuous high-temperature weather, and the highest daily temperature in parts of Zhejiang, Jiangsu, Anhui, Chongqing, Shaanxi, Hubei, and Hunan exceeded 40°C. Among them, 6 counties (districts) such as Shaanxi Xunyang (44.7°C) and Chongqing Jiangjin (42.5°C) exceeded 42°C. On July 21st, the highest temperature of Xujiahui in Shanghai reached 40.9°C, breaking the historical record of Xujiahui since 1873.

**Low temperature** In 2017, a total of 7.87 million mu of farmland was affected by low-temperature freezing and snow disasters, resulting in a total of 1.25 million mu of crop failure with direct economic loss being 1.78 billion Yuan. Compared with the average figure from 2010 to 2016, the economic loss was obviously less, and it was a year of relatively light low-temperature freezing and snowstorm. In January, the central and eastern regions suffered three times of low-temperature snowfall. Heavy winds and snowfall adversely affected the Spring Festival travel rush, with multiple highways being closed and airport flights being delayed; over 10,000 passengers were prevented from traveling; and some inter-provincial flights in the Bohai Strait were suspended. In late February, during the large-scale cold waves, the extreme minimum temperatures in most of Heilongjiang, eastern Jilin, eastern Inner Mongolia, and most parts of northern Xinjiang dropped to -20°C and below. Strong winds and heavy rain and snow conditions had adverse effects on transportation and agricultural infrastructure.

**Sandstorm** In spring of 2017, a total of 6 times of sand and dust weather occurred in northern China, 11 times less than that in the same period over the years (17 times), including 1 sandstorm. The average number of dusty days in northern China was 1.9 days, 3.2 days less than the same period of previous years, the least since 1961. The first sand and dust weather in 2017 took place on January 25, 21 days earlier than the 2000-2016 average (February 15) and 24 days earlier than 2016 (February 18). From May 3rd to 7th, northern China experienced sandstorms, with area of 2.35 million $km^2$ being affected. The main affected areas were the south Xinjiang basin, Gansu, Ningxia, Shaanxi, Shanxi, Hebei and Beijing.

## Earthquake disaster

In 2017, there were 19 earthquakes at or above 5.0 Richter Scale (13 happened in Mainland and 6 happened in Taiwan and in the Straits). Among them, 16 earthquakes were at 5.0~5.9 Richter Scale, 2 earthquakes were at 6.0~6.9 Richter Scale, and 1 earthquake was at 7.0~7.9 Richter Scale. The strongest earthquake occurred on August 8 in Jiuzhaigou at 7.0 Richter Scale. Compared with 33 times in 2016, the earthquake frequency was significantly reduced. In Chinese Mainland, there were 11 earthquake disasters. According to the grading standard of *National Earthquake Contingency*

*Plan*, there were 1 severe earthquake disaster, 1 relatively severe earthquake disaster and 9 ordinary earthquake disasters, totally resulting in 37 deaths, 1 missing and 638 injuries with a direct economic loss of 14.8 billion Yuan on the whole. The 7.0 Ricer Scale earthquake in Jiuzhaigou caused the largest number of deaths, with 29 deaths, 1 missing and 543 injuries.

## Geological disaster

In 2017, there were 7,521 various kinds of geological disasters across the country, causing 329 deaths, 25 missing, 169 injuries and the consequent direct economic loss of 3.59 billion Yuan. The number of geological disasters occurred and that of people died or injured dropped by 22.5% and 12.6% respectively, and the direct economic loss up by 13.2% compared with that of 2016. Among them, there were 21 super-large geological disasters causing 118 deaths, 12 missing, 15 injuries and a direct economic loss of 1.33 billion Yuan. There were 47 large geological disasters causing 19 deaths, 1 missing, 7 injuries and a direct economic loss of 280 million Yuan. There were 333 mid-sized geological disasters causing 92 deaths, 9 missing, 60 injuries and a direct economic loss of 610 million Yuan. There were 7,120 small geological disasters causing 100 deaths, 3 missing, 87 injuries and a direct economic loss of 1.37 billion Yuan.

## Marine disaster

In 2017, marine disasters were dominated by storm surges, waves, sea ice, sargassum outbreaks, and coastal erosion. Red tides, green tides, sea level changes, seawater intrusion, soil salinization, and saltwater intrusion occurred at varied degrees. Marine disasters caused a total of 6.398 billion Yuan of direct economic loss and 17 deaths (including missing persons). Among them, the storm surge caused a direct economic loss of 5.577 billion Yuan and 6 deaths (including missing persons); wave disasters caused a direct economic loss of 27 million Yuan, 11 deaths (including missing persons), and sea ice disasters caused a direct economic loss of 1 million Yuan; the outbreak of sargassum caused a direct economic loss of 448 million Yuan; coastal erosion caused a direct economic loss of 345 million Yuan. The most serious direct economic loss was caused by storm surge disasters, which accounted for 87% of the total; the largest number of deaths (including missing persons) was caused by wave disasters, accounting for 65% of the total deaths (including missing persons). The storm surge of 1713 Super Typhoon Hato caused the most serious direct economic loss of 5.154 billion Yuan. The direct economic loss in Guangdong province was the highest of 5.41 billion Yuan.

# Infrastructure and Energy

## Infrastructure

**Transport** Up to the end of 2017, the total mileage of railway in operation across the country was 127,000 km with 87,000 km of electric mileage. The total road length of China reached 4.7735 million km with 136,000 km of highway. The total length of navigable inland river channels across the country was 127,000 km. There were 27,578 berths in all ports and harbors across the country. There were a total of 229 civil airports with certificate in the country. In 2017, the railway across the country completed 3.084 billion passenger traffic volume with 1,345.692 billion person·km turnover of passenger traffic. It had finished 3.689 billion t of total shipments of goods with total freight volume of 2,696.220 billion t·km. The total passenger volume for road traffic reached 14.568 billion, and the turnover volume of passenger transportation hit 976.518 billion person·km. The commercial freight vehicles across the country have finished transport of 36.869 billion t freight volume with 6,677.152 billion t·km freight mileage. The country finished waterway transport of 283 million people with 7.766 billion person·km turnover volume of passenger transportation. The country finished 6.678 billion t waterway freight volume with 9,861.125 billion t·km freight mileage. The civil aviation across the country had finished 552 million person·times volume of passenger traffic with 951.278 billion person·km turnover volume of passenger transportation. The country has finished 7.058 million t freight volume with 24.354 billion t·km freight turnover. In the whole year, urban passenger transport system had carried 127.340 billion passengers. Among them, buses and trolleys transported 72.287 billion people with mileage of 35.520 billion km; rail transport system transported 18.430 billion people with mileage of 513 million train·km; patrolling taxis finished transport of 36.540 billion people. Moreover, passenger ferries had transported 83 million people.

**Urban sewage** Up to the end of 2017, the urban sewage treatment capacity across the country reached 157 million $m^3$/day, and the accumulative sewage treatment volume reached 46.26 billion $m^3$, reducing 11.8008 million t of COD and 1.0963 million t of ammonia nitrogen respectively.

**Municipal Solid Waste** Up to the end of 2017, the cleanup and transportation volume of municipal solid waste across the country was 215.4797 million tons. The decontamination capacity was 638,208 t/day, and the decontamination volume was 209.3111 million t, and the decontamination rate of municipal solid waste reached 97.14%.

## Energy

Based on preliminary accounting, the total consumption of primary energy across the country was 4.49 billion t coal equivalent, up by 2.9% compared with that of 2016. Among them, coal consumption went up by 0.4%, crude oil up by 5.2%, natural gas up by 14.8%, and electricity up by 6.6%. Coal consumption took up 60.4% of total energy consumption, down by 1.6 percentage points compared with that of 2016. The consumption of clean energy such as natural gas, hydropower, nuclear power and wind power took up 20.8% of the total energy consumption, up by 1.3 percentage points. The energy consumption per 10,000 Yuan GDP went down by 3.7% compared with that of 2016.

The Annual Output and Growth Rate of Major Energy Products in 2017

| Product name | Unit | Output | Increase from 2016 (%) |
|---|---|---|---|
| Total output of primary energy | 100 million t coal equivalent | 35.9 | 3.6 |
| Raw coal | 100 million t | 35.2 | 3.3 |
| Crude oil | million t | 19,150.6 | -4.1 |
| Natural gas | 100 million $m^3$ | 1,480.3 | 8.2 |
| Power generation | 100 million kW•h | 64,951.4 | 5.9 |
| Thermal | 100 million kW•h | 46,627.4 | 5.1 |
| Hydro | 100 million kW•h | 11,898.4 | 0.5 |
| Nuclear power | 100 million kW•h | 2,480.7 | 16.3 |

## Data Sources and Explanations for Assessment

The data on the state of environmental quality in the current report is mainly from the monitoring data of National Environmental Monitoring Network, and supplemented by relevant ministries and commissions. Among them, the information about groundwater quality of 223 APL cities, marine water environment of all sea areas, land resource and arable land, geoparks, geological disasters as well as marine disasters is provided by Ministry of Natural Resources. Data on scenic spots and historic sites, urban sewage and municipal solid waste is provided by Ministry of Housing and Urban-Rural Development. The data on transportation is provided by Ministry of Transport. The data on groundwater environmental quality per river basin, water quality of trans-province waters, water and soil erosion, and flood and drought disasters is provided by Ministry of Water Resources. The data on the status of inland and marine fishery waters, the quality of farmlands and agricultural non-point source is provided by Ministry of Agriculture and Rural Affairs. The data on earthquake disaster is provided by Ministry of Emergency Management. The data of energy chapter is provided by National Bureau of Statistics. The data on air temperature, precipitation and meteorological disasters is mostly provided by China Meteorological Administration. The data in the chapter on desertification and sandification, wetland, forest and grassland is provided by State Forestry and Grassland Administration.

National Environmental Monitoring Network includes 1,436 monitoring sites on national ambient air quality that cover 338 APL cities; 1,940 sections (sites) on water quality assessment, exanimation and ranking that cover 978 rivers and 112 lakes (reservoirs); nearly 1,000 monitoring sites on national acid deposition that cover 338 APL cities and some county-level cities; monitoring network for centralized drinking water source areas covering 338 APL cities; 417 monitoring sites on coastal marine environment across the coastal waters of the country; nearly 80,000 urban monitoring sites on acoustic environment covering 338 APL cities; 645 ecological monitoring sites; 10 regional key monitoring stations and 1 measurement system on ecological conditions in 31 provinces (autonomous regions or municipalities).

In the current Report, the assessment of urban ambient air quality is based on the *Ambient Air Quality Standard (GB 3095-2012)*and *the Supplementary Provisions on Urban Air Quality Assessment Affected by Sandstorm 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) are chlorophyll-a, TP, TN, SD 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 14848-93)*. The assessment of the quality of groundwater is based on *Quality Standard for Groundwater (GB/T 14848-93)*. The assessment of the quality of offshore marine waters is based on *Sea Water Quality Standard (GB 3097-1997)* and *Specification for Offshore Environmental Monitoring (HJ 442-2008)* with 29 assessment indicators of pH, dissolved oxygen, COD, $BOD_5$, inorganic nitrogen, nonionic ammonia, active phosphate, mercury, cadmium, Pb, hexavalent chromium, total chromium, arsenic, copper, zinc, selenium, nickel, cyanide, sulfide, volatile phenol, petroleum, benzene hexachloride, DDT, malathion, methyl parathion, benzo[a]pyrene, anionic surfactant, E-coli and fecal coliform. The assessment of sound 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 eco-environment quality is based on *Technical Criterion for Ecosystem Status Evaluation (HJ 192-2015)*. 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)*.

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

# Contributors to the 2017 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

(National Energy Administration)

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

(China Earthquake Administration)

National Bureau of Statistics

China Meteorological Administration

State Forestry and Grassland Administration