# 2014
# Report on the State of the Environment in China

Ministry of Environmental Protection
The People's Republic of China

**The *2014 Report on the State of the Environment in China* is hereby announced in accordance with the *Environmental Protection Law of the People's Republic of China.***

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## Boxes

Xi Jinping delivered an important speech at the Central Economic Work Conference in Beijing during December 9-11, 2014. From the perspective of resource and environmental bottlenecks, the environmental carrying capacity is reaching the upper limits. The Conference highlighted that we must promote green, low-carbon, and circular development, in order to meet the people's expectations of a favorable ecological environment.

Photo by Xinhua News Agency

Li Keqiang, member of the Standing Committee of the Political Bureau of the CPC Central Committee and Premier of the State Council, presided over the working meeting on energy conservation and emission reduction in Beijing on March 21, 2014. Li said that we have made new progress last year, but still face an arduous task this year, with an aim to cut the energy intensity by 3.9% while maintaining a 7.5% economic growth. We are unswerving in energy conservation and emission reduction despite the downward pressure on the economy and challenges to stable growth. To achieve the target, we are embarking on new ways to boost economic development and reduce energy consumption and carbon emissions, in a responsible attitude to the current and future generations.

Photo by Xinhua News Agency

In 2014 we ushered in a new era of deepening reform. In the face of complicated and volatile international situation and arduous task of reform, development and stability, following the general guideline of making progress while ensuring stability, the Central Committee of the Communist Party of China (CPC) and the State Council of China united with and led the people of all nationalities in adapting to the new normal and pushed forward sustainable, stable economic and social development. Local governments and departments firmly implemented the decisions and deployments of the CPC Central Committee and the State Council, and with reform and innovation as the driving force and problem-solving as orientation, achieved positive progress in environmental protection.

**First, a new step forward has been made in the prevention and control of air, water and soil pollution.** The *Action Plan for the Prevention and Control of Air Pollution* was put into practice. 1) Pollution control in key industries was intensified. Air pollution governance programs were printed and issued for key industries in the Beijing-Tianjin-Hebei (BTH) region, Yangtze River Delta (YRD), Pearl River Delta (PRD) and the surrounding areas. The *Action Plan to Upgrade the Quality of Refined Oil for Air Pollution Prevention and Control,* the *Program for the Comprehensive Management of Volatile Organic Compounds in the Petrochemical Industry*, and the action program to promote oil and gas recovery technologies in piers were rolled out. This year, the outdated and excess production capacity was eliminated, involving 31.1 mil. t of steel, 81 mil. t of cement, and 37.6 mil. weight boxes of plate glass. More than 6 mil. yellow-label vehicles and old and used cars and 55,000 small coal-fired boilers were removed. 2) Regional cooperation was enhanced. The task of air quality assurance during the Beijing Asia-Pacific Economic Cooperation (APEC) Summit and Nanjing Youth Olympic Games was satisfactorily completed. In particular, the "APEC Blue" was staged with excellent air quality in four days and good in seven days and the average concentration of pollutants fell to the five-year lowest levels. 3) Regulation of atmospheric environmental law enforcement was tightened. By high-tech means of satellite and unmanned aerial vehicles, environmental protection departments carried out special inspections monthly through joint enforcement, cross-department enforcement and regional enforcement and the results are communicated to local governments and to the public. 4) The monitoring and early warning system was improved. The 1,436 monitoring sites in 338 cities at or above the prefecture level are all capable of monitoring according to the new ambient air quality standards. Regional air quality forecasting and early warning platforms have been basically built in the Beijing-Tianjin-Hebei region, Yangtze River Delta and Pearl River Delta. 5) The supporting policies were introduced at a quicker pace. The State Council printed and distributed the *Performance Assessment Measures*

*for the Action Plan for Air Pollution Prevention and Control (Trial)*, according to which, 19 policy measures and 20 pollutant emission standards were released. 6) The foundation was consolidated. The Central Government has arranged a special fund of 10 bn. yuan to support air pollution prevention and control. The Clean Air Research Program and the Blue Sky Technology Program were launched, *Collection of Advanced Technologies for Air Pollution Prevention and Control* unveiled, and results about source apportionment of atmospheric particulates in Beijing, Tianjin, Shijiazhuang and Shanghai published. Through these efforts, the mean annual concentration of fine particulate matter ($PM_{2.5}$) in 74 cities at Stage Ⅰ of the new Ambient Air Quality Standards was reduced by 11.1% to 64 μg/$m^3$ this year.

Water pollution prevention and control was advanced. The *Action Plan for Water Pollution Prevention and Control (Draft for Approval)* was prepared. China assessed the performance of water pollution control plans in major river basins, talked with leaders of local governments failing in the assessment, and restricted the examination and approval of regional environmental impact assessment (EIA). With the prior approval of the State Council, Ministry of Environmental Protection (MEP), in conjunction with other departments, printed and distributed the *Master Plan for Eco-environment Protection of Lakes with Good Water Quality (2013-2020)*. The Central Government allocated 5.5 bn. yuan to better protect 55 lakes with good water quality. Ministry of Housing and Urban-Rural Development (MOHURD) and National Development and Reform Commission (NDRC) actively promoted urban water conservation, while Ministry of Water Resources (MWR) and Ministry of Land and Resources (MLR) launched the national groundwater monitoring project.

Soil pollution prevention and control was strengthened. MEP drafted, jointly with relevant departments, the *Action Plan for Soil Pollution Prevention and Control* and issued, in conjunction with MLR, the *Bulletin on National Soil Pollution Survey*. The Central Government allocated 5.9 bn. yuan to support the pollution control and prevention of contiguous polluted rural areas. Ministry of Agriculture (MOA) conducted a general survey and dynamic monitoring of heavy metal soil contamination in agricultural producing areas and implemented restoration projects in nine areas. The formula fertilizer project implemented this year helped to save nearly 2 mil. t of fertilizer.

**Second, the annual task of reducing total emissions was accomplished.** The performance of emission reduction responsibility was subject to strict assessment. MEP restricted the approval of EIA from 5 cities with serious problems, supervised the management of 37 companies, and deducted 510 mil. yuan from the tariff revenue of coal-fired power enterprises with non-normal operation of desulfurization facilities. With the implementation of emission reduction projects, the daily capacity

of urban sewage treatment increased by 10.7 mil. t. 260 mil. kW coal-fired units were equipped with denitration facilities, 240 mil. kW dust removal facilities, and 130 mil. kW desulfurization facilities. 36,000 $m^2$ steel sintering machine was equipped with flue gas desulfurization facilities and the dry-process cement clinker production line with a total capacity of 650 mil. t, denitration facilities. The emission reduction policy system was also perfected. The State Council unveiled the *2014-2015 Action Program for Energy-saving, Low-carbon Development* and the *Guiding Opinions on Further Promoting the Pilot Program for the Paid Use and Trading of Emissions*. MEP printed and distributed, together with relevant departments, the *Measures on the Supervision of Green Tariff and Environmental Protection Facilities in Coal-fired Power Plants* and *Action Plan on Coal-fired Power Transformation and Upgrading for Energy Conservation and Emission Reduction (2014-2020)*. In 2014, the emissions of chemical oxygen demand (COD), ammonia nitrogen ($NH_3$-N), sulfur dioxide ($SO_2$) and nitrogen oxide ($NO_x$) fell by 2.47%, 2.90%, 3.40%, and 6.70% respectively.

**Third, environmental protection played the due role in optimizing economic development.** Provincial planning for main functional areas have all been released and the environmental function zoning pilot carried out in 13 provinces. The strategic environmental assessment for the central region was completed, which facilitated the policy pilot of urbanization and economic transformation. This year, MEP approved 237 EIA documents involving a total investment of 2.15 trillion yuan, and rejected, suspended or returned the reports of 26 projects below the criteria, involving a total investment of 87.2 bn. yuan. *Implementation Plan for the Industrialization of Material Environmental Protection Equipment and Products* and the catalog of state-encouraged material equipment for environmental protection were unveiled to boost environmental protection industries. In addition, 140 new national environmental standards were formulated, raising the total standards to 1,623.

**Fourth, the environmental legal system, law enforcement and environmental risk management were upgraded.** The amended *Environmental Protection Law* was promulgated by the NPC Standing Committee. Based on this, MEP rolled out documents, covering daily penalty, sequestration, production restriction and shutdown, administrative detention, environmental information disclosure of business and public institutions, and investigation and handling of environmental emergencies. The State Council issued the *Circular on Strengthening Environmental Regulation and Enforcement*, according to which, MEP launched comprehensive environmental supervision in 25 cities and conducted public interviews with government leaders of 6 cities. Totally 100,000 times punishment were imposed on enterprises and 2,177 cases handled under supervision, involving a total fine of up to more than 2 bn. yuan. 2,180 suspected environmental criminal cases

were transferred to the public security organs, twice the total of the last decade. The management of heavy metals, chemicals and hazardous waste was strengthened. The Central Government allocated 4.2 bn. yuan to control heavy metal pollution in key provinces. MEP developed the Directory of Key Hazardous Chemicals under Environmental Management and kicked off the registration of dangerous chemicals. 106 companies were given 3.3 bn. yuan subsidies for disposing nearly 70 mil. waste electrical and electronic products. Environmental emergencies, numbering 471 this year, were properly responded to.

**Fifth, eco-environmental protection proceeded.** Ecological civilization demonstration zones were set up and China Ecological Civilization Award established with the approval of the Central Government. Currently, there are 92 state-level eco-cities (counties) and 4,596 eco-towns. The pilot ecological redlining program was implemented under the Technical Guide on Ecological Redlining. *2014-2015 China Action Plan for the United Nations Decade on Biodiversity* was printed and distributed and 21 new national nature reserves created with the approval of the State Council. The Central Government allocated special funds of 300 mil. yuan and 50 mil. yuan to support water environmental compensation in Xinan and Tingjiang river basins respectively. Forests were planted in area of 6.03 mil. ha. and restored in 333,333 ha. of farmland. The control of soil erosion was expanded to an additional area of 54,000 $km^2$ and enclosure-based protection, 20,000 $km^2$.

**Sixth, nuclear and radiation safety control was established.** The 24-hour regulation was upgraded for in-service nuclear power plants while the quality of nuclear power plants under construction is subject to strengthened supervision. All the 22 nuclear power plants running in the country are in a safe state and 26 under construction brought under quality control, and 19 civilian research reactors are generally in good condition. China announced the nuclear safety culture policy statement and organized activities to promote nuclear safety culture. The incident of radioactive source loss in Nanjing was properly dealt with and a special inspection on the safety of radioactive sources was launched.

**Seventh, the reform in eco-environmental field advanced smoothly.** The State Council issued the *Opinions on Promoting Third-party Governance of Environmental Pollution*. Research is underway regarding the general idea of ecological civilization system reform and the top-level design for environmental management system reform, while the studies on the national park system and land-sea coordination mechanism proceeded in an orderly manner. MEP together with relevant departments adjusted discharge fees, forming a differentiated sewage charging policy. With the approval of the State Council, MEP canceled two approval items including “class-A qualification certification for operators of environmental protection facilities” and granted provincial

environmental protection departments the right to approve three items including “hazardous waste operation license”.

In 2014 the national environmental quality situation is described as follows:

Only 16 of the 161 cities at or above prefecture level under the monitoring program met the new ambient air quality standards. Air quality in the other 145 cities exceeded the national standard. 29.8% of the 470 cities (districts, counties) under precipitation monitoring were stricken with acid rain, and the acid rain frequency averaged 17.4%.

The sections meeting the Grades Ⅰ~Ⅴ standards accounted for 3.4%, 30.4%, 29.3%, 20.9%, and 6.8% respectively and 9.2% was found worse than Grade Ⅴ, according to the national surface water quality monitoring of 968 sections (points) of 423 rivers and 62 lakes (reservoirs). The main pollution indicators were COD, total phosphorus (TP) and five-day biochemical oxygen demand ($BOD_5$). Water quality in all the sections of the trunk in the Eastern and Middle Routes of the South-to-North Water Diversion Project were at or better than Grade Ⅲ. The combined water intake amounted to 33.255 bn. t this year in the monitoring program of centralized source water areas distributed in 329 cities at or above prefectural level, and 31.989 bn. t or 96.2% met the standards. 10.8% of the 4,896 sites designated for monitoring groundwater environment quality this year were found with excellent good, 25.9% with good, 1.8% with relatively good, 45.4% with relatively poor, and 16.1% with extremely poor quality.

In spring, summer and autumn, the sea area below the Grade Ⅳ seawater quality standards was 52,280 $km^2$, 41,140 $km^2$ and 57,360 $km^2$ respectively, mainly distributed in Liaodong Bay, Bohai Bay, Laizhou Bay, Yangtze River estuary, Hangzhou Bay, Zhejiang coast, and the Pearl River estuary. Among the 301 monitoring sites of coastal waters, 18.6% were recorded with poor water quality and 28.6%, 38.2%, 7.0%, and 7.6% attained Grades Ⅰ~Ⅳ respectively. The major pollutants were inorganic nitrogen and active phosphate salt.

The acoustic environmental quality in urban areas and in urban road traffic declined compared with last year. The compliance rate of acoustic environmental quality in different functional zones was higher in daytime than at night.

The environmental ionizing radiation level in China remained within the fluctuation range of background level. The comprehensive electromagnetic field strength was far below the specified limit.

# Pollutant Discharge

## General Situation

**Main Pollutants in Wastewater** In 2014, a total of 22.946 mil. t COD was discharged within the year, down by 2.47% from a year earlier, as well as 2.385 mil. t ammonia nitrogen, down by 2.90% from a year earlier.

**Main Pollutants in Waste Gas** A total of 19.744 mil. t $SO_2$ was emitted within the year, down by 3.40% from a year earlier, as well as 20.780 mil. t NOx, down by 6.70% from a year earlier.

**Solid Wastes** Up to 3,256.2 mil. t industrial solid wastes were generated nationwide in 2014, and 2,043.302 mil. t were comprehensively utilized (including wastes generated in previous years), accounting for 62.13% of the total.

**Municipal Discharge** Up to 1,797 sewage treatment plants were set up nationwide by the end of 2014 with sewage treatment capacity of 131 mil. $m^3$/d, up by 6.11 mil. $m^3$/d. With sewage treatment rate totaling 90.2%, up to 38.27 bn. $m^3$ of wastewater was treated and disposed, up by 5.9% from a year earlier.

A total of 15.46 mil. t night soil was cleared away and 6.91 mil. t treated in 2014, with night soil treatment rate reaching

Discharge of main pollutants in wastewater in China in 2014

| COD (10,000 t) | | | | | Ammonia nitrogen (10,000 t) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Total | Industry | Municipal | Agriculture | Centralized | Total | Industry | Municipal | Agriculture | Centralized |
| 2294.6 | 311.3 | 864.4 | 1,102.4 | 16.5 | 238.5 | 23.2 | 138.1 | 75.5 | 1.7 |

Emission of main pollutants in waste gas in China in 2014

| $SO_2$ (10,000 t) | | | | $NO_x$ (10,000 t) | | | | |
|---|---|---|---|---|---|---|---|---|
| Total | Industry | Municipal | Centralized | Total | Industry | Municipal | Motor vehicles | Centralized |
| 1974.4 | 1740.3 | 233.9 | 0.2 | 2,078.0 | 1,404.8 | 45.1 | 627.8 | 0.3 |

Industrial solid wastes generated and utilized in China in 2014

| Generated (10,000 t) | Comprehensively utilized (10,000 t) | Stored (10,000 t) | Disposed (10,000 t) |
|---|---|---|---|
| 325,620.0 | 204,330.2 | 45,033.2 | 80,387.5 |

44.7%. Up to 124,244 toilets has been set up, with 63,011 in the east region, 34,883 in the central region and 26,350 in the west region, respectively accounting for 50.7%, 28.1% and 21.2% of the total. Public toilet attaining Grade Ⅲ standard totaled 92,997, accounting for 74.9% of the total, among which, 50,374 in the east region, 22,732 in the central region and 19,891 in the west region, respectively accounting for 54.2%, 24.4% and 21.4%.

A total of 179 mil. t municipal solid wastes were cleared away in 2014 from municipalities that administer one or more county-level cities in China. Up to 162 mil. t solid wastes were decontaminated and processed, with decontamination and processing rate totaling 90.3%. The environmentally sound processing capacity reached 0.529 mil. t/d, up by 37,000 t/d, leading to 1 percentage point (pps) increase of decontamination and processing rate. Of the total waste decontaminated and processed, 105 mil. t was disposed through sanitary landfill, accounting for 65%, 53 mil. t through incineration, accounting for 33%, and 2% through other disposal means.

The environmentally sound processing capacity of municipal solid waste incineration facilities totaled 185,000 t/d, accounting for 35.0% of total processing capacity, up 2.8 pps.

## Measures and Actions

**【Reduction of main pollutants】** Earnest efforts were made this year in implementation of the *12th Five-Year Comprehensive Work Programme on Energy Conservation and Pollution Reduction*, the *12th Five-Year Plan for National Environmental Protection*, and the *12th Five-Year Plan for Energy Conservation and Pollution Reduction*, as well as in the improved verification and regulation on the reduction of total load of main pollutants. Huge breakthroughs were made in constructing and operating the key reduction project targeting at 6 types of industrial plants (thermal power plant, iron and steel plant, cement plant, paper mill, municipal sewage treatment plant as well as livestock and poultry breeding farm) and motor vehicle. Quantified targets on environmental protection set in the Government Report were all achieved. Municipal sewage treatment capacity increased by 10.7 mil. t/d and the daily use of water reclaimed from municipal sewage by 2.85 mil. t, new leachate treatment facilities were set up in 73 solid wastes landfills. Wastewater advanced treatment and reclamation engineering was available for 830 key projects in paper making, printing and dyeing industries. The facilities for polluted water treatment and resource utilization were upgraded in 14,475 scaled livestock and poultry breeding farms. De-$SO_2$ facilities were being expanded and upgraded for 130 mil. kW in-service thermal power generating units. The flue gas bypass was dismantled from de-$SO_2$ facilities for 140 mil. kW in-service units. The flue gas sulfur removal facilities of sintering machines increased by 36,000 $m^2$ in iron and steel industry. Sulfur removal facility was made available to 26 sets of catalytic cracking devices with combined capacity at 40.05 mil. t in petroleum refining industry. The gas availability was up 2.5 bn. $m^3$, owing to local coal-to-gas upgrading engineering, which had 5.2 mil. t raw coal replaced and 48,000 t $SO_2$ emission reduced. The total capacity of de-$NO_x$ electricity generating units increased by 260 mil. kW, de-$NO_x$ facility was made available to NSP cement production line with combined capacity at 650 mil. t and to plate glass production line with daily capacity at 31,000 t. Falsification, deception and illegal behaviors during operation of de-$SO_2$ facilities and de-$NO_x$ facilities were cracked down. Electricity tariffs equivalent to 510 mil. yuan were either fined or confiscated.

**【Prevention and control of pollution by solid wastes】** Mid-term evaluation and treatment of hazardous waste specified in *12th Five-Year Plan for Prevention and Control of Pollution by Hazardous Waste* was accomplished. Authority to issue hazardous waste business license was delegated to provincial environmental department and continuous progress was made to supervise and assess the standardized management of hazardous waste. The actual import of waste totaled 49.6 mil. t, of which, waste paper, waster plastic, scrap metal (including waste hardware appliances, waste communication cables and was electric machines) and scale cinder are the four largest imports. Hazardous waste export totaled 9,684 t, including electroplating sludge, waste battery, waste printer circuits plate, electronic waste and organic solvents waste. A total of 71.60 mil. appliances and electronic products including TV sets, refrigerators, washing machine, air-conditioner and microcomputer were processed by 106 enterprises that are qualified to get subsidies for processing waste appliance and electronic products. Chromium slag produced this year were all treated and disposed within the same year. 2013 Annual assessment on the implementation of *12th Five-Year Plan for Comprehensive Prevention and Control of Pollution by Heavy Metals* was carried out. Mid-term evaluation on the plan has already been finished and related information was open to the public.

**【Environmental Management of Chemicals】** *List of Environmental Management of Dangerous Chemicals* was released and implemented in 2014 and 84 chemicals were identified as severely hazardous to environment and human

health. *Circular on Environmental Supervision of Precursor Chemical Production and Use and its Innocent Treatment* was printed and circulated, which strengthened the environmental supervision to the enterprise on its use of precursor chemicals. *Notice for Building Labs on Chemical Testing Analysis and Evaluation* was printed and circulated, which enhanced ability on risk prevention and control. Environmental management registration and approval on new chemicals and poisonous chemicals were preceded. A total of 118 environmental management registration certificates were issued, including 14 kinds of poisonous chemicals. The registered chemicals totaled 3.8539 mil. t and 9,874 import and export licenses of poisonous chemicals were approved. Mid-term evaluation report on *12th Five-Year Plan for Prevention and Control of Pollution by POPs in Major Industries* and investigation report on *National Environmental Conditions of Chemical Production* were prepared.

**【Demonstration Project of Cap-and-trade Emissions Trading System】** *Instructions on Pilot Work of Cap-and-trade Emissions Trading System* was released and implemented by the General Office of State Council in 2014, marking the first regulatory document in the field of Cap-and-trade Emissions Trading in China. Pilot projects were approved and carried out successively in 11 provinces and municipalities including Zhejiang, Jiangsu province and Tianjin Municipality. Guangdong, Liaoning, Guizhou and other provinces also launched the pilot projects. By the end of 2014, the emission trading volume has totaled 5.3 bn. RMB. Emission trading administrations were established in many pilot zones. A number of regions have established platforms of transaction management and e-auctioning, thus further enhanced its management ability. Financing channels were expanded in several regions for enterprises to control pollution through emission trade mortgage and leasing.

**【Self-monitoring and information disclosure for Enterprises under Key National Supervision】** *Procedures on Self-monitoring and Information Disclosure for Enterprises under Key National Supervision (trial)* and *Procedures on Monitoring Source of Pollution and Information Disclosure of Enterprises under Key National Supervision (trial)* came into effect on January 1, 2014. Environmental protection departments of various levels urged relevant enterprises to actively establish and improve self-monitoring and information disclosure system so as to further rationalize mechanism of monitoring of pollution source and information disclosure. Up to 2014, 10,597 enterprises out of 14,462 enterprises of key supervision conducted self-monitoring. The environmental departments conducted monitoring to 51,594 enterprises. Municipalities and provinces across China except Tibet all established system of enterprise self-monitoring and information disclosure platform for supervising monitoring of pollution source, thus enabling public oversight on key emission enterprises.

## Environmental Protection Law

On April 24, 2014, the Environmental Protection Law was reviewed and adopted by the 8th Meeting of the Standing Committee of the 12th National People's Congress (NPC). The same day, President Xi Jinping signed Presidential Decree No. 9, officially announcing that the law shall take effect on January 1, 2015. The amended law sets out the basic principles and systems of ecological and environmental protection through 70 articles in 7 chapters. As a fundamental, comprehensive law in the field of environment, the new law, deemed as the most stringent one so far in China, has made breakthroughs and innovation in the basic ideas, government responsibility, cost of violation of law and public participation.

The newly revised law for environmental protection demonstrates three distinct characteristics. 1) Relevance to reality. The law provides a number of measures to address such outstanding problems as inappropriate law enforcement, failure to fulfill government responsibility, and low costs of corporate violation of law. These measures embody the requirements of source control, strict process management and consequences-based severe punishment. The law demonstrates, in response to the public expectation of blue sky, the indomitable will and firm determination of the Party and the State to strengthen environmental protection towards ecological civilization. 2) View to the future. The amended law provides strong forward-looking and long-term guidance, standing at the height of the Chinese dream of great rejuvenation of the Chinese nation and height of two one-hundred-year goals. It proposes a number of new ideas and guidelines and stipulates a number of new mechanisms and management measures according to the deployments of the 18th National Congress of the Communist Party of China (CPC) and of the 3rd Plenary Session of the 18th CPC Central Committee on deepening the reform of ecological civilization system. This will help to remove resource and environment constraints facing the development of the country. 3) Balance of rights and obligations. The amended law specifies the basic responsibilities, rights and obligations of individual citizens, enterprises, social organizations, governments and environmental protection departments, but also provides the safeguards, restraints and punishment measures, so that the parties can become actively involved, attend to their duties and fulfill their responsibilities. Moreover, breakthroughs and innovation are observed in ideas, systems and safeguard measures. In terms of innovative ideas, "to push ahead the ecological progress and promote sustainable economic and social development" has been included into the legislative purpose. The law puts forward the basic principles of promoting harmony between man and nature and prioritizing conservation and explicitly requires the coordination of economic and social development with environmental protection. In terms of institutional improvement, the law requires the establishment of monitoring and early warning mechanism for resource and environment carrying capacity and the implementation of responsibility system and evaluation system for environmental targets. Economic policies shall give full consideration to the impact on the environment. Mechanisms for trans-regional joint prevention and control and public monitoring and early warning of environmental pollution shall be put in place. Systems for ecological redlining, environmental and health risk assessment, and total quantity control and pollution permit shall be set up. Making use of market-based instruments and economic policies, the law also clearly stipulates the mechanisms for finance, taxation, pricing, ecological compensation, environmental tax, environmental pollution liability insurance, and incentives for the exit of heavily polluting enterprises, as well as environmental credit system of business operators. In terms of co-governance, while strengthening the environmental responsibility of government, the law dedicates chapters to information disclosure and public participation which give citizens access to environmental information, participation and supervision. The range of social organizations that file environmental public interest litigation is outlined. The environmental responsibilities of the people's courts and departments and organs for finance, education, agriculture, public security, supervision, and appointment and removal are clearly provided. In addition, the law for the first time defines the legal status of "environmental monitoring agencies" and grants the environmental protection departments new regulatory powers.

The amended law has laid the foundation for environmental protection in the new era. It is of high significance for protecting and improving the environment, safeguarding public health, promoting the ecological civilization and boosting sustainable economic and social development.

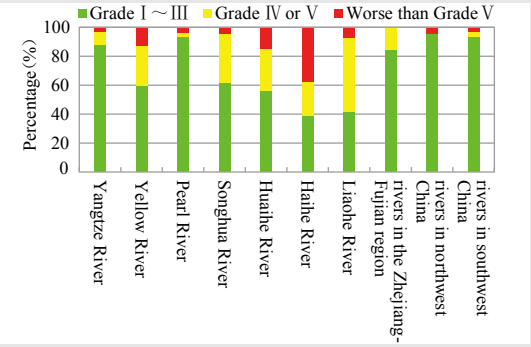
# Freshwater Environment

## General Situation

### Rivers

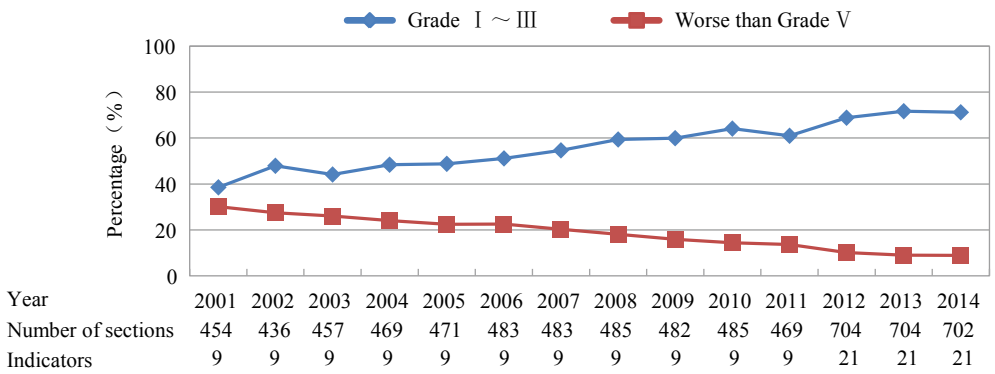
Among the national monitoring sections of 10 major river basins including Yangtze River, Yellow River, Pearl River, Songhua River, Huaihe River, Haihe River, Liaohe River, rivers in the Zhejiang-Fujian region, and rivers in northwest and southwest China, 2.8% was found to have water quality at Grade Ⅰ national standards, an increase of 1.0 pps, and 36.9% at Grade Ⅱ and 31.5% at Grade Ⅲ, down by 0.8 and 0.7 pps respectively. In 15.0% of the river sections, the water quality met Grade Ⅳ national standards, up by 0.5 pps, while 4.8% Grade Ⅴ and 9.0% worse than Grade Ⅴ, same as last year. The major pollution indicators were COD, $BOD_5$ and TP.

The overall water quality in the 10 major river basins has improved markedly during 2001-2014. The percentage of sections with water quality at Grade Ⅰ~Ⅲ rose by 32.7 pps while the percentage of sections, worse than Grade Ⅴ dropped by 21.2 pps.




Percentage of graded water quality in 10 major river basins in 2014

**Yangtze River Basin** 4.4% of the sections under national monitoring program were recorded with Grade Ⅰ water quality and 51.0% Grade Ⅱ, up by 2.5 and 0.4 pps respectively, and 32.7% Grade Ⅲ, down by 4.2 pps. Water quality was found to be Grade Ⅳ in 6.9% of the sections and Grade Ⅴ in 1.9%, increases of 0.6 and 0.7 pps respectively, but the same 3.1% of




Inter-annual variability of water quality in 10 major river basins in 2001–2014

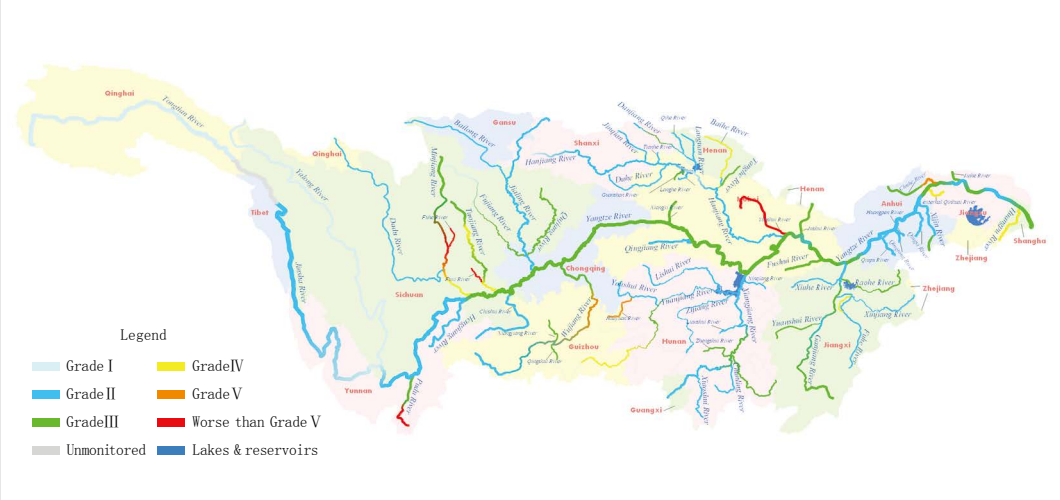



Diagram of graded water quality of the Yangtze River Basin in 2014

sections remained below Grade Ⅴ standards.

In the mainstream of the Yangtze River, the water quality showed no notable changes and remained Grade Ⅰ ~ Ⅲ in all sections. To be more specific, 7.3% of the sections had water quality at Grade Ⅰ, an increase of 4.9 pps, and 41.5% Grade Ⅱ and 51.2% Grade Ⅲ, down by 3.7 and 1.2 pps respectively.

In the tributaries of the Yangtze River, no obvious change in water quality was observed. 3.4% of the sections under national monitoring program met the Grade Ⅰ standards, 54.2% Grade Ⅱ, 9.3% Grade Ⅳ and 2.6% Grade Ⅴ, increases of 1.7, 1.7, 0.8 and 0.9 pps respectively, while water quality was found at Grade Ⅲ in 26.3% of the sections, down by 5.1 pps and worse than Grade Ⅴ in 4.2% of sections, the same as last year. Tanglangchuan River, Yunshui River, Fuhe River and Fuxi River suffered severe pollution, Minjiang River, Tuojiang River, Chuhe River, Outer Qinhuai River, Huangpu River, Huayuan River and Tangbai River faced light pollution.

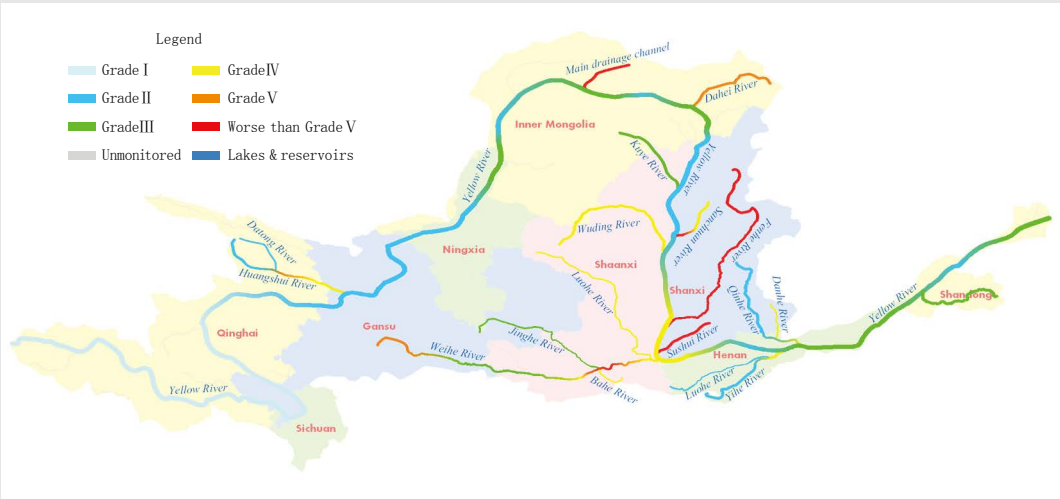



Diagram of graded water quality of the Yellow River Basin in 2014

Excellent or good water quality was observed in the remaining tributaries.

**Yellow River Basin** 1.6% of the sections under national monitoring program were recorded with Grade Ⅰ water quality and 8.1% Grade Ⅴ, the same as last year. 33.9% of the sections were found to have water quality at Grade Ⅱ and 19.3% Grade Ⅳ, up by 8.1 and 1.6 pps respectively, 24.2% Grade Ⅲ and 12.9% worse than Grade Ⅴ, down by 6.5 and 3.2 pps respectively. The major pollution indicators were COD, ammonia nitrogen and $BOD_5$. As a whole, there were no notable changes to the water quality in the basin compared with last year.

In the mainstream of the Yellow River, 3.8% of the sections under national monitoring program met the Grade Ⅰ standards, basically the same level as a year earlier, 53.8% Grade Ⅱ and 34.7% Grade Ⅲ, up by 15.3 and down by 15.3 pps respectively, and 7.7% Grade Ⅳ. No sections failed Grade Ⅴ standards or below. Generally, the water quality showed no notable changes over last year.

In the tributaries of the Yellow River, no sections under national monitoring program met the Grade Ⅰ standards, 19.4% attained Grade Ⅱ and 27.8% Grade Ⅳ, each up by 2.8 pps, 16.7% Grade Ⅲ and 13.9% Grade Ⅴ, the same as last year, and 22.2% failed Grade Ⅴ, an decrease of 5.6 pps. As a whole, the tributaries exhibited no notable changes in water quality. However, Zongpaigan River, Sanchuan River, Fenhe River, and Sushui River suffered serious pollution and Dahei River and Weihe River moderate pollution. Yiluo River, Qinhe River, Bahe River, Beiluo River and Danhe River were slightly polluted, and the rest tributaries enjoyed excellent or good water quality.

**Pearl River Basin** 5.6% of the sections under national monitoring program were recorded with Grade Ⅰ water quality and 1.8% Grade Ⅳ, increases of 5.6 and 1.8 pps respectively, 74.1% Grade Ⅱ, down by 5.5 pps, and 14.8% Grade Ⅲ, the same as last year. No sections were found to have water quality at Grade Ⅴ, but 3.7% worse than Grade Ⅴ, a decrease of 1.9 pps. As a whole, there were no notable changes to the water quality compared with last year.

In the mainstream of the Pearl River, 77.8% of the sections under national monitoring program met the Grade Ⅱ standards, down by 11.2 pps, while 5.6% attained the Grade Ⅰ and Grade Ⅳ standards each, an increase of 5.6 pps, and the rest 11.0% Grade Ⅲ. Generally, the water quality in the mainstream showed no notable changes over last year.

In the tributaries of the Pearl River, 7.7% of the sections under national monitoring program reached the Grade Ⅰ standards, an increase of 7.7 pps, 73.1% Grade Ⅱ, down by 3.9 pps, and 11.5% Grade Ⅲ, the same as last year. 7.7% of the sections fell short of Grade Ⅴ standards, down by 3.8 pps. Relative to a year earlier, there were no significant changes in the water quality of tributaries. Excellent or good water quality was observed, except in the heavily polluted Shenzhen River and Lianjian River.

**Songhua River Basin** The water quality experienced no notable changes over last year. No Grade Ⅰ water quality was observed like the situation last year. The sections recorded with water quality at Grade Ⅱ and Grade Ⅲ increased by 1.2

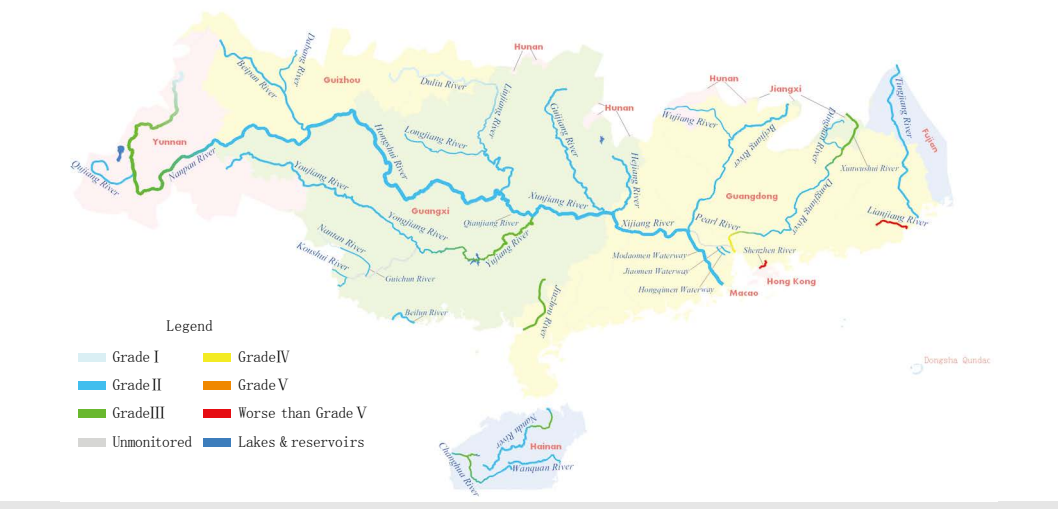



Diagram of graded water quality of the Pearl River Basin in 2014


Diagram of graded water quality of the Songhua River Basin in 2014

and 5.2 pps respectively to 6.9% and 55.2%, while the sections at Grade Ⅳ and Grade Ⅴ fell by 1.9 and 3.4 respectively to 28.7% and 4.6%. 4.6% of the sections remained below Grade Ⅴ standards, a decrease of 1.1 pps. The major pollution indicators were COD, $COD_{Mn}$ and $BOD_5$.

In the mainstream of the Songhua River, no Grade Ⅰ water quality and 6.2% worse than Grade Ⅴ were observed, like the situation last year. 6.2% of the sections under national monitoring program attained the Grade Ⅱ standards, down by 6.3 pps, while 81.4% met the Grade Ⅲ and 6.2% Grade Ⅳ, increases of 12.6 and 6.2 pps respectively. The sections with Grade Ⅴ water quality observed last year, accounting for 12.5 pps, became absent. Generally, the water quality in the mainstream showed no notable changes.

In the tributaries of the Songhua River, no Grade Ⅰ water quality and 8.8% worse than Grade Ⅴ were found, like the situation last year. 11.8% of the sections reached the Grade Ⅱ standards and 52.9% Grade Ⅲ, increases of 3.0 and 2.9 pps

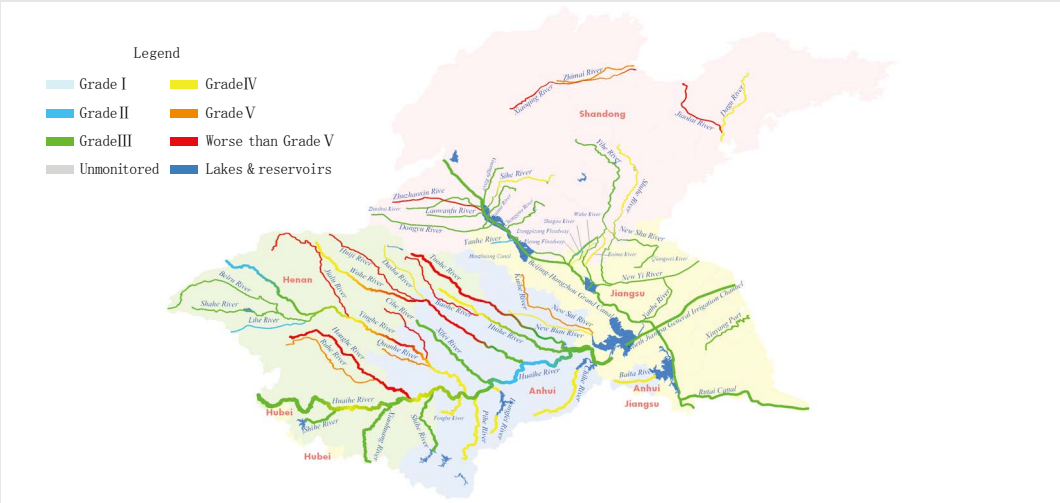



Diagram of graded water quality of the Huaihe River Basin in 2014

respectively, while 20.6% were recorded Grade Ⅳ and 5.9% Grade V, down by 3.0 and 2.9 pps respectively. Relative to a year earlier, there were no significant changes in the water quality of tributaries.

Heilong River, Ussuri River System and Tumen River were slightly polluted, but Suifen River maintained good water quality.

**Huaihe River Basin** The water quality showed no notable changes over last year. No Grade Ⅰ sections were observed as the year earlier. 7.5% of the sections under national monitoring program attained the Grade Ⅱ standards and 21.3% Grade Ⅳ, up by 1.1 and 3.2 pps respectively, and 48.9% Grade Ⅲ and 7.4% Grade Ⅴ, down by 4.3 and 3.2 pps respectively. The sections with water quality worse than Grade Ⅴ accounted for 14.9%, an increase of 3.2 pps. The major pollution indicators were COD, $BOD_5$ and $COD_{Mn}$.

In the mainstream of the Huaihe River, no sections with water quality at Grade Ⅰ or Grade Ⅴ or worse than Grade Ⅴ were observed as last year. The sections recorded with Grade Ⅱ water quality accounted for 30.0%, up by 20.0 pps, Grade Ⅲ 50.0%, down by 30.0 pps, and Grade Ⅳ 20.0%, up by 10.0 pps. The water quality of the mainstream deteriorated this year.

In the tributaries of the Huaihe River, no sections met the Grade Ⅰ standards. 4.8% of the sections had water quality at Grade Ⅱ and 11.9% Grade Ⅴ, deceases of 7.1 and 7.2 pps respectively. 28.5% reached the Grade Ⅲ standards and 31.0% Grade Ⅳ, increases of 2.3 and 7.2 pps respectively. 23.8% of the sections failed the Grade Ⅴ standards, up by 4.8 pps. Relative to a year earlier, the water quality of tributaries declined. Honghe River suffered severe pollution, Guohe River moderate pollution, and Yinghe River, Huihe River and Tuohe River slight pollution. Shihe River, Huanghe River, Shihe River, Shiguan River and Xifei River enjoyed good water quality.

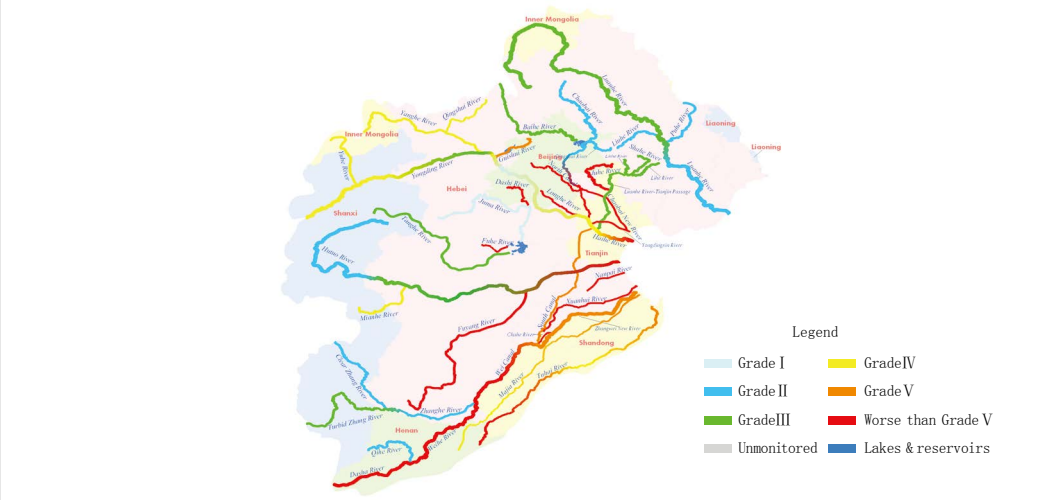



Diagram of graded water quality of the Haihe River Basin in 2014

**Haihe River Basin** 4.7% of the sections under national monitoring program met the Grade Ⅰ standards, Grade Ⅲ 20.3% and Grade Ⅳ 14.1%, increases of 3.1, 1.6 and 4.7 pps respectively. 14.1% of the sections were recorded with Grade Ⅱ water quality, 9.3% Grade Ⅴ and 37.5% worse than Grade Ⅴ, down by 4.6, 3.2 and 1.6 pps respectively. There wasn't any notable change in the water quality compared with a year ago. The major pollution indicators were COD, $BOD_5$ and TP.

The two monitored sections in the mainstream of Haihe River showed water quality at Grade Ⅳ and worse than Grade Ⅴ respectively, basically the same as the picture of last year.

In the tributaries of Haihe River, the sections with Grade Ⅰ water quality took up 6.0%, Grade Ⅲ 20.0% and Grade Ⅳ 12.0%, increases of 4.0, 2.0 and 6.0 pps respectively, while Grade Ⅱ water quality was found in 12.0% of the sections and Grade Ⅴ 6.0%, decreases of 8.0 and 6.0 pps respectively. 44.0% of the sections failed the Grade Ⅴ standards, up by 2.0 pps. As a whole, there were no significant changes in water

quality of tributaries. However, severe pollution was observed in Beiyun River, Chahe River, Longhe River, Chaobai New River, Dasha River, Dashi River, Fuhe River, Fuyang River, Juhe River, Napai River, Weihe River, Weiyun River, Xuanhui River, Yongding New River, Ziya New River. Meanwhile, Guishui River, Nanyun River and Zhangwei New River were moderately polluted and Yuhe River, Yanghe River, Mianhe River and Qingshui River slightly polluted. The rest tributaries enjoyed excellent or good water quality.

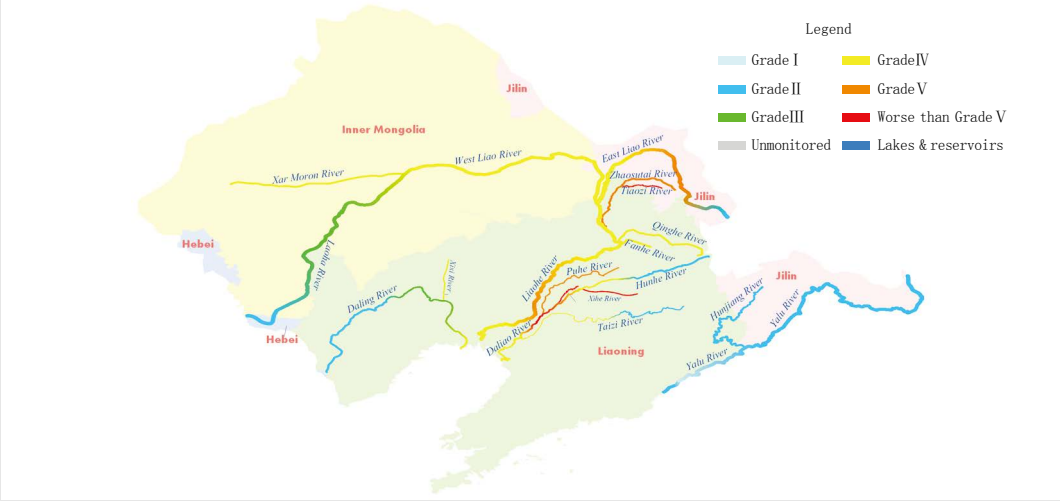



Diagram of graded water quality of the Liaohe River Basin in 2014

**Liaohe River Basin** 1.8% of the sections under national monitoring program were recorded with Grade Ⅰ water quality, the same proportion as last year, and 34.5% Grade Ⅱ, 5.5% Grade Ⅲ, and 40.0% Grade Ⅳ, decreases of 1.9, 1.8 and 5.5 pps respectively. Water quality at Grade Ⅴ was observed in 10.9% of the sections and below Grade Ⅴ in 7.3% of the sections, up by 7.3 and 1.9 pps respectively. Overall, there were no notable changes in water quality of the Liaohe River. The major pollution indicators were COD, $BOD_5$ and petroleum pollutants.

In the mainstream of Liaohe River, no sections attained the Grade Ⅰ standards, 14.3% met the Grade Ⅱ standards and 57.2% Grade Ⅳ, the same as last year. The sections with water quality at Grade Ⅲ accounted for 7.1%, down by 7.2 pps, and Grade Ⅴ 21.4%, up by 14.3 pps. Water quality worse than Grade Ⅴ was not observed in sections, a decrease of 7.1 pps. Generally, there were no notable changes in water quality of the Liaohe River mainstream.

In the tributaries of the Liaohe River, no sections under national monitoring program met the Grade Ⅰ ~ Ⅲ standards, which represented a decrease of 16.7 pps over last year. 50.0% of the sections were found to have water quality at Grade Ⅳ, almost the same as last year. 33.3% Grade Ⅴ, up by 33.3 pps and 16.7 % worse than Grade Ⅴ, down by 16.6 pps. Relative

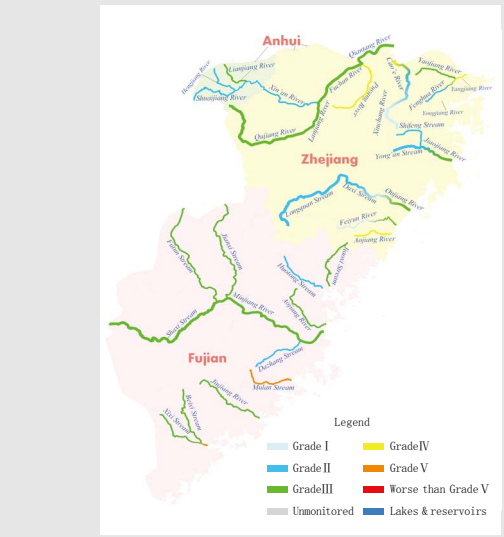



Diagram of graded water quality of rivers in Zhejiang–Fujian Region in 2014

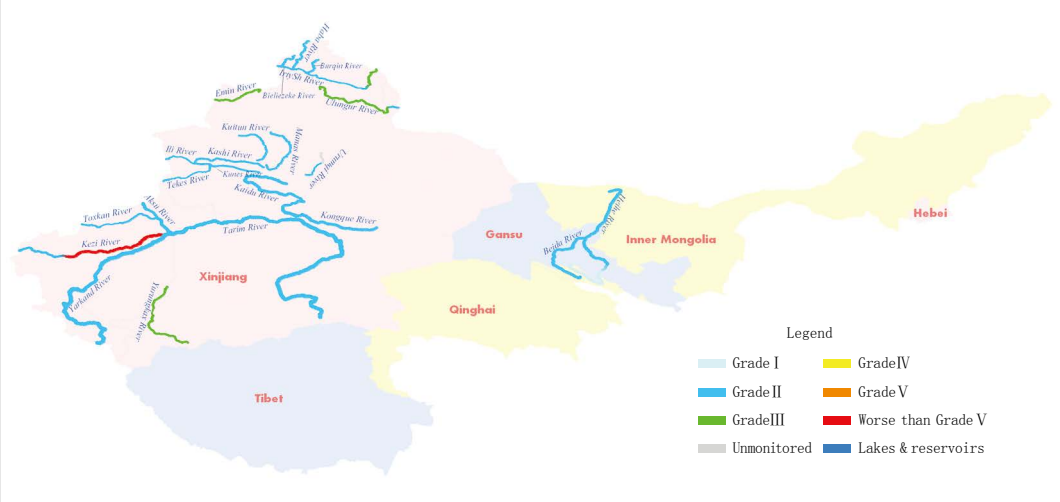



Diagram of graded water quality of rivers in northwest China in 2014

to the previous year, the water quality had no significant changes.

Daliao River and Daling River were slightly polluted, while Yalu River maintaind excellent water quality.

**Rivers in Zhejiang-Fujian region** 6.7% of the sections under national monitoring program attained Grade Ⅰ standards, 51.1% Grade Ⅲ, and 4.4% Grade Ⅴ, up by 2.2, 11.1 and 4.4 pps respectively. 26.7% met Grade Ⅱ standards and 11.1% Grade Ⅳ, down by 15.5 and 2.2 pps respectively. Water quality worse than Grade Ⅴ was not observed as last year. As a whole, the rivers exhibited no significant changes in water quality.

**Rivers in northwest China** 3.9% of the sections under national monitoring program attained Grade Ⅰ standards, a decrease of 5.9 pps, while 84.3% met the Grade Ⅱ standards and 9.8% Grade Ⅲ, up by 2.0 and 3.9 pps respectively. Grade Ⅳ and Ⅴ sections were not observed, and sections with water quality below Grade Ⅴ took up 2.0%. As a whole, the rivers showed no significant changes in water quality.

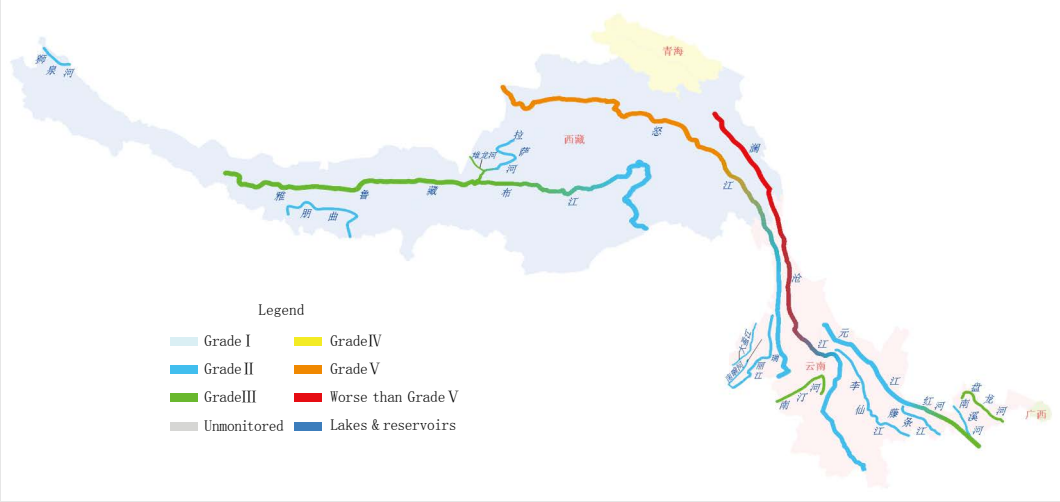
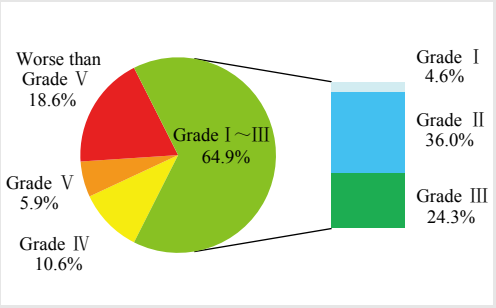



Diagram of graded water quality of rivers in southwest China in 2014

**Rivers in southwest China** Grade Ⅰ and Ⅳ water quality were not found as last year. 67.8% of the sections under national monitoring program reached Grade Ⅱ standards, up by 0.1 pps, and 25.8% Grade Ⅲ, a decrease of 6.5 pps. The sections with water quality at and below Grade Ⅴ each accounted for 3.2%, representing an increase of 3.2 pps. As a whole, the rivers showed no significant changes in water quality.

**Waters bodies crossing provincial boundaries** The sections with water quality at Grades Ⅰ~Ⅲ, Grades Ⅳ~Ⅴ and worse than Grade Ⅴ accounted for 64.9%, 16.5% and 18.6% respectively. The major pollutants were ammonia nitrogen, TP and COD.




Percentage of graded water quality of waters across provincial boundaries in 2014

Water quality of sections across provincial boundaries in 2014

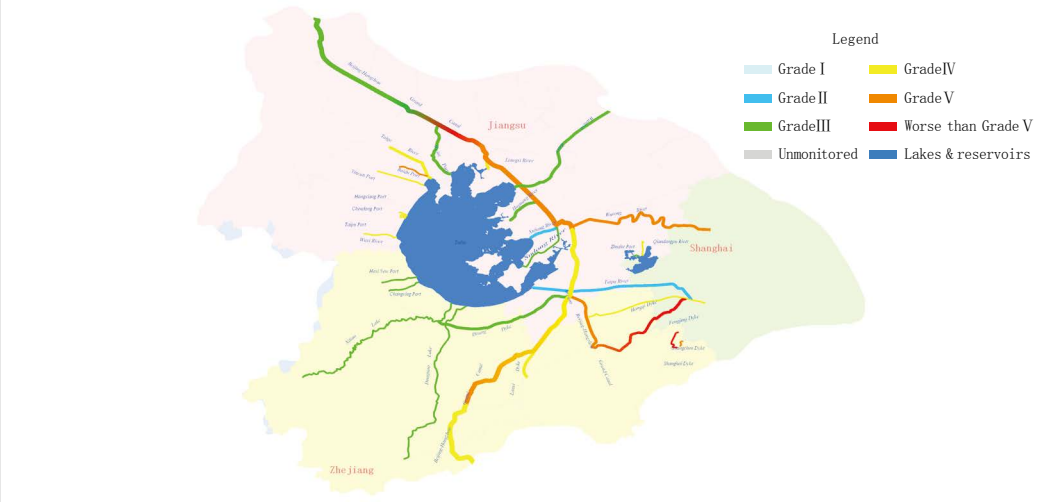
| Basin | Section pct (%) | | Geographical distribution of sections with water quality worse than Grade Ⅴ |
|---|---|---|---|
| | Grade Ⅰ~Ⅲ | Worse than Grade Ⅴ | |
| Yangtze River | 78.0 | 7.5 | Qingliu River section at Anhui-Jiangsu boundary, Wushui River section at Guizhou-Hunan boundary, Qinghe River section and Huangqu River section at Henan-Hubei boundary, Niulang Lake section at Hubei-Hunan boundary |
| Yellow River | 49.3 | 34.2 | Huangshui River section at Qinghai-Gansu boundary, Dusitu river section at Inner Mogolia-Ningxia boundary, Huangfuchuan River section, Kuye River section and Ziniuchuan River section at Inner Mongolia-Shaanxi boundary, Hulu River section, Yuhe River section and Ruhe River section at Ningxia-Gansu boundary, Jindi River section at Henan-Shandong boundary, section of Longwanggou River that empties into the Yellow River in Inner Mongolia, sections of Pianguan River, Weifen River, Qiushui River, Sanchuan River, E'he River, Fenhe River, Sushui River that empty into the Yellow River in Shanxi, Huangfuchuan River, Gushanchuan River, Qingjian River, Yanhe River and Jinshui River that empties into the Yellow River in Shaanxi, sections of Shuangqiao River and Hongnongjian River empty into the Yellow River in Henan |
| Pearl River | 85.5 | 5.5 | Huanghua River section at Guangdong-Guangxi boundary, Shenzhen River section at Guangdong-Hong Kong boundary |
| Songhua River | 83.0 | 6.4 | Sections of Alun River and Yalu River at Inner Mongolia-Heilongjiang boundary, Kacha River section at Jilin-Heilongjiang boundary |
| Huaihe River | 49.0 | 18.4 | Sections of Hongru River, Nanming River, Dasha River (Xiaohonghe River), Tuohe River and Baohe River at Henan-Anhui boundary, Kuihe River section at Jiangsu-Anhui boundary, section of the south branch of Guanhe River at Anhui-Jiangsu boundary, sections of Xiuzhen River and Qingkou River at Shandong-Jiangsu boundary |
| Haihe River | 31.7 | 61.7 | Sections of Chaobai River, Beiyun River, Juhe River, Fenggangjian River, Xiaoqing River and Dashi River at Beijing-Hebei boundary, Beijing Paishui River section at Beijing-Tianjin boundary, sections of Chaobai River, Jiyun River, Beiyun River, Juhe River, Huanxiang River, Shuangcheng River, Daqing River, Qingjinghuang Drainage, Ziya River, Ziya New River, North Paishui River, Canglang River at Hebei-Tianjin boundary, sections of Weiyun River and Zhangwei New River at Hebei-Shandong boundary, Weihe River section at Henan-Hebei boundary, Tuhai River section at Henan-Shandong boundary, Yinma River section at Inner Mongolia-Shanxi boundary, Nanyun River section at Shandong-Hebei boundary, sections of Sanggan River and Nanyang River at Shanxi-Hebei boundary |
| Liaohe River | 19.0 | 23.8 | Yinhe River section at Hebei-Inner Mongolia boundary, Laoha River section at Liaoning-Inner Mongolia boundary, sections of Zhaosutai River and Tiaozi River at Jilin-Liaoning boundary |
| Rivers in southeast China | 90.0 | 10.0 | Ganqi Reservoir section at Zhejiang-Fujian boundary |
| Rivers in southwest China | 100.0 | —— | —— |

## Lakes (Reservoirs)

**Water quality** In 2014, 7 of the 62 key lakes (reservoirs) enjoyed Grade Ⅰ water quality, 11 Grade Ⅱ, 20 Grade Ⅲ, 15 Grade Ⅳ, and 4 Grade Ⅴ, and 5 failed the Grade Ⅴ standards. There were no significant changes in these percentages compared with last year. The major pollutants were TP, COD and $COD_{Mn}$.

Graded water quality of major lakes (reservoirs) in 2014

| Water quality | Three lakes | Major lakes | Major reservoirs |
|---|---|---|---|
| Excellent | —— | Futou Lake, Honghu Lake, Liangzi Lake, Erhai Lake, Fuxian Lake and Lugu Lake | Miyun Reservoir, Danjiangkou Reservoir, Songtao Reservoir, Taiping Lake, Xinfengjiang Reservoir, Shimen Reservoir, Changtan Reservoir, Qiandao Lake, Geheyan Reservoir, Huanglongtan Reservoir, Dongjiang Reservoir, Zhanghe Reservoir |
| Good | —— | Wabu Lake, Nansi Lake, Nanyi Lake, Dongping Lake, Shengjin Lake, Wuchang Lake, Luoma Lake, Bangongcuo Lake | Yuqiao Reservoir, Laoshan reservoir, Dongpu Reservoir, Xiashan Reservoir, Fushui Reservoir, Mopanshan Reservoir, Dahuofang Reservoir, Xiaolangdi Reservoir, Cha'ersen Reservoir, Daguangba Reservoir, Wangyao Reservoir , Bailianhe Reservoir |
| Mild pollution | Taihu Lake, Chaohu Lake | Yangcheng Lake, Xiaoxingkai Lake, Gaoyou lake, Xingkai Lake, Dongting Lake, Caizi Lake, Poyang Lake, Yangzonghai Lake, Jingpo Lake, Bosten Lake | Ni'erji Reservoir, Lianhua Reservoir, Songhua Lake |
| Moderate pollution | —— | Hongze Lake, Dianshan Lake, Bei'er Lake, Longgan Lake | —— |
| Serious pollution | Dianchi Lake | Dalai Lake, Baiyangdian Lake, Ulungur Lake, Chenghai Lake (due to higher natural background level) | —— |

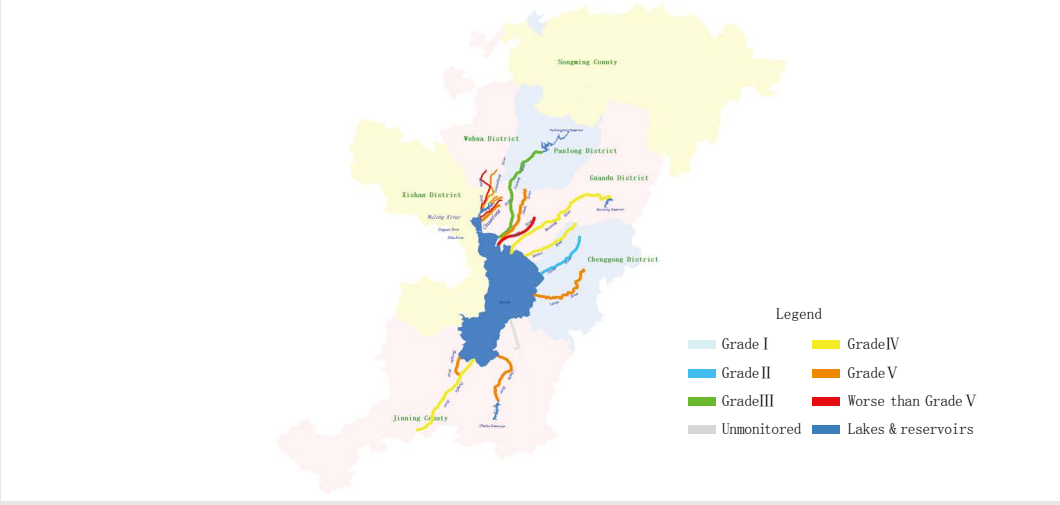



Percentage of graded water quality of the Taihu Lake Basin in 2014

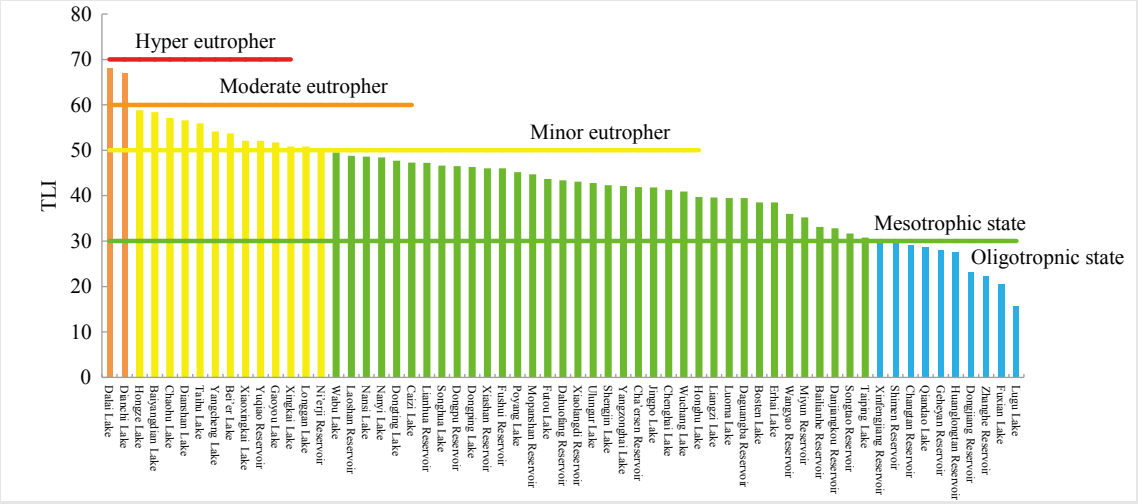

Percentage of graded water quality of the Chaohu Lake Basin in 2014

In 2014, up to 90.0% of the 20 monitored sites in Taihu Lake met the Grade Ⅳ standards and 10% Grade Ⅴ, and the lake as a whole was recorded with Grade Ⅳ water quality. The major pollutants were COD and TP. Among the 34 monitored sections, Grades Ⅱ~Ⅴ sections accounted for 5.9%, 38.2%, 32.4%, and 14.7% respectively, while water quality below Grade Ⅴ was observed in 8.8% of the sections.

In 2014, 12.5% of the 8 monitored sites in Chaohu Lake met the Grade Ⅲ standards, 50.0% Grade Ⅳ, and 37.5% Grade Ⅴ. The lake as a whole was recorded with Grade Ⅳ water quality. The major pollutants were TP and COD. Among the 11 monitored sections, 9.1% and 63.6% were found to have water quality at Grades Ⅱ and Ⅲ respectively, while water quality worse than Grade Ⅴ was observed in 27.3% of




Percentage of graded water quality of the Dianchi Lake Basin in 2014




Trophic Level Index (TLI) of major lakes (reservoirs) in 2014

the sections.

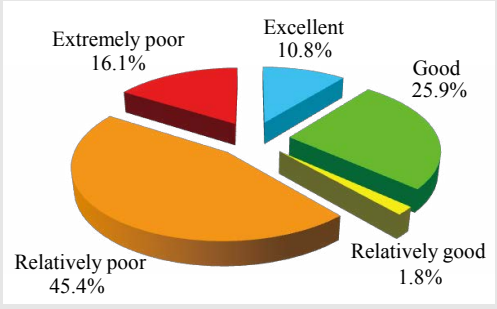
In 2014, all the 10 monitored sites of Dianchi Lake showed water quality below Grade Ⅴ standards. The major pollution indicators were COD, TP and $COD_{Mn}$. Among the 16 monitored sections, 6.2% were found to have water quality at Grade Ⅱ, 6.2% at Grade Ⅲ, 18.8% Grade Ⅳ, and 50.0% Grade Ⅴ, while water quality worse than Grade Ⅴ was observed in 18.8% of the sections.

**Trophic level** In 2014, 10 of the 61 monitored lakes (reservoirs) were in oligotrophic state, 36 in mesotrophic state, 13 in minor eutrophic state and 2 in moderate eutrophic state.

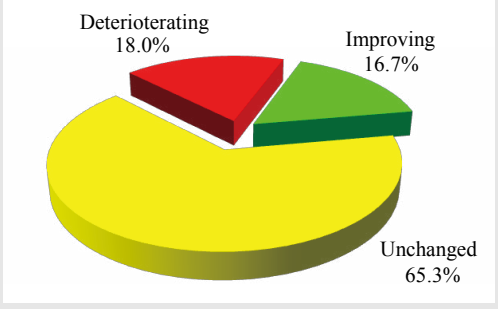
In 2014, Taihu Lake as a whole suffered minor eutropher, including waters in the northern, western, eastern and southern shores and in the center. Chaohu Lake as a whole was in minor eutrophic state, with moderate eutropher in the western half of the lake and minor eutropher in the eastern. Dianchi Lake faced moderate eutrophication, of which Caohai Lake was in severe eutrophic state and Waihai Lake in moderate eutrophic state.

## Groundwater

There were 4,896 sites designated for monitoring groundwater environment quality in China this year, 1,000 of




Groundwater quality at monitoring sites in China in 2014




Year–on–year change of groundwater quality in China in 2014

which were state-level sites. Monitoring data found 10.8% of the sites with excellent good quality, 25.9% with good, 1.8% with relatively good, 45.4% with relatively poor, and 16.1% with extremely poor. The major non-attainment indicators were total hardness, total dissolved solids, iron, manganese, nitrite, nitrate, ammonia nitrogen, fluoride, and sulfate. Individual sites exceeded the standards for arsenic, lead, hexavalent chromium, cadmium and heavy metals.

There were 4,501 monitoring sites distributed in 195 cities for which continuous monitoring data were kept with regard to groundwater quality. The groundwater quality in 65.3% of the sites remained unchanged compared with last year, improved in 16.7% and deteriorated in 18.0%.

In 2014, the groundwater quality monitoring wells were mainly distributed in the plain area of 17 northern provinces (autonomous regions and municipalities), covering areas with a high degree of groundwater development and pollution. The monitoring was focused on shallow groundwater prone to surface water pollution or soil infiltration, and the results found poor groundwater quality. Among the 2,071 monitoring sites, 0.5% exhibited excellent groundwater quality stations and 14.7% good, while 48.9% indicated relatively poor groundwater quality and 35.9% extremely poor. Relatively good groundwater quality was not observed. In addition to the high values of the total hardness, manganese, iron and fluoride, probably due to the hydrogeological chemical background, the results identified high content of nitrite, nitrate, and ammonia nitrogen and in some areas, heavy metal and toxic organic pollution.

The average content of groundwater nitrate (calculated by N, the same below) registered 10.9 mg/L in 1,857 sampling sites of typical farmland in Beijing, Tianjin, Hebei, Shandong, Henan and Liaoning. Among them, the vegetable growing areas showed the highest average concentration of groundwater nitrate up to 15.6 mg/L and the other types of farmland (including flower and cotton growing areas), an average content of 12.8 mg/L. The concentration numbered 9.7 mg/L and 6.1 mg/L in grain growing areas and fruit growing area respectively. The levels of groundwater nitrate in monitoring sites as a whole and different types of farmland met the Grade Ⅲ requirements of *Groundwater Quality Standards (GB/T 14848-93)* and the groundwater can be used as centralized source drinking water and for industrial and agricultural purposes.

## Centralized Source Water Areas in Cities at or above Prefectural Level

The statistical data on water intake were available this year for centralized source water areas distributed in 329 cities at or above prefectural level[①]. The combined water intake amounted to 33.255 bn. t the whole year, which had been supplied to 326 mil. people. 96.2 % of them or 31.989 bn. t attained national standards with regard to surface water quality. The non-attainment indicators of surface source waters were TP, manganese and iron, whereas those of the underground source waters turned out to be iron, manganese, and ammonia nitrogen.

## Major Water Conservancy Projects

**Three Gorges Project Area** The mainstream enjoyed good water quality. All of the three sections under national monitoring program attained Grade Ⅲ standards. The TLI value of the primary tributary waters ranged between 50.1 and 72.1, and 29.4% of the monitored sections were found with eutropher.

**South-to-North Water Diversion Project (Eastern Route)** Sanjiangying Section of Jiajiang River, the water intake of the eastern route from Yangtze River, attained Grade Ⅲ standards. Along the mainstream of the route, the Inner Canal, Baoying segment, Suqian segment, South Shandong segment, Hanzhuang segment, and Liangji segment of the Grand Canal enjoyed good water quality. The 6 monitored sites in the Hongze Lake were recorded with Grade Ⅴ water quality and minor eutropher. The 2 monitored sites in the Luoma Lake, 5 in Nansi Lake, and 2 in Dongping Lake were in a mesotrophic state with water quality at Grade Ⅲ.

**South-to-North Water Diversion Project (Central Route)** Taocha Section at the water intake of the middle route attained Grade Ⅱ standards. 5 monitored sites at Danjiangkou Reservoir were in mesotrophic state Grade Ⅱ water quality. Among the 18 sections of the nine tributaries that empty into Danjiangkou Reservoir, 2 sections of Hanjiang River were observed with Grade Ⅰ water quality and 5 with Grade Ⅱ water quality. The water quality of Tianhe River, Jinqian River, Langhe River, Duhe River, Laoguan River and Qihe River met the Grade Ⅱ standards. Danjiang River was found to have Grade Ⅱ water quality at 3 sections and Grade Ⅲ at 1 section. Guanshan River as a whole was recorded with Grade Ⅲ water quality.

## Inland Fishery Waters

The main pollution indicators of valuable fishery waters in rivers were TN and $COD_{Mn}$ this year. The TN concentrations

[①]Including cities with counties, prefectures and leagues and cities directly under the provincial government, sic passim.

in some fishery waters of the Yellow River and Yangtze River and the $COD_{Mn}$ concentration in certain fishery waters of the Heilong River exceeded the limits. The concentrations of TN, TP, petroleum pollutants, volatile phenol, copper and cadmium increased to varying degrees, while the concentrations of $COD_{Mn}$ and notably, non-ionic ammonia decreased.

The pollution indicators of valuable fishery waters in lakes (reservoirs) were TN, TP, $COD_{Mn}$, petroleum pollutants and copper this year. The concentrations of TP, TN and $COD_{Mn}$ overshoot the upper limits by a larger margin than other pollutants. The excessive concentrations of TN, $COD_{Mn}$, petroleum pollutants, volatile phenol and copper were recorded on a smaller scale, while the TP concentration exceeded the limit by a larger margin over the year.

The major pollutants in national aquatic germplasm resources conservation areas (freshwater) were TN, TP and $COD_{Mn}$.

## Measures and Actions

**【Water pollution prevention and control】** The text and related materials for the *Action Plan for the Prevention and Control of Water Pollution* were prepared. An environmental assessment of centralized drinking water sources in cities at or above the prefecture level was conducted. The *Circular on Enhancing the Protection of Drinking Water Sources and Properly Responding to Environmental Emergencies* was issued to further strengthen protection of drinking water sources in the rural areas, combined with the incentives for rural environmental governance. The groundwater investigation and assessment was carried out in key industrial pollution sources and landfill with the support of 6 guidelines, including *Guide to the Investigation and Evaluation of Groundwater Environment (Trial)* and *Guide to the Simulation, Assessment and Prediction of Groundwater Pollution (Trial)*. For the protection of rivers and lakes, the *Agreement on the Ecological Environment of Rivers and Lakes* was signed and *Master Plan for Eco-environment Protection of Lakes with Good Water Quality (2013-2020)*, *Interim Measures for the Performance Evaluation of Project Funds for River and Lake Governance and Protection*, *Technical Guidelines for Ecological Safety Assessment of Lakes (Trial)*, and *Technical Guidelines for Ecological Restoration of Rivers and Channels Emptying into Lakes (Trial)* were formulated. The performance of the 2013 special action for water pollution prevention and control in major river basins was evaluated, in order to actively promote trans-boundary water environmental compensation, and the technical program for urban surface water environmental quality assessment was drafted.

**【Progress in the Major Science and Technology Program for Water Pollution Control and Treatment】** The Major Science and Technology Program for Water Pollution Control and Treatment (hereinafter referred to as the "Program"), with a budget of 14.168 bn. yuan, follows a three-step approach for source control, remediation and integrated regulation of water bodies. As of 2014, totally 437 research projects were launched under the Program and 7.085 bn. yuan was allocated from the Central Government. Among them, 230 projects involving 3.205 bn. yuan were included in the 11th Five-Year Plan and 207 involving 3.88 bn. yuan in the 12th Five-Year Plan. According to the river-specific policy and lake-specific policy, research and demonstration were carried out in 10 river basins, namely the Taihu Lake, Liaohe River, Songhua River, Dianchi Lake, Chaohu Lake, Haihe River, Huaihe River, Three Gorges Reservoir, Dongjiang River, and Erhai River. The results of Phase Ⅰ included over 1,000 key technologies, 500 S&T demonstration projects, 2,300 patent applications (1,221 approved), 100 quick-test methods, and 300 standards and technical specifications. In Phase Ⅱ, aiming at remediation, technology research and development for the control of non-point source pollution and toxic and hazardous pollutants has been enhanced. More than 200 demonstration projects, 90 integrated bases and platforms and 8 strategic alliances for industrial technological innovation were established, 480 patent applications were filed and 28 standards, specifications or technical manuals published. The methods for water ecological function zoning were improved and the management systems for water quality target of river basins built. Key sewage treatment technologies in chemical and other four major industries were developed, and progress was seen in wastewater utilization in paper making industry. Technical achievements in this phase also included new methods for source apportionment and water quality response of urban water environmental systems, key technologies for improving urban sewage quality, monitoring and early warning technologies and interception and disposal systems to address blue algae and green bloom, ecological restoration technologies for complex lakefront belts, water purification process for lakes and rivers, key technologies for monitoring and early warning of mildly contaminated drinking water sources and for purification for emergency water supply. The systems for trans-boundary ecological compensation and compensation for water pollution were implemented and the pollution permit scheme piloted in typical watersheds.

**【The most stringent water resource management**

**system】** Under the water resource management system, the three-level responsibility system of government leaders was built in 31 provinces (autonomous regions and municipalities) which broke down the targets of “three red lines” specified by the State Council to provincial, city and county levels, administrative. Now, the system has achieved full coverage at provincial and city levels and 90% at county level. The 2013 performance assessment of the most stringent water resource management system was completed according to the work plan. The National Water Monitoring Capacity-Building Projects has made breakthroughs. The information platform integrating the Central Government, basins and provinces and the monitoring systems for water users, water functional areas, and trans-boundary sections were built, which facilitates information sharing, interoperability and operational synergies. The water quality monitoring program has been extended to all sections at provincial boundaries.

## International Cooperation on Environmental Protection

**Serve the national political diplomacy to raise the voice in environmental protection. A** number of cooperative activities have been incorporated into the results of home and foreign affairs of the Party and state leaders, including green supply chain demonstration center, environmental information sharing platform based on Shanghai Cooperation Organization, China-South Korea and China-Singapore environmental cooperation documents, and presentation of environmental monitoring equipment to Cuba. Focus efforts have been made to strengthen cooperation with neighboring countries, in order to enhance mutual trust and resolve disputes and conflicts.

**Share Chinese environmental stories with the international community to gain understanding and support.** China's stories of environmental protection spread via bilateral and multilateral cooperation mechanisms and platforms, including the United Nations Conference on the Environment, Tripartite Environment Ministers Meeting among Korea, China and Japan, and the 3rd International Conference on Challenges Faced by Technical and Scientific Support Organizations (TSOs) in Enhancing Nuclear Safety and Security. They are expected to introduce China’s environmental policy and new idea of "rational, coordinated, balanced" development of nuclear security.

**Introduce advanced international ideas to support domestic environmental priorities.** China has been actively involved in international negotiations on the Minamata Convention on Mercury, Stockholm Convention on Persistent Organic Pollutants (POPs), Montreal Protocol, Convention on Nuclear Safety, and issued the commencement notice on the amendment of the Stockholm Convention to list additional 10 POPs. These efforts safeguard national interests and rights and promote compliance mechanisms. China also actively participates in the negotiations on China-US and China-EU investment agreements, China-South Korea Free Trade Agreement, China-Japan-South Korea Free Trade Agreement, and World Trade Organization Environmental Goods Agreement, with an aim to build international rules favorable for environmental protection, economic development, opening up environmental services, and putting environmental protection industries and services to the international market.

**Carry out South-South Cooperation in environmental protection in the interest of the "going out" strategy.** The international cooperation echoes the "One Belt and One Road" strategy and pushes forward the Green Silk Road. This not only strengthens ties with Association of South-East Asian Nations, Africa, Latin America and the BRICS nations, but also guides Chinese enterprises to further regulate environmental behavior in overseas investment.

# Marine Environment

## General Situation

### All Sea Areas

Sea areas that failed the Grade Ⅳ standard on water quality this year totaled 52,280 $km^2$ in spring, 41,140 $km^2$ in summer and 57,360 $km^2$ in autumn, mostly concentrated in the nearshore sea areas of Liaodong Bay, Bohai Bay, Laizhou Bay, Yangtze River estuary, Hangzhou Bay, areas along Zhejiang River and the Pearl River estuary.

Sea areas in eutrophic state during spring, summer and autumn were respectively 85,710 $km^2$, 64,400 $km^2$ and 104,130 $km^2$. In the summer, sea areas recorded with minor eutropher, moderate eutropher and hyper eutropher were 12,800 $km^2$, 15,840 $km^2$ and 35,760 $km^2$ respectively. Sea areas recorded with hyper eutropher were mostly concentrated in Liaodong Bay, Yangtze River estuary, Hangzhou Bay and the Pearl River estuary.

### Nearshore Sea Areas

Among the national monitoring sites in nearshore sea areas, up to 28.6 % of the monitoring sites attained Grade Ⅰ National Standard on water quality, 4.0 pps higher from last year, 38.2% of those attained Grade Ⅱ national standard, down 3.6 pps from a year earlier, 7.0% attained Grade Ⅲ standard, down 1.0 pps, 7.6% attained Grade Ⅳ standard, up 0.6 pps from a year earlier, and 18.6% failed the Grade Ⅳ standard, the same as last year. The main pollutants were inorganic nitrogen and active phosphate, exceeding upper limit at a rate of 31.2% and 14.6% respectively.

**Bohai Sea** Up to 26.5% of the monitoring sites in nearshore sea areas attained Grade Ⅰ national standard, up 14.3 pps from previous year, 46.9% attained Grade Ⅱ standard, down 4.1 pps from a year earlier, 6.2% attained Grade Ⅲ standard, down 10.2 pps from last year, 14.3% attained Grade Ⅳ standard, and 6.1% failed Grade Ⅳ standard, both the same as last year. The main pollution indicators were inorganic nitrogen and petroleum pollutants.

**Yellow Sea** Up to 42.6% of the monitoring sites in nearshore sea areas attained Grade Ⅰ national standard, up 13.0 pps from last year, 40.7% attained Grade Ⅱ standard, down 14.9 pps from a year earlier, 9.2% attained Grade Ⅲ standard, down 3.7 pps from last year, 5.6% attained Grade Ⅳ standard, up 3.7 pps, and 1.9% failed Grade Ⅳ standard, up 1.9 pps from last year. The main pollution indicators were inorganic nitrogen.

**East China Sea** Up to 2.1% of the monitoring sites in nearshore sea areas attained Grade Ⅰ national standard, up 2.1 pps from last year, 27.4% attained Grade Ⅱ standard, down 3.1 pps from a year earlier, 9.4% attained Grade Ⅲ standard, up 2.0 pps from last year, 13.7% attained Grade Ⅳ standard, up 1.1 pps, and 47.4% failed Grade Ⅳ standard, down 2.1 pps from last year. The main pollution indicators were inorganic nitrogen and active phosphate.

**South China Sea** Up to 46.6% of the monitoring sites in nearshore sea areas attained Grade Ⅰ national standard, down 3.9 pps from a year earlier, 42.7% attained Grade Ⅱ standard, up 1.9 pps from previous year, 3.9% attained Grade Ⅲ standard, up 2.0 pps from last year, none of the monitoring sites attained Grade Ⅳ standard, down 1.0 pps from a year earlier. 6.8% failed Grade Ⅳ standard, up 1.0 pps from last year. The main pollution indicators were inorganic nitrogen and active phosphate.

**Major bays** Among the nine major bays, Yellow River estuary enjoyed excellent water quality, Beibu Bay was recorded with good water quality, Jiaozhou Bay saw an average water quality, Bohai Bay, Liaodong Bay and Minjiang River estuary was recorded with poor water quality, and Hangzhou Bay, Yangtze River estuary and Pearl River estuary with extremely poor water quality.

**Sea-going rivers** Among the 198 monitoring sections, 84 sections was found to have water quality Grade at Ⅰ~Ⅲ national standard, accounting for 42.4% of the total, down 4.1 pps from a year earlier, 78 had water quality grade at Ⅳ~Ⅴ, accounting for 39.4%, up 4.4 pps from last year, 36 failed the Grade Ⅴ standard, accounting for 18.2%, down 0.3 pps.

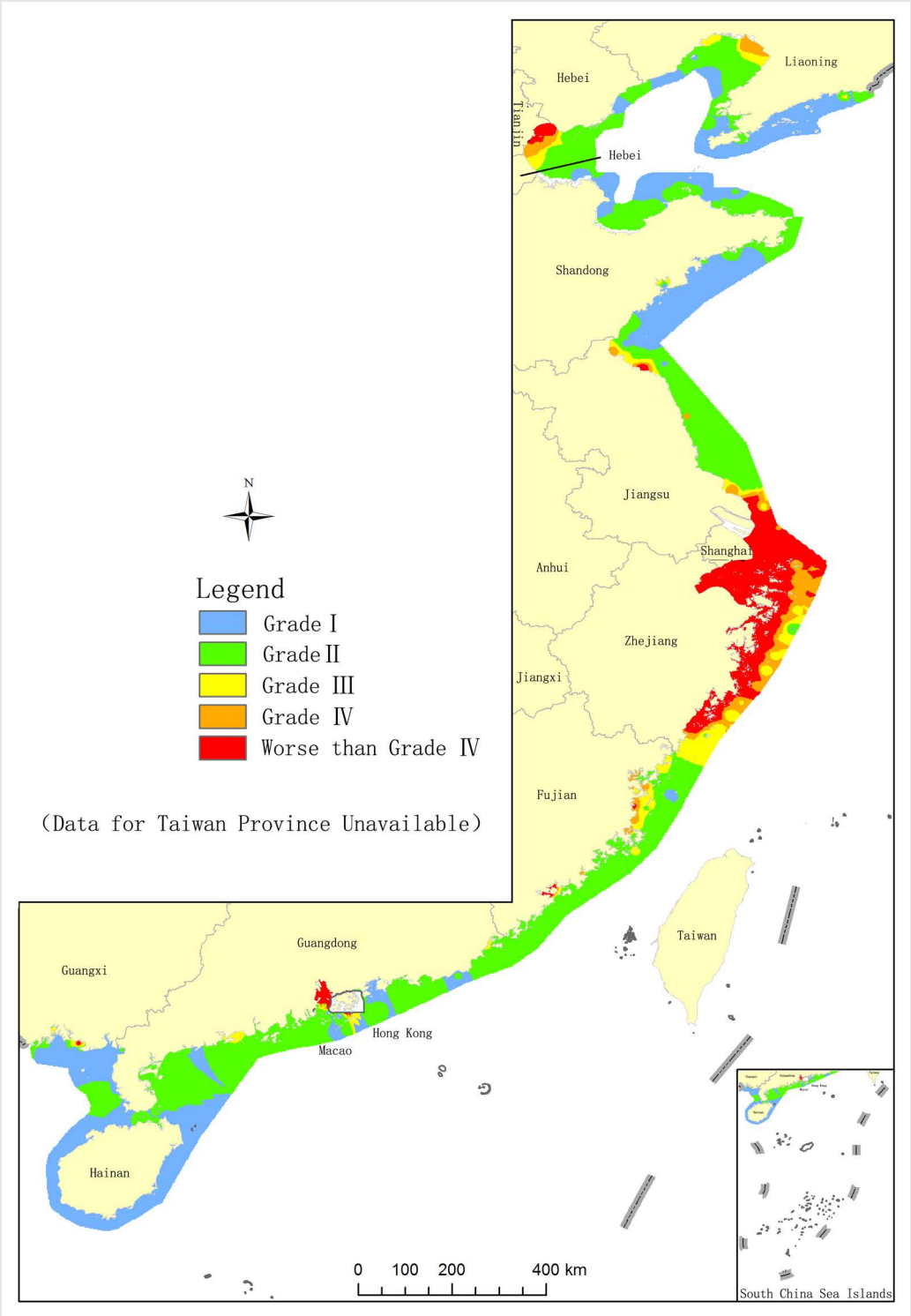
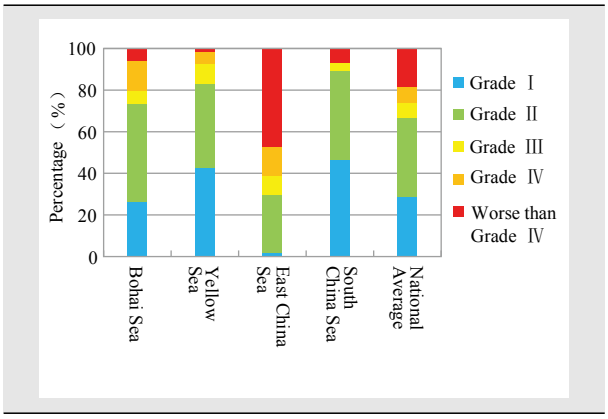
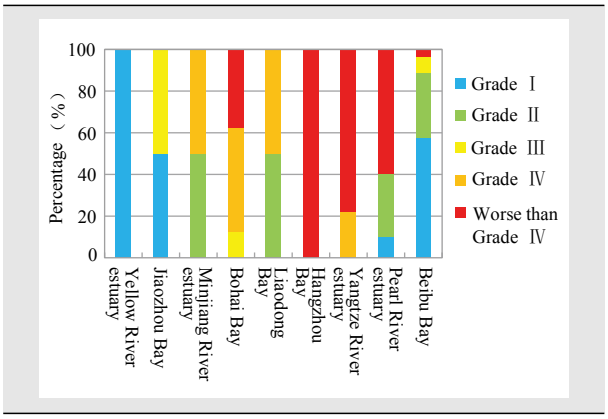



Diagram of graded near shore seawater quality in China in 2014




Percentage of graded nearshore seawater quality of national average and four major seas in China in 2014




Seawater quality of major bays in 2014

**Land-based pollutants** Around 6.311 bn. t of wastewater was discharged altogether this year by 415 monitored pollution sources discharging directly into seas at a rate above 100 $m^3$/d. The discharged pollutants included 0.211 mil. t COD, 1,199 t petroleum pollutants, 14,800 t ammonia nitrogen, 3,126 t TP and part of pollution sources discharged mercury, $Cr^{6+}$, lead and cadmium directly into the seas.

## Marine Fishery Waters

The main pollution indicators for the spawn sites, feeding sites, migration passages and nature reserves of major sea fish, shrimp, and shellfish species were inorganic nitrogen and active phosphate in 2014. The inorganic nitrogen pollution at river estuaries including Pearl River estuary and Yangtze River estuary are relatively high. Hangzhou Bay and Yangtze River estuary saw relatively severe active phosphate pollution. Excessive inorganic nitrogen and copper were observed on a smaller scale in Chinese sea areas than last year, while there was an increase in the amount of active phosphate, COD and petroleum pollutants exceeding upper limit.

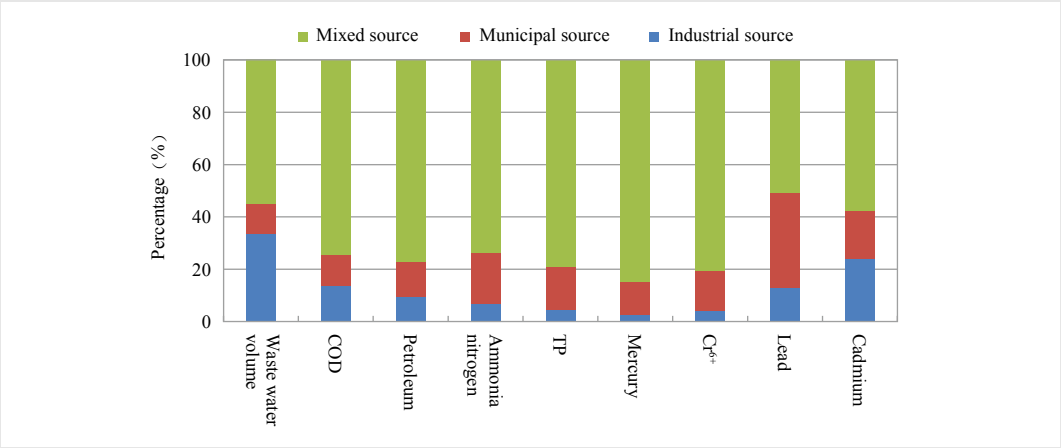
The main pollution indicators of the major marine aquaculture plots were inorganic nitrogen, active phosphate and petroleum pollutants. The concentration of inorganic nitrogen and active phosphate were relatively high in some aquaculture waters in East China Sea and South China Sea and petroleum pollution was relatively heavy in aquaculture waters in South China Sea. Excessive inorganic nitrogen, petroleum pollutants and COD were observed on a larger scale in Chinese sea areas than last year, while the extent of sea areas with excessive active phosphate and copper were observed on a smaller scale.

The main pollution indicators of the sediments of major marine fishery waters were petroleum pollutants and copper. The concentration of petroleum pollutants was relatively high in some fishery waters of South China Sea, and that of copper was relatively high in some fishery waters of East China Sea.

The main pollution indicators of national aquatic germplasm resources conservation areas (marine) were inorganic nitrogen, active phosphate and COD.

Graded water quality for monitoring sections of sea-going rivers in 2014

| Water quality / Sea areas | Grade Ⅰ (number) | Grade Ⅱ (number) | Grade Ⅲ (number) | Grade Ⅳ (number) | Grade Ⅴ (number) | Worse than Grade Ⅴ (number) |
|---|---|---|---|---|---|---|
| Bohai Sea | 0 | 1 | 7 | 9 | 14 | 17 |
| Yellow Sea | 0 | 3 | 18 | 19 | 5 | 8 |
| East China Sea | 0 | 2 | 10 | 6 | 5 | 2 |
| South China Sea | 0 | 24 | 19 | 18 | 2 | 9 |
| Total | 0 | 30 | 54 | 52 | 26 | 36 |




Main pollutants discharged directly into Chinese seas in 2014

Main pollutants discharged directly into four major seas in 2014

| Pollutants / Sea areas | Wastewater (100 mil. t) | COD (10,000 t) | Petroleum (t) | Ammonia nitrogen (10,000 t) | TP (t) |
|---|---|---|---|---|---|
| Bohai Sea | 2.99 | 1.9 | 29.3 | 0.2 | 247.3 |
| Yellow Sea | 10.58 | 3.9 | 85.1 | 0.3 | 475.4 |
| East China Sea | 38.37 | 11.6 | 853.9 | 0.6 | 1351.8 |
| South China Sea | 11.17 | 3.7 | 230.4 | 0.4 | 1051.8 |

## Measures and Actions

**【Pollution Prevention and Control of Nearshore Sea Areas】** *Plan on Nearshore Sea Areas Monitoring Information Disclosure* was published and circulated in 2014. The plan set specific regulations on information disclosure with regard to the monitoring on water quality of nearshore sea areas, monitoring sections of sea-going rivers as well as pollution sources (including drainage ditches and outfall) discharging directly into seas at a rate above 100 $m^3/d$.

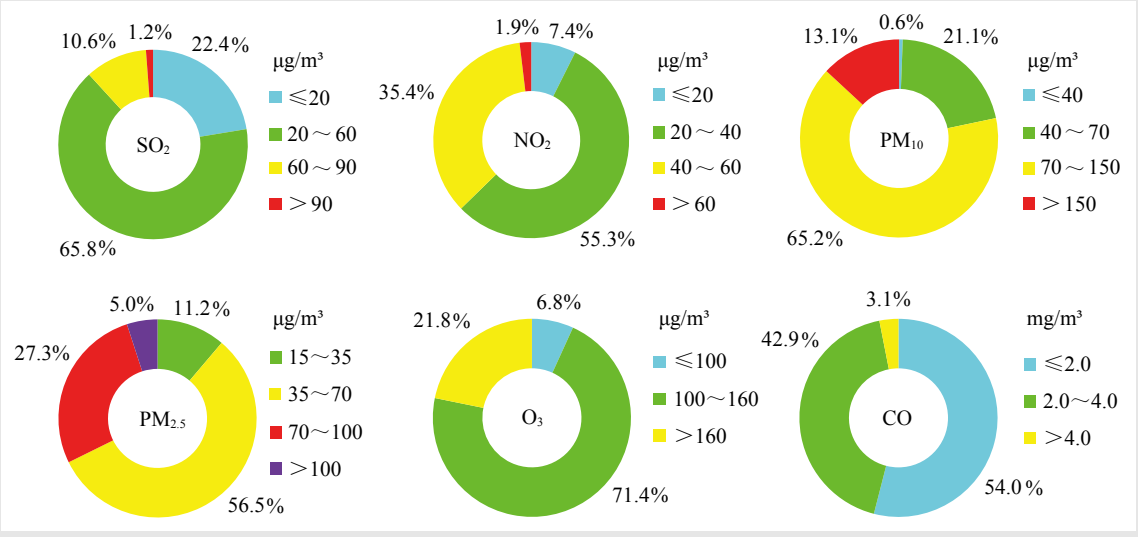
# Atmospheric Environment

## General Situation

### Air Quality

**Cities enforcing new ambient air quality standards at Stages Ⅰ and Ⅱ** A total of 161 cities at or above the prefecture level including 74 cities at Stage Ⅰ and 87 at Stage Ⅱ enforced the new ambient air quality standards in 2014. Up to 90.1% or 145 cities failed to meet the new standards, and only 9.9% of them or 16 cities succeeded (better than national Grade Ⅱ standards), namely Zhoushan, Fuzhou, Shenzhen, Zhuhai, Huizhou, Haikou, Kunming, Lhasa, Quanzhou, Zhanjiang, Shanwei, Yunfu, Beihai, Sanya, Qujing and Yuxi.

The analysis of specific indicators found the mean annual $SO_2$ concentration ranged between 2 μg/m$^3$ and 123 μg/m$^3$ among those cities and averaged 35 μg/m$^3$, down by 14.6% year on year. 88.2% of those cities attained air quality standards with regard to $SO_2$, up by 3.1 pps. The attainment rate of mean daily $SO_2$ concentration registered 74.4% ~ 100.0% and averaged 98.3%, up by 0.8 pps year on year, while the average non-attainment rate read 1.7%. The mean annual $NO_2$ concentration ranged between 14 μg/m$^3$ and 67 μg/m$^3$ and averaged 38 μg/m$^3$, the same with last year, and 62.7% of those cities attained air quality standards, an increase of 5.6 pps. The attainment rate of mean daily $NO_2$ concentration registered 78.3% ~ 100.0% and averaged 96.8%, up by 1.6 pps year on year, while the average non-attainment rate read 3.2%. The mean annual $PM_{10}$ concentration ranged between 35 μg/m$^3$ and 233 μg/m$^3$ and averaged 105 μg/m$^3$, a 3.7% decrease, and 21.7% of those cities reached air quality standards, an increase of 2.4 pps. The attainment rate of mean daily $PM_{10}$ concentration registered 30.9% ~ 100.0% and averaged 81.0%, up by 1.1 pps year on year, while the average non-attainment rate read 19.0%. The mean annual $PM_{2.5}$ concentration ranged between 19 μg/m$^3$ and 130 μg/m$^3$ and averaged 62 μg/m$^3$, and 11.2% of those cities attained the standards. The attainment rate of mean daily $PM_{2.5}$ concentration registered 32.1% ~ 99.7% and averaged 73.4%, while the average non-attainment



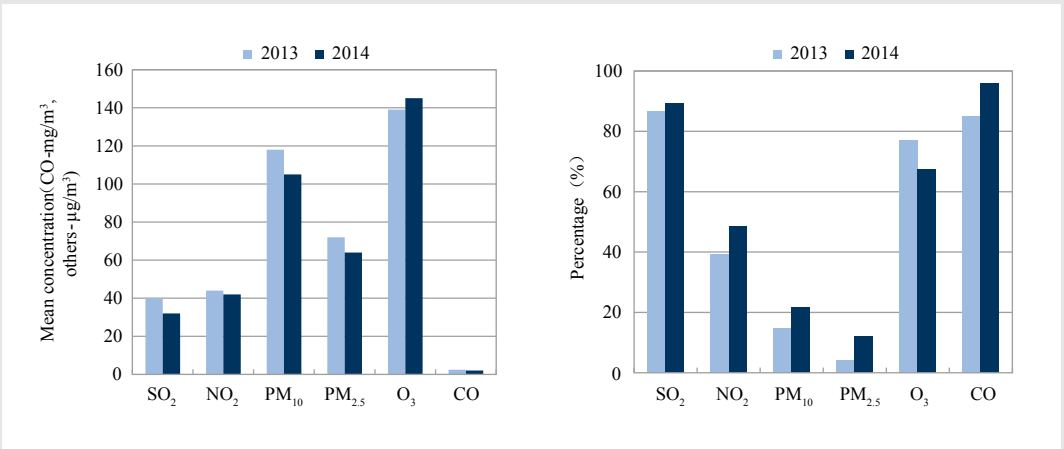

Percentage of ranges of pollution indicator readings among the cities that enforced the new ambient air quality standards in 2014

rate read 26.6%. The 90th-percentile value of the mean daily value of the maximum 8-hour $O_3$ reading ranged between 69 μg/m$^3$ and 210 μg/m$^3$ and averaged 140 μg/m$^3$, and 78.2% of the cities met the standards. The attainment rate of mean daily value of the maximum 8-hour $O_3$ reading ranged 68.7% ~ 100.0% and averaged 93.9%, while the average non-attainment rate read 6.1%. The 95th-percentile value of the mean daily CO concentration ranged between 0.9 mg/m$^3$ and 5.4 mg/m$^3$ and averaged 2.2 mg/m$^3$, and 96.9% of the cities attained air quality standard with regard to CO. The attainment rate of mean daily CO concentration ranged 88.4% ~ 100.0% and averaged 99.3%, while the average non-attainment rate read 0.7%.

**74 cities enforcing new ambient air quality standards at stage Ⅰ** A total of 74 cities, including cities seated in the Beijing-Tianjin-Hebei region, Yangtze River Delta, and Pearl River Delta, as well as municipalities directly under the Central Government, provincial capital cities and cities listed separately in State plans, enforced the new ambient air quality standards in 2014 as scheduled. Among them, 8 cities met the standards, 5 more than last year, namely Haikou, Lhasa, Zhoushan, Shenzhen, Zhuhai, Fuzhou, Huizhou and Kunming. The rest 66 cities exceeded the standards to different degrees. According to the ranking of cities with air quality, the top 10 were Haikou, Zhoushan, Lhasa, Shenzhen, Zhuhai, Huizhou, Fuzhou, Xiamen, Kunming and Zhongshan, while the bottom 10 were Baoding, Xingtai, Shijiazhuang, Tangshan, Handan, Hengshui, Jinan, Langfang, Zhengzhou and Tianjin.

The analysis of specific indicators found the mean annual $SO_2$ concentration ranged between 6 μg/m$^3$ and 82 μg/m$^3$ among those cities and averaged 32 μg/m$^3$, down by 20.0% year on year. 89.2% of those cities attained air quality standards with regard to $SO_2$, up by 2.7 pps. The mean annual $NO_2$ concentration ranged between 16 μg/m$^3$ and 61 μg/m$^3$ and averaged 42 μg/m$^3$, down by 4.5%. 48.6% of those cities attained air quality standards, an increase of 9.4 pps. The mean annual $PM_{10}$ concentration ranged between 42 μg/m$^3$ and 233 μg/m$^3$ and averaged 105 μg/m$^3$, an 11.0% decrease, and 21.6% of those cities reached air quality standards, an increase of 6.7 pps. The mean annual $PM_{2.5}$ concentration ranged between 23 μg/m$^3$ and 130 μg/m$^3$ and averaged 64 μg/m$^3$, making an 11.1% decrease. 12.2% of those cities attained the standards, up by 8.1 pps. The 90th-percentile value of the mean daily value of the maximum 8-hour $O_3$ reading ranged between 69 μg/m$^3$ and 200 μg/m$^3$ and averaged 145 μg/m$^3$, making a 4.3% increase. 67.6% of the cities met the standards, down by 9.4 pps. The 95th-percentile value of the mean daily CO concentration ranged between 0.9 mg/m$^3$ and 5.4 mg/m$^3$ and averaged 2.1 mg/m$^3$, down by 16.0% year on year, and 95.9% of the cities attained air quality standard with regard to CO, up by 10.8 pps.

**Three key regions** In the 13 cities at or above prefecture level in Beijing-Tianjin-Hebei region, the mean annual $PM_{2.5}$ concentration registered 93 μg/m$^3$, down by 12.3% year on year, and among these cities, only Zhangjiakou met the standards. The mean annual $PM_{10}$ concentration of these cities read 158 μg/m$^3$, down by 12.7%, and all of the 13 cities exceeded the standards. The mean annual $SO_2$ concentration




Interannual change of the mean pollutant concentrations and the percentage of attainment cities at Stage Ⅰ

of these cities fell by 24.6% to 52 μg/m$^3$, and 4 cities had excessive $SO_2$ emissions than allowed. The mean annual $NO_2$ concentration of these cities read 49 μg/m$^3$, down by 3.9% year on year and 10 cities exceeded the upper limits. The 95$^{th}$-percentile value of the mean daily CO concentration read 3.5 mg /m$^3$, down by 14.6%, and the 90$^{th}$-percentile value of the mean daily value of the maximum 8-hour $O_3$ reading was 162 μg/m$^3$, up by 4.5%. 3 and 8 cities exceeded the standards with regard to CO and $O_3$ respectively. $PM_{2.5}$ was deemed as the primary pollutant in the largest number of days throughout the year, followed by $PM_{10}$ and $O_3$.

This year, the mean annual $PM_{2.5}$ concentration registered 85.9 μg/m$^3$ in Beijing, 83 μg/m$^3$ in Tianjin and 124 μg/m$^3$ in Shijiazhuang, down by 4.0%, 13.5% and 19.5% year on year respectively.

In the 25 cities at or above prefecture level in Yangtze River Delta, the mean annual $PM_{2.5}$ concentration fell by 10.4% year on year to 60 μg/m$^3$, and among these cities, only Zhoushan met the standards. The mean annual $PM_{10}$ concentration of these cities registered 92 μg/m$^3$ after a 10.7% decrease, and 22 cities failed to meet the standards. The mean annual $SO_2$ concentration was reduced by 16.7% to 25 μg/m$^3$, and all of the cities reached the standards. The mean annual $NO_2$ concentration of these cities read 39 μg/m$^3$, down by 7.1% year on year, and 11 cities exceeded the upper limits. The 95$^{th}$-percentile value of the mean daily CO concentration read 1.5 mg /m$^3$, down by 21.1%, and all of the cities reached the standards. The 90$^{th}$-percentile of the mean daily value of the maximum 8-hour $O_3$ reading was 154 μg/m$^3$, up by 6.9%, and 10 cities exceeded the standards. $PM_{2.5}$ was deemed as the primary pollutant in the largest number of days throughout the year, followed by $O_3$ and $PM_{10}$.

This year, the mean annual $PM_{2.5}$ concentration registered 52 μg/m$^3$ in Shanghai, 74 μg/m$^3$ in Nanjing and 65 μg/m$^3$ in Hangzhou, decrease of 16.1%, 5.1% and 7.1% year on year respectively.

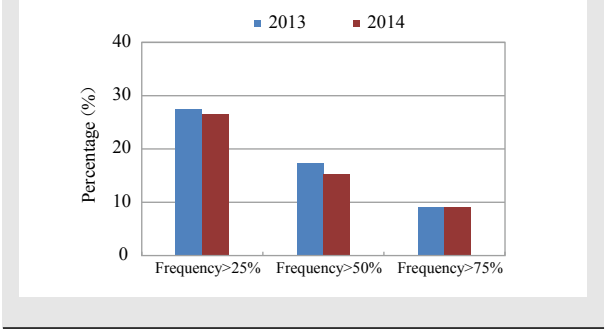
In 9 cities at or above prefecture level in the Pearl River Delta, the mean annual $PM_{2.5}$ concentration fell by 10.6% year on year to 42 μg/m$^3$, and only 3 of these cities met the standards. The mean annual $PM_{10}$ concentration of these cities registered 61 μg/m$^3$ after a 12.9% decrease, and only Zhaoqing exceeded the standards. The mean annual $SO_2$ concentration was reduced by 14.3% to 18 μg/m$^3$, and all of the cities reached the standards. The mean annual $NO_2$ concentration of these cities read 37 μg/m$^3$, down by 9.8% year on year, and 3 cities exceeded the upper limits. The 95$^{th}$-percentile value of the mean daily CO concentration fell by 6.3% to 1.5 mg /m$^3$, and all of the cities reached the standards. The 90$^{th}$-percentile of the mean daily value of the maximum 8-hour $O_3$ reading registered 156 μg/m$^3$, up by 0.6%, and 4 cities exceeded the standards. $O_3$ was deemed as the primary pollutant in the largest number of days throughout the year, followed by $PM_{2.5}$ and $NO_2$.

This year, the mean annual $PM_{2.5}$ concentration registered 49 μg/m$^3$ in Guangzhou and 34 μg/m$^3$ in Shenzhen, down by 7.5% and 15.0% year on year respectively.

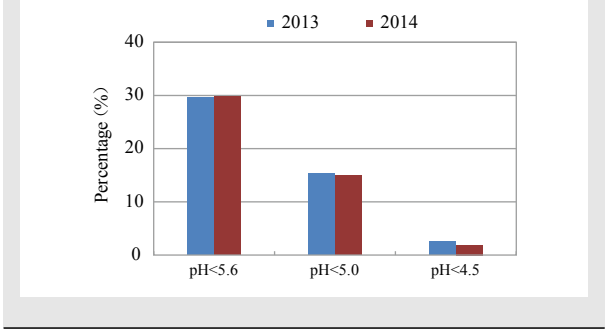
## Acid Rain

**Acid rain frequency** In 2014, acid rain was reported in 44.3% of the 470 cities (districts, counties) under precipitation monitoring program. With an average value of 17.4%, the acid rain frequency was above 25% in 26.6% of those cities, and above 75% in 9.1% of those cities.

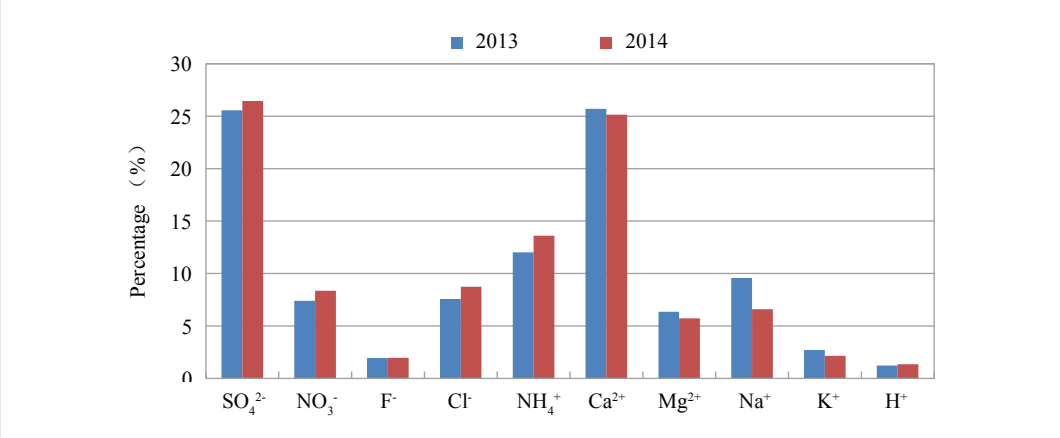
**Acidity of precipitation** The mean annual pH value of rainfalls was below 5.6 (acid rain) in 29.8% of the monitored cities, below 5.0 (relatively serious acid rain) in 14.9% of them, and below 4.5 (serious acid rain) in 1.9% of them this year. The proportion of cities with records of acid rain, relatively serious acid rain, and serious acid rain this year was




Year–on–year change of the percentage of cities with varied acid rain frequencies




Year–on–year change of the percentage of cities with varied mean annual pH values




Year-on-year change of the percentage of normality of main ions in precipitation

basically the same as the previous year.

**Chemical composition** The main positive ions in the precipitation were $Ca^{2+}$ and $NH_4^+$ this year, which accounted for 25.1% and 13.6% respectively of the total ion equivalent. The main negative ion was $SO_4^{2-}$, accounting for 26.4% of the total ion equivalent. $NO_3^-$ took up 8.3%. Sulphate was the leading acid-causing substance.

**Geographical distribution of acid rain** In 2014, the acid rain in China mainly spread in the area south of the Yangtze River and east of the Tibetan Plateau, covering most parts of Zhejiang, Jiangxi, Fujian, Hunan, Chongqing, as well as Yangtze River Delta and Pearl River Delta.

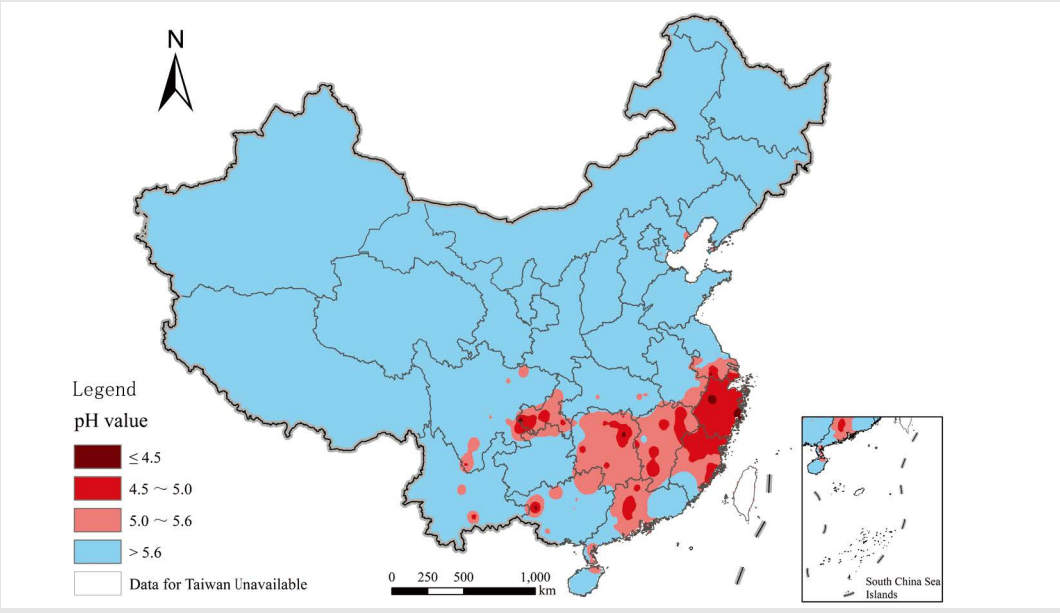



Diagram of the isoline of the mean annual pH value of precipitation in China in 2014

## Measures and Actions

**【Full implementation of the Action Plan for Air Pollution Prevention and Control】** 2014 is a critical year for the implementation of the *Action Plan for Air Pollution Prevention and Control*. Under the leadership of the CPC Central Committee and the State Council, centering on the main line of air quality improvement, all localities and departments with high attention introduced supporting policies, implemented the responsibility system, and made positive progress in the practical work. 1) Performance assessment. The State Council issued the *Performance Assessment Measures for the Action Plan for Air Pollution Prevention and Control (Trial)* which established the quality-centered evaluation system. 2) Environmental regulations. In line with the amendment by the Legislative Affairs Office, the State Council executive meeting discussed and passed the *Draft Amendment to Law of the People's Republic of China for Air Pollution Prevention and Control* on November 26, 2014, and set out 22 policies supporting the *Action Plan for Air Pollution Prevention and Control* on February 12, 2014. 3) Regional cooperation mechanisms. The regional coordination mechanisms for the Beijing-Tianjin-Hebei region and the surrounding area, Yangtze River Delta and Pearl River Delta played an active role in solving common regional air pollution. Based on these mechanisms, China strengthened regional cooperation and carried out joint prevention and control, and completed source apportionment of atmospheric particulates in major cities. 4) Ambient air quality in major events. In conjunction with the Beijing-Tianjin-Hebei region and Yangtze River Delta cooperation mechanisms, the *Program for Air Quality Assurance in Beijing-Tianjin-Hebei region and the Surrounding Area during the 2014 Asia-Pacific Economic Cooperation Summit* and the *Work Program for Air Quality Assurance during the Second Summer Youth Olympic Games* were worked out and guaranteed the ambient air quality.

**【Research on source apportionment of atmospheric particulates in major cities】** To implement the spirit of the 39th State Council executive meeting and deployments of the *Action Plan for Air Pollution Prevention and Control*, the *Circular on Carrying out the Phase I Research on Atmospheric Particulate Source Apportionment* was issued, and in January, 2014, the work was kicked off in all municipalities, capital cities (except Lhasa) and cities (totally 35) specified in state plans. In accordance with the State Council's requirements, the joint working mechanism was established for Ministry of Environmental Protection, Chinese Academy of Sciences and Chinese Academy of Engineering. At the end of 2014, the feasibility studies on source apportionment in 9 major cities of the Beijing-Tianjin-Hebei region, Yangtze River Delta and Pearl River Delta were successfully completed, and the research findings have been applied to the local air pollution prevention and control. The source apportionment proceeded steadily in other 26 cities.

**【Industrial pollution prevention and control】** The *Comprehensive Management of Volatile Organic Compounds (VOCs)* was officially kicked off. Focus efforts were made to eliminate coal-fired boilers and promote integrated retrofit projects for energy saving and environmental protection. The demonstration on heating supply based on biomass briquette fired boilers was carried out in order to reduce outdoor biomass combustion and air pollution from coal-fired boilers. To support these actions, a group of documents were rolled out, including the *Program for the Comprehensive Management of Volatile Organic Compounds in the Petrochemical Industry*, *Emission Standards for Air Pollutants from Boilers (GB 13271-2014)*, *Standards for Pollution Control on Municipal Garbage Burning (GB 18485-2014), Exhaust Emission Limits and Measurement Methods for Diesel-fired Non-road Mobile Machinery (Phases Ⅲ and Ⅳ) (GB 20891-2014), Emission Standards for Tin, Antimony and Mercury in Industrial Sectors (GB 30770-2014), Program for the Coal-fired Power Transformation and Upgrading for Energy Conservation and Emission Reduction,* and *Circular on Carrying out the Heating Demonstration Project of Biomass Briquette Fired Boilers*.

**【Pollution prevention and control of motor vehicles】** A monthly reporting system combined with economic incentives and travel restrictions on high-polluting vehicles were implemented, which forced the retirement of more-than-expected 6 mil. yellow-label vehicles and old vehicles. The supervision for environmental compliance of new vehicles was strengthened, lending a powerful blow and deterrence to non-compliance producers. A total of 1,318 vehicle (engine) models from 109 companies in 20 cities in the Beijing-Tianjin-Hebei region, Yangtze River Delta and Pearl River Delta were inspected. The mechanism for joint management of motor vehicle pollution took the initial shape. A special operation on motor gasoline and diesel was launched in the Beijing-Tianjin-Hebei region to rectify and combat against counterfeit and inferior fuel. The country began to supply as scheduled the standards Ⅳ motor gasoline and diesel on a national scale and standards Ⅴ in Beijing, Tianjin, Shanghai, Jiangsu, Guangdong and Shaanxi, in order to fundamentally

solve the long-standing vehicle-fuel matching problem.

**【Special inspection for air pollution prevention and control】** Ministry of Environmental Protection printed and distributed the *Inspection Program for Air Quality Assurance in the Beijing-Tianjin-Hebei Region and the Surrounding Area during the Asia-Pacific Economic Cooperation Summit* and sent 16 inspection teams to relevant cities from October 20 to November 12, 2014. The special inspection has made a positive contribution to air quality during the APEC meeting. In the winter of 2014, an inspection operation for air pollution prevention and control was carried out, involving inspection to key areas on a monthly basis, and a total of 283 problems were identified and publicized during October-December. This year, unmanned aerial vehicles were introduced in law enforcement and inspection for 40 times and the flying range of a variety of aircrafts used exceeded 6,000 km.

**【Remote sensing of straw burning】** The remote sensing and monitoring of straw burning and information dissemination were strengthened. Unauthorized straw burning sites were destroyed based on remote sensing results of environmental satellites and meteorological satellites and on-site inspection and verification in major agricultural areas. In 2014, totally 5,034 straw burning sites (excluding removed ones) were found nationwide, a decrease of 2,949 or 36.9% over last year. In terms of distribution, there were 1,145 sites in Henan, 787 in Heilongjiang, 722 in Anhui, 547 in Jilin, 469 in Liaoning, 330 in Shandong, 256 in Inner Mongolia, 149 in Hebei, 148 in Shanxi, and 133 in Hubei. In terms of fire intensity per 1,000 ha. cultivated land, the top 10 were 0.1445 in Henan, 0.1260 in Anhui, 0.1148 in Liaoning, 0.0988 in Jilin, 0.0665 in Heilongjiang, 0.0439 in Shandong, 0.0365 in Shanxi, 0.0361 in Ningxia, 0.0358 in Inner Mongolia and 0.0302 in Beijing.

**【Action program for energy-saving low-carbon development】** The State Council printed and distributed the *2014-2015 Action Program for Energy-saving, Low-carbon Development*, further clarifying targets in 2014 and 2015, strengthening measures, and quantifying the division of tasks. The action program made specific arrangements in eight aspects, industrial restructuring, project development, energy conservation and carbon reduction in key fields, technical support, policy support, market-oriented mechanisms, monitoring, early warning and supervision and inspection, and fulfillment of responsibilities. The targets and tasks in the two years were decomposed to regions, covering incremental energy consumption, elimination of coal-fired boilers, emission reduction projects for major air pollutants, and elimination of yellow-label cars and old vehicles. Work priorities, schedule, and time requirements were also clarified.

**【Heavy pollution weather emergency management】** The heavy pollution weather emergency plan was unveiled in 194 cities at or above the prefecture level in 21 provinces (autonomous regions and municipalities), and the emergency plan of 11 provinces in the Beijing-Tianjin-Hebei region, Yangtze River Delta and Pearl River Delta and 5 provinces in other areas was archived. In 2014, the country issued more than 170 alerts of heavy pollution weather, including over 60 yellow or higher-level alerts in the Beijing-Tianjin-Hebei region. During the APEC meeting, Beijing, Tianjin and Hebei took Level-Ⅰ emergency response measures which effectively secured the ambient air quality in Beijing.

# Acoustic Environment

## General Situation

### Area–wide Acoustic Environment

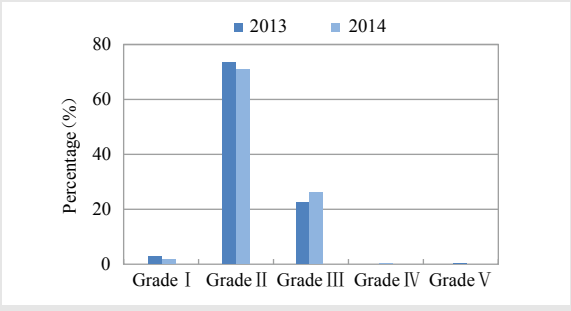
Among the 327 cities being monitored for daytime area-wide acoustic environment quality, 1.8% attained Grade Ⅰ national standard, down 1.0 pps from last year, 71.6% attained Grade Ⅱ standard, down 2.5 pps, 26.3% attained Grade Ⅲ standard, up 3.5 pps, 0.3% attained Grade Ⅳ standard, up 0.3 pps. And none of these areas attained Grade Ⅴ, down 0.3 pps. Generally, area-wide acoustic environment quality saw a decline in 2014 compared with that of 2013.

### Road Traffic Acoustic Environment

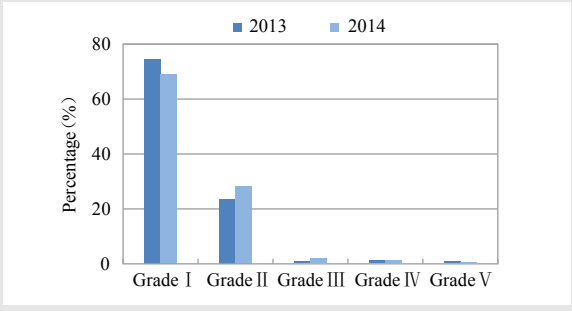
Among the 325 cities being monitored for daytime road traffic acoustic environment quality, 68.9% attained Grade Ⅰ national standard on environmental quality, down 5.5 pps from last year, 28.1% attained Grade Ⅱ standard, up 4.7 pps, 1.8% attained Grade Ⅲ standard, up 1.2 pps, 0.9% attained Grade Ⅳ standard, down 0.1 pps, and 0.3% attained Grade Ⅴ standard, down 0.3 pps. Road traffic acoustic environment saw deteriorating quality compared with that of last year.

### Acoustic Environment of Urban Function Zones

Among the 296 cities being monitored, up to 91.3% of the daytime monitoring sites (times) attained national standard, up 0.2 pps from last year, and 71.8% of the nighttime monitoring sites (times) were able to do so, up 0.1 pps. The number of sites monitored for daytime was higher than that for nighttime in all urban functional zones. Up to 49.4% of the nighttime monitoring sites (times) for Type 4a functional zone (on both sides of road traffic) attained national standard, and 35.3% of the nighttime monitoring sites (times) for Type 4b functional zone (on both sides of railroad) managed to do so.




Graded area–wide environmental quality of cities at or above prefectural level in 2013 and 2014




Graded road traffic acoustic environmental quality of cities at or above prefectural level in 2013 and 2014

Acoustic environment quality attainment status of urban functional zones in cities at or above prefectural level in 2014

| Type of functional zone | Type 0 | | Type 1 | | Type 2 | | Type 3 | | Type 4a | | Type 4b | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Day | Night | Day | Night | Day | Night | Day | Night | Day | Night | Day | Night |
| Monitored site (time) | 113 | 113 | 2,279 | 2,279 | 3,062 | 3,062 | 1,882 | 1,882 | 2,221 | 2,221 | 68 | 68 |
| Attainment rate (%) | 77.0 | 61.1 | 87.2 | 72.0 | 91.4 | 79.8 | 96.5 | 86.8 | 91.7 | 49.4 | 98.5 | 35.3 |

## 2014 Annual General Meeting of China Council for International Cooperation on Environment and Development

The 2014 Annual General Meeting (AGM) of China Council for International Cooperation on Environment and Development (CCICED) was held during December 1-3, 2014 in Beijing, under the theme of "Management and Institutional Innovation in Green Development". The meeting heard the reports on the special policy studies on "Evaluation and Prospects for a Green Transition Process in China", "Ecological Civilization and Innovation of Environmental Management System", "Good City Models under the Concept of Ecological Civilization", "Institutional Innovation of Eco-Environmental Redlining", "Performance Evaluation on the Action Plan of Air Pollution Prevention and Control and Regional Coordination Mechanism", and "Green Accounting and Environmental Performance Evaluation". 2014 AGM encompassed two parallel forums themed by "Institutional Innovation in Ecological Civilization" and "Green Transformation and Prospects" respectively and formed the policy recommendations to the Chinese Government. Vice Premier Mr. Zhang Gaoli attended the opening ceremony and delivered a keynote speech. He iterated that China has always attached high importance to environmental protection by establishing resource conservation and environmental protection as a basic national policy, implementing the sustainable development strategy, and incorporating ecological civilization into the overall layout of the cause of socialism with Chinese characteristics. CCICED has acted an important role in China's green development in more than 20 years since establishment, said Zhang. CCICED provides an important platform for dialogue with the world, opens the door for introducing international experience in sustainable development into China, and sets up a bridge of communication with the international community in the field of environment and development. The Chinese Government will as always support CCICED's development in the hope that CCICED will continue to contribute to the green development in China and the world by virtue of intensive intelligence and two-way communication.

# Radiation Environment

## General Situation

### Ionizing Radiation

The 2014 environmental ionizing radiation level in China remained within the fluctuation range of background level. The real-time, consecutive air absorbed γ radiation dose rates were also within fluctuation range of local natural background levels, according to the monitoring data derived from local radiation environment automatic monitoring stations. The activity concentrations of radionuclides in aerosol and air sediments, and of airborne tritium witnessed no notable changes. There were no notable changes in the activity concentration of artificial radionuclides in the Yangtze River, Yellow River, Pearl River, Songhua River, Huaihe River, Haihe River, Liaohe River, rivers in Zhejiang-Fujian region, rivers in southwest and northwest China, and major lakes (reservoirs), compared with previous years. The activity concentration of natural radionuclides in those rivers was at the same level as monitored during the national survey on natural radioactivity levels between 1983 and 1990. The activity concentrations of gross α and gross β in underground drinking waters and in centralized drinking water sources monitored in provincial capital cities were unchanged and within the limits set by *Standards for Drinking Water Quality (GB 5749-2006)*. The activity concentrations of artificial radionuclides Sr-90 and Cs-137 in seawaters of nearshore sea areas were basically unchanged and below the limits specified by the *Seawater Quality Standards (GB 3097-1997)*. The activity concentration of artificial radionuclides Sr-90 and Cs-137 in soils did not change much compared with monitoring data of previous years, whereas the activity concentration of natural radionuclides was at the same level as monitored during the aforementioned survey.

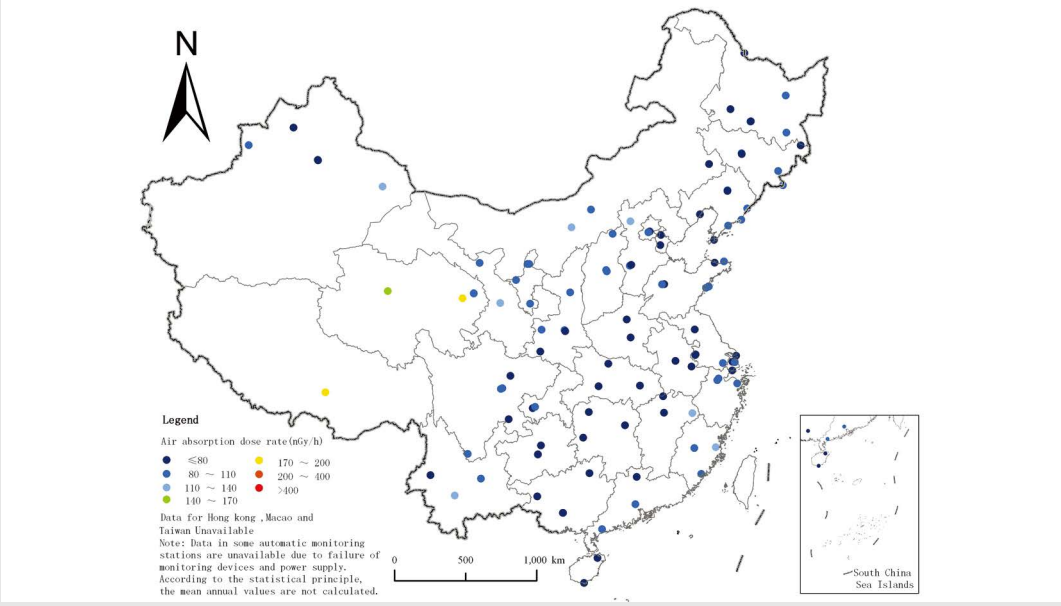
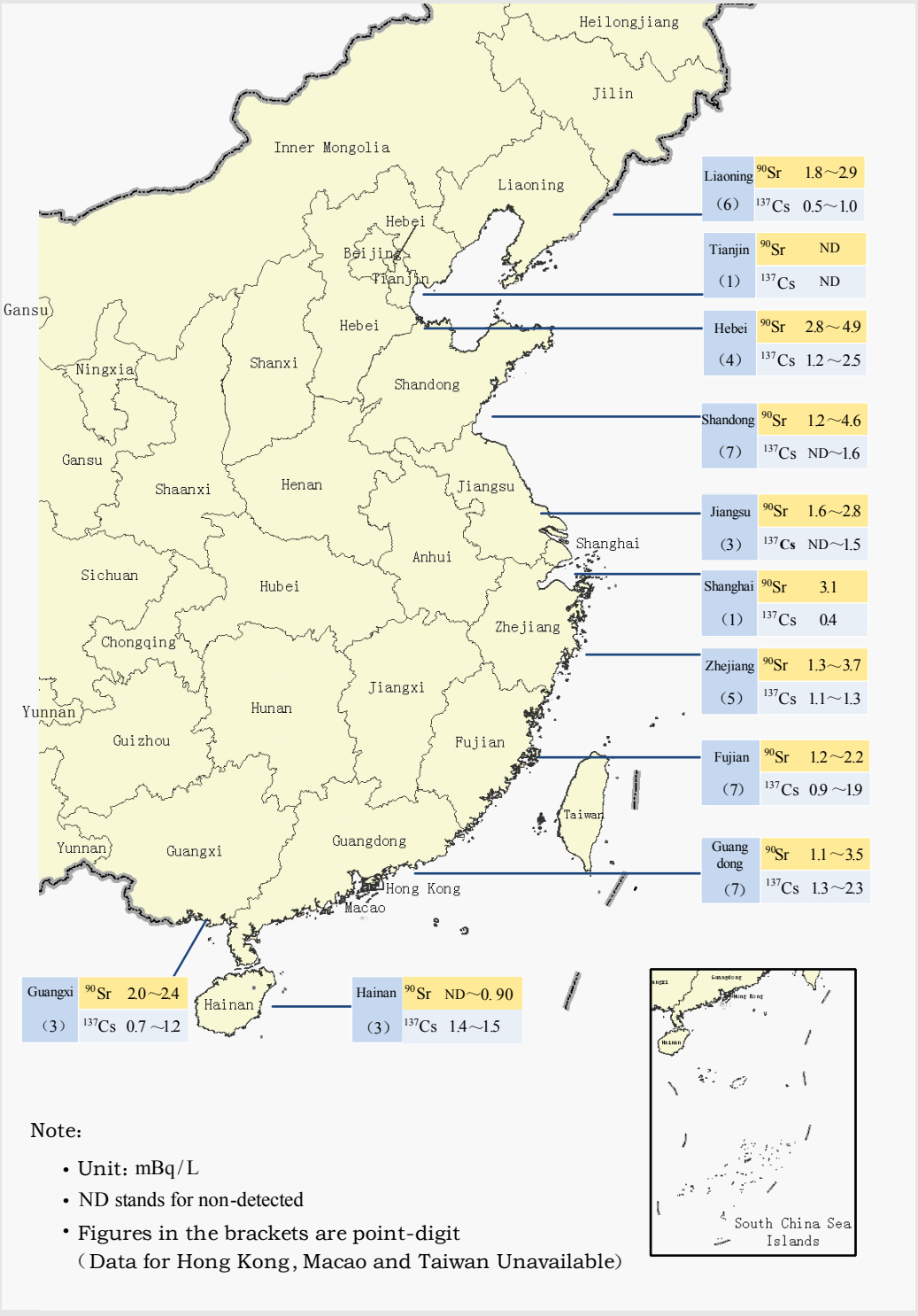



Diagram of the real–time, consecutive air absorbed γ radiation dose rate monitored at radiation environment automatic monitoring stations in China in 2014




Note:

- Unit: mBq/L
- ND stands for non-detected
- Figures in the brackets are point-digit
  (Data for Hong Kong, Macao and Taiwan Unavailable)

Activity concentration of Sr-90 and Cs-137 in seawaters of Chinese nearshore sea areas in 2014

**Environment ionizing radiation in the vicinity of in-service nuclear power plants** The mean annual value of the real-time, consecutive air absorbed γ radiation dose rates (before deducting the response to the cosmic rays) registered 100.6 nGy/h, 124.0 nGy/h, 118.6 nGy/h, 98.0 nGy/h, 76.4 nGy/h and 98.1 nGy/h respectively in the vicinity of the nuclear power plants at Qinshan Nuclear Power Base, Dayawan/Ling'ao Nuclear Power Plant, Yangjiang Nuclear Power Plant, Tianwan Nuclear Power Plant, Hongyanhe Nuclear Power Plant and Ningde Nuclear Power Plant, which were all within the fluctuation range of local natural background levels, according to the data from autonomic monitoring stations in the perimeters of those plants. The activity concentrations of tritium in the ambient air, rainfalls, surface water, well water, and some biological samples taken from the vicinity of Qinshan Nuclear Power Base were higher than the natural background level measured before the Base was put into commercial operation. The same case applied to the activity concentration of tritium in seawaters near the sewage outlets of Dayawan/Ling'ao Nuclear Power Plant and Tianwan Nuclear Power Plant, but the radiation exposure to the general public was far below the dose limits specified by national standards. The activity concentrations of tritium in the environment media in the vicinity of Yangjiang Nuclear Power Plant, Hongyanhe Nuclear Power Plant and Ningde Nuclear Power Plant were basically the same as measured before these plants put into commercial operation, while the activity concentration of radionuclides (except tritium) in the environment media in the vicinity of nuclear power plants varied little compared with data of previous years.

**Environment ionizing radiation in the vicinity of civil research reactors** In the vicinity of Institute of Nuclear and New Energy Technology with Tsinghua University, Miniature Neutron Source Reactor (MNSR) with Shenzhen University, and other research facilities, the air absorbed γ radiation dose rate and the activity concentrations of radionuclides in aerosols, air sediments, surface water, groundwater and soils were not obviously different from the data of previous years. I -131 was detected in the environment media in the vicinity of China Institute of Atomic Energy Science and Nuclear Power Institute of China, but the radiation exposure to the general public was far below the dose limits specified by national standards.

**Ionizing Radiation Surrounding Nuclear Fuel Cycle Facilities and Waste Disposal Facilities** The γ radiation air absorbed dose rate surrounding nuclear fuel cycle facilities of CNNC Lanzhou Uranium Enrichment Co. Ltd., CNNC Shaanxi Uranium Enrichment Co. Ltd., CNNC China North Nuclear Fuel Co. Ltd., CNNC Jianzhong Nuclear Fuel Co. Ltd. and CNNC 404 Co. Ltd., and Northwest low-median radioactive waste disposal sites, Guangdong Beilong low-median radioactive waste disposal sites and Qinghai State-owned 221 Plant radioactive contaminants landfills is within the fluctuation range of local natural background. Activity concentrations of radionuclides in the environmental medium related to the above business practices are of no significant change from that of previous years.

**Environment ionizing radiation in the vicinity of uranium mines and metallurgical plants** The radiation environment was in stable condition in the vicinity of uranium mines and metallurgical plants. There were no notable changes to the air absorbed γ radiation dose rate, activity concentration of radon in the air, of gross α in the aerosol, and of radionuclides Uranium and Radium-226 in the surface water and drinking well water near mines.

### Electromagnetic Radiation

The environmental electromagnetic radiation this year was good at large. The comprehensive electromagnetic field strength was far below the derived limit to public exposure as specified by *Regulations for Electromagnetic Radiation Protection (GB 8702-88)*. The environmental electromagnetic radiation levels varied little in the vicinity of electromagnetic facilities. They were below the derived limit to public exposure as specified the aforementioned regulations, in environmentally sensitive sites around the antennas of monitored mobile communication stations. The power frequency electric field strength and magnetic induction intensity in the environmentally sensitive sites close to the power transmission lines and transformers monitored were below the power frequency electric field evaluation standards of residential areas as well as the power frequency limits set for 24/7 public exposure by the *Technical Regulations on Environmental Impact Assessment of Electromagnetic Radiation Produced by 500 kV Ultra-high Voltage Transmission and Transfer Power Engineering (JH/T 24-1998)*.

## Measures and Actions

**【Radiation environmental monitoring】** The check and acceptance work for 13 provincial platforms for nuclear and radiation emergency monitoring and dispatching included in the 2011 emission reduction projects, 4 state-controlled automatic monitoring stations in Shandong and Heilongjiang and the national data collection and dissemination systems for

radiation environment were finished. The supervision-oriented monitoring system of nuclear power plants was in the process of approval and acceptance. National provincial radiation monitoring bodies were mobilized to quality assessment and skills contest, and urged to strengthen certificate-based service. The pilot program for drinking water radioactivity survey was implemented according to the *Circular on Drinking Water Radioactivity Monitoring and Emergency Response* issued this year. The vigorous efforts in environmental radiation monitoring also included the preparation of training materials and 35 sessions of integrated training and operational skills training benefiting 700 people.

**【Special actions】** A total of 22 technical panel meetings were held to improve and optimize the survey and evaluation programs. The 2nd Meeting of the Leading Group for the Program for National Investigation and Assessment of Radiation Environment in Nuclear Bases and Nuclear Facilities was convened, wrapping up achievements and experience and clarifying ideas and approaches for follow-up work. The investigation and evaluation of radiation environment was completed in Lincang Mines of Yunnan, CNNC 404 Co. Ltd., China Institute of Atomic Energy and Qinshan Nuclear Power Base. A special inspection of radiation safety was carried out, covering more than 400 γ ray detection units and other high-risk radioactive sources. China also embarked on a year-long program for nuclear safety culture promotion and announced the Nuclear Safety Culture Policy Statement.

**【Decentralization】** The *Circular on Matters Concerning the Decentralization of Nuclear Radiation Regulatory Functions* was distributed to ensure a smooth transition of regulation. The *Circular on Matters Concerning the Radiation Safety Management of Radioisotopes and Radiation-emitting Devices in Military* distributed this year clearly defined the duties in safety regulation of military radiation environment. The *Circular on Matters Concerning the Radiation Safety Management of Radioactive Drugs* extended the pending period for approving the import, export and transfer of radioactive drugs and raw materials to one natural year from six months.

## County–level Eco–environmental Quality Monitoring, Assessment and Evaluation in National Key Ecological Functional Areas

In order to assess the effects of central government transfer payments in improving and protecting the county-level eco-environment in the national key ecological functional areas, Ministry of Environmental Protection, in conjunction with Ministry of Finance, launched a program for monitoring, assessing and evaluating the eco-environment in 512 counties (only eco-environmental quality status assessment in 20 counties added in 2014) in 2014. The program employed a variety of technical means, including satellite remote sensing, environmental monitoring, unmanned aerial vehicles, statistical surveys, on-site verification. The status and changes of eco-environmental quality are described as follows:

**Eco-environmental quality status** Among the 512 counties, 11.9% or 61 counties had a "vulnerable" ecological environment, mainly distributed in the wind and sand control areas (37.7%) and functional areas of water conservation (37.7%). 157 or 30.7% of these counties had a "general" ecological environment, of which 48.4% were concentrated in the functional areas of water conservation. The ecological environment was "good" in 294 or 57.4% of these counties, mainly located in the functional areas of water conservation (41.1%) and biodiversity conservation areas (30.6%).

**Eco-environmental quality changes** Among the 492 counties, 14.0% or 69 saw the environmental quality turn "better", including 4 "obviously better", 17 "generally better" and 48 "slightly better". The environmental quality remained "basically stable" in 355 counties, accounting for 72.2%, but turned "worse"in 68 counties (13.8%), including 4 "obviously worse", 15 "generally worse" and 49 "slightly worse".

# Natural and Ecological Environment

## General Situation

### Eco-environmental Quality

In 2013[②], among the 2,461 counties monitored for eco-environmental quality assessment, the county-wide eco-environmental quality was "excellent" in 558 counties, "good" in 1,051 counties, "average" in 641 counties, "relatively poor" in 196 counties, and "poor" in 15 counties. Areas of counties observed with "excellent" or "good" eco-environmental quality totaled around 46.7% of the national territory, mainly distributed to the south of Tsinling Mountains and Huaihe River, and in the Greater and Lesser Khingan Mountains and Changbai Mountain in northeast China, those with "average" records accounted for 23.0%, mainly distributed on the North China Plain, central and western part of Northeast China Plain, central part of Inner Mongolia, and Qinghai-Tibet Plateau, and those with "relatively poor" or "poor" records totaled 30.3%, mostly in northwestern region of China such as western part of Inner Mongolia, central and western part of Gansu province, western part of Tibet and most part of Xinjiang province.

### Biodiversity

In terms of ecosystem diversity, China boasts various types of terrestrial ecosystems, with 212 types of forest ecosystems, 36 types of bamboo wood ecosystems, 113 types of shrubbery ecosystems, 77 types of meadow ecosystems, and 52 types of desert ecosystems. The freshwater aquatic

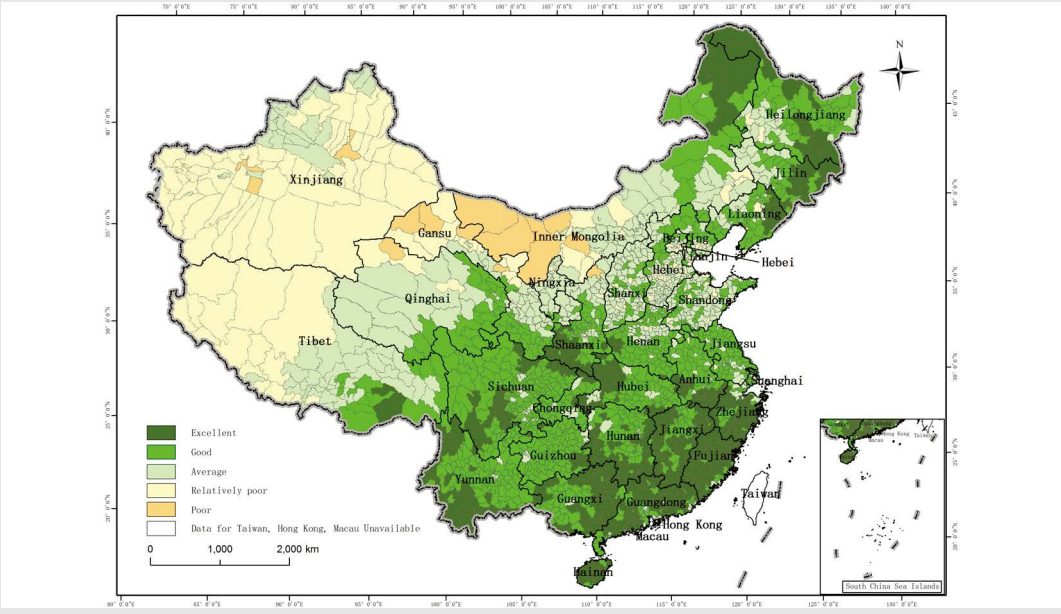



Diagram of graded county-wide eco-environmental quality in China in 2013

② As the data collection is time-bound, this part of content is one year behind that of other environmental elements.

ecosystems are complex. There are 4 types of wetlands found in China altogether, that is, the marsh wetlands, inshore and coastal wetlands, river wetlands and lake wetlands. Also, China has 4 major marine ecosystems in inshore waters of the Yellow Sea, the East China Sea, the South China Sea and Kuroshio Current Basin. Typical marine ecosystems can be found in China's nearshore sea areas, such as coastal wetlands, mangroves, coral reefs, estuaries, bays, lagoons, islands, upwelling currents and seaweed beds, along with natural sceneries and natural monuments such as under-sea ancient forests, and marine abrasion and sea deposition landforms. With regard to artificial ecosystems, there are farmland ecosystems, planted forest ecosystems, constructed wetland ecosystems, artificial grassland ecosystems, and urban ecosystems, etc.

In terms of species diversity, China has 34,792 species of higher plants, including 2,572 species of Bryophytes, 2,273 species of Pteridophyta, 244 species of Gymnosperms, and 29,703 species of Angiosperms. In addition, China owns almost all of the woody plant species that can be found in temperate zone. China also boasts about 7,516 species of vertebrate animals, including 562 species of mammals, 1,269 species of Aves, 403 species of reptiles, 346 species of amphibians and 4,936 species of fish. A total of 420 species of rare and endangered wild animals are included in the *List of Wild Animals under Special State Protection in China*. Hundreds of animal species such as giant panda, crested ibis, golden monkey, South China tiger and Chinese alligator are endemic to China. The identified fungi amount to above 10,000 species.

In terms of genetic resources diversity, China has cultivated crops of 1,339 cultivars in 528 classes, and boasts more than 1,000 species of economic trees, up to 7,000 species of ornamental plants which are of Chinese origin, and 576 species of domestic animals.

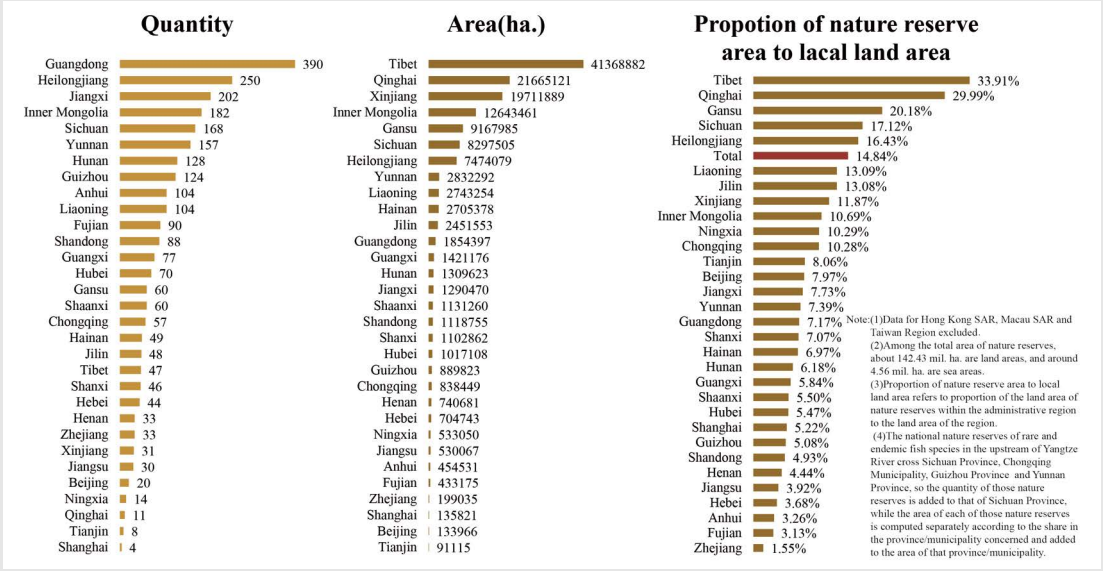
**Endangered Species** Evaluation to 34,450 higher plant species showed that 27 species were categorized as Extinct category (EX), 10 species as Extinct in the Wild Category (EW) and 15 species as Regional Extinct Category (RE). Endangered species among the higher plant species in China totaled 3,767, accounting for 10.9% of the evaluated species. Furthermore, a total of 2,723 species were categorized as Near Threatened (NT) and up to 3,612 species fell into the category of Data Deficient (DD). Up to 10,102 higher plant species required special attention and protection, making up 29.3% of the total evaluated species.

**Nature Reserves** A total of 2,729 nature reserves of various types and at different levels had been established nationwide by the end of the year, with overall coverage of about 146.99 mil. ha., including 142.43 mil. ha. land area which accounts for 14.84% of national land area. There are 428 national nature reserves, the combined area of which totaled around 96.52 mil. ha..

**National marine nature reserves** In 2014, among all the marine species national nature reserves, the density of lancelet populations in Changli Golden Coast National Nature Reserve of Hebei Province in north China was 18/$m^2$ with biomass of 4.1 g/$m^2$ in 2014. Since 2002, the lancelet saw a declining density and biomass with 2014 hitting the record low. Change of sand content and type of sediment is one of the main reasons for degrading lancelet habitat. The Jiushan Islands National Nature Reserve of Xiangshan

Nature reserves of various types in China in 2014

| Type | Quantity | Total area (ha.) |
|---|---|---|
| Forest ecosystem | 1,425 | 31,647,873 |
| Grassland and meadow ecosystem | 41 | 1,654,155 |
| Desert ecosystem | 31 | 40,054,288 |
| Inland wetlands | 378 | 30,751,764 |
| Marine and coastal ecosystems | 68 | 711,489 |
| Wild animals | 520 | 38,852,546 |
| Wild plants | 151 | 1,782,786 |
| Geological monuments | 83 | 992,413 |
| Paleontology monuments | 32 | 544,192 |
| Gross | 2,729 | 146,991,506 |




Nature reserves in local provinces (autonomous regions and municipalities directly under the Central Government) in 2014

County in Zhejiang Province in east China saw increasing number of bird species. Nanji Islands National Nature Reserve of Zhejiang witnessed increasing distribution area of wild narcissus and the amount of bird species remained stable. In Xiamen Rare Marine Species National Nature Reserve, sousa chinensis were observed for 204 times and the number of which being observed totaled 633, and both increased notably from last year, while both the density and biomass of lancelet population decreased from a year earlier. Mangrove species, including rhizophora stylosa, bruguiera gymnorrhiza, kandelia candel and aegiceras corniculatum, were observed in Guangxi Shankou Mangrove National Nature Reserve, with average density of 6,600 stocks per ha., basically the same as last year. Part of the mangrove species were threatened by insect pest and invasive alien species. The average density of mangrove species in Beilun Hekou National Nature Reserve of Guangxi Province remained stable, and there was a notable increase in the number of bird species from a year earlier. The live coral coverage decreased in Guangdong Xuwen Coral Reef National Nature Reserve and Hainan Sanya Coral Reef National Nature Reserve, while the live coral coverage in Wanning Continents National Ecological Nature Reserve of Hainan Province remained stable on the whole. Among the marine natural monuments national nature reserves, in Changli Golden Coast National Nature Reserve, the maximum elevation of the coastal dunes registered 36.8 m, and that of the saddles was 21.4 m, basically the same as last year, the location of the vertex of the ridge line moved by 2.65 m to the northwest. The area of shell dykes remained stable in Tianjin Ancient Coast and Wetland National Nature Reserve. The shell dykes in Binzhou Shell-Dyke Island and Wetland National Nature Reserve are mainly distributed on Dakouhe Island, Gaotuozi Island-Jijiapuzi Island and Wangzi Island. The area of shell dykes amounted to 39.8 ha., up 1.2 ha. from a year earlier. The ancient stumps remained intact and the number of which remained stable in Shenhu Bay undersea ancient forest National Nature Reserve.

**Important Coastal Wetlands** The typical estuary ecosystems monitored this year were all in sub-health conditions. Sea water quality in most estuary ecosystems was in eutrophic state and hypoxia zone was spotted in part of Yangtze River estuary. A larger amount of cadmium and petroleum hydrocarbon was found in estuarine organism. The zooplankton density was below the normal range at the estuaries of Shuangtaizi River. In Luanhe River estuary-Beidaihe in Hebei province, the phytoplankton density was above the normal range, whereas the biomass of large benthic organisms was below normal range. The phytoplankton density was above the normal range at the estuary of the Yellow River. The density of large benthic organisms was above the normal range at Yangtze River estuary. The density of large benthic organisms and the biomass were below the normal range at the Pearl River estuary. The density of fish roes and larva at the estuaries of Luanhe-Beidaihe, Yellow

River and Pearl River increased compared with previous year. Among the monitored mangrove ecosystems, the mangrove ecosystems in Beihai Municipality and estuary of Beilun River, Guangxi Autonomous Region in South China were in healthy condition. The area and amount of mangrove forests in the monitored area remained unchanged and the density of mangrove benthic organisms and the biomass were relatively high. Part of the forest areas suffered from pest damage and the invasive spartina alterniflora loisel still posed a threat to the growth of mangrove. Among the monitored tidal flat wetland ecosystems, the shallow tidal flat wetland ecosystems were in sub-health conditions in north Jiangsu. The nutritive salt content in some sea areas failed Grad Ⅳ national standard of water quality, and the dissolved oxygen content was relatively low. The zooplankton density was below the normal range, whereas the density of large benthic organisms and the biomass was above the normal range by a significant margin. The deterioration of organism habitat has yet been effectively controlled.

### Invasive Alien Species

The situation remained grave in China where its natural ecological system in China continued to be threatened by invasive alien species. There are around 544 invasive alien species in China, up 11.5% from that of 2010. More than 50 alien species out of the 100 hazardous invasive alien species listed by IUCN had already been found in China. Over 120 alien species wrecked perennial damage on a large scale. Economic loss caused by 20 invasive agricultural alien species including alternanthera philoxeroides and pomacea canaliculata totaled 84 bn. RMB. The invasive alien species posed a threat to various ecological systems including farm field, forest, wetland and grassland and endangered wildlife resource.

## Measures and Actions

**【Ecological Civilization Construction】** Ecological protection redlining was actively advanced. *Technical Guidelines of Drawing National Ecological Protection Red-line-Ecological Function Redline* was printed and circulated, *Guidelines of Constructing National Ecological Protection Redlining System* was drafted, The *Work Programme on the Administrative over National Ecological Redlining (Draft) and Work Programme on the Supervision and Performance Evaluation over National Ecological Redlining* were prepared. Eco-compensation mechanism was promoted and put in place. The transfer payment for key national ecological functional zones has expanded to 512 counties in 2014. Ecological Industrial Demonstration zones were set up in 96 industry zones, of which 34 were officially named as national ecological industrial demonstration zone. The Green Credit Initiative co-invested by the bank, government and investment institution was launched to effectively solve the problems of lack of access to and high cost of financing for small and medium sized enterprises and attract more social capital flowing into the field of environmental protection.

**【Integrated Management of Nature Reserves Nationwide】** 21 new national nature reserves were established this year and the areas of 4 national nature reserves were adjusted. 22 nature reserves were upgraded to national level and 6 were subject to adjustment. Kaihua and Xianju in Zhejiang province were approved as the 2nd batch of demonstration areas to establish national park. 36 conservation areas were newly established as the 8th batch of national aquatic germplasm resources conservation areas and one more aquatic organism national nature reserve was established. 10 new conservation sites for agricultural wild plants were increased. 23 counties were increased as pilot enclosed nature reserves. 32 National Desert Park demonstration zones were launched. *Guidelines of Standardized Establishment and Administration of National Marine Reserve* and other guiding documents were released. Efforts were made to strengthen management and protection facilities, increasing investment into video monitoring system, establishing national marine reserve management platform and improving the informatization of marine reserve management. Project of establishing coastal wetland monitoring center was carried out, investigation on the resource condition of coastal wetland was conducted in demonstration zones and new model was explored to manage and protect coastal wetland.

**【Biodiversity conservation】** In 2014, vice premier Zhang Gaoli chaired the *China Biodiversity Conservation Council meeting* and announced list of council members. The meeting examined and approved documents on strengthening biodiversity conservation and made plans for major tasks of biodiversity conservation in next step. *2014-2015 China Action Plan for United Nations Decade on Biodiversity* was printed and circulated. South-south cooperation on Biodiversity Convention was conducted and activities were held by Asian urban biodiversity workshop to celebrate "5.22 International Day for Biodiversity".

**【Wetland conservation】** The second investigation of national wetland resource showed that the total wetland areas in China totaled 53.603 mil. ha., accounting for 5.9%

of the total. The *12th Five-Year Plan for National Wetland Conservation Program* was implemented and 331 pilot projects were launched with the support of state revenue to implement the co-compensation and incentive mechanism for returning farmland to wetland and wetland conservation. For the first time, health and function evaluation of all international wetlands under China's administration was accomplished with result showing that each hectare of wetland was worth 114,000 RMB every year. Carbon pool investigation on peat bogs was conducted, playing a significant role in combating climate change. The 5th phase GEF project was fully launched. 140 pilot zones for national wetland park were approved and up to 0.5 mil. ha. wetland conservation areas were increased. A total of 20 national wetland parks went through examination and met the standard. The Yellow River Wetland Conservation network was well established.

**【Prevention and Control of Invasive Alien Species】** *List of Invasive Alien Species in China (3rd batch)* was released in 2014, based on which, research and investigation was conducted on the status quo of part of conservation areas at Yunnan province and the damage caused by invasion was also analyzed. Further research is underway to develop plans to control alien species. Demonstration projects were set up in Yunnan province to prevent and eliminate cyanophyta through the introduction of purple root water hyacinth and set up in Guangxi province to prevent and eliminate spartina alterniflora loisel. Invasive alien species elimination activities were conducted three times nationwide, specifically in Yingshan, Hubei province, Shenyang, Liaoning province and Tongnan, Chongqing province, to reduce and eliminate pomacea canaliculata, ambrosia artemisiifolia and water hyacinth respectively. Targeting at mikaniamicrantha, flaveria bidentis, solanum rostratumand pomacea canaliculata and other invasive alien species, research on chemical technology, biotechnology and substitution technology was conducted to prevent and control invasive alien species.

## Environmental Incidents and Their Settlement

In 2014, there were 471 cases of environmental incidents occurring in the country, a decrease of 241 year on year. Among them, 3 cases involved serious incidents, 16 large incidents and 452 general incidents. Ministry of Environmental Protection (MEP) directly guided and handled 98 cases of environmental emergencies, including 3 cases of major incidents, 12 cases of large incidents, and 83 cases of general incidents. The 3 cases of major incidents were the discomfort of teachers and students caused by inhalation of contaminated air in Gongguan Town, Maonan District, Maoming, Guangdong, excessive ammonia in Wuhan section of Hanjiang River in Hubei, and pollution of Qianzhangyan Reservoir in Wushan County, Chongqing caused by Huangchangping Mines Co. Ltd. in Jianshi County, Enshi Autonomous Prefecture, Hubei.

A total of 73,160 environmental violation cases registered and investigated this year, involving 83,195 administrative penalty decisions and a total fine of 3.1683 bn. yuan. Environmental protection departments at all levels accepted 2,180 suspected criminal cases from public security organs.

The "010-12369" green hot-line received 59,917 times of calling and online reporting and accepted 1,463 complaints which were all dealt with. To address events below the public satisfaction, on-site supervision, restricted approval, and interviews were combined, ensuring cases 100% closed on schedule. The public reporting system was established this year, under which 1,479 reported cases were disclosed and 33 exposed.

# Land and Rural Environment

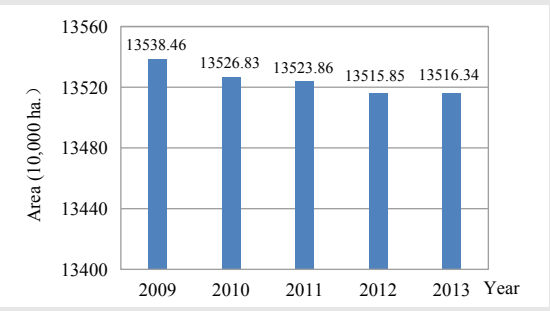
## General Situation

### Land Resources and Farmlands

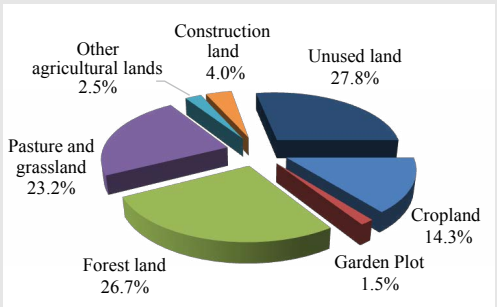
By the end of 2013[③], there had been 646.1684 mil. ha. agricultural land uses which includes 135.1634 mil. ha. croplands, 253.2539 mil. ha. forest lands, and 219.5139 mil. ha. pastures and grasslands, as well as 37.4564 mil. ha. construction lands, of which 30.6073 mil. ha. are urban villages and industrial and mining land uses.

Up to 0.3547 mil. ha. croplands were lost to construction projects, disasters, ecological conversions and agricultural restructuring in 2013, while 0.3596 mil. ha. croplands were gained through land improvement and agricultural restructuring, resulting in net increase of croplands by 4,900 ha..

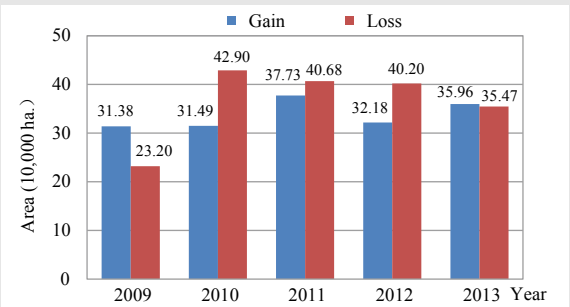
By the end of 2014[④], the national cropland has been sorted into 10 Grades based on land quality with Grade one being the highest. A total of 33.2 mil. ha. crop land attained Grade 1~3, accounting for 27.3% of the total. The soil productivity of such cropland was relatively high and basically there were no other soil constraints. In conducting agricultural activity, approach of combination of plantation with appropriate tending shall be adopted to ensure the steady improvement of cropland quality. Up to 54.5 mil. ha. attained Grade 4~6, accounting for 44.8% of the total. For this part, climate condition is suitable for farming and the




2009–2013 year-on-year change of cropland area in China




Percentage of different land uses in China in 2013




2009–2013 cropland gains and losses in China

[③] As the data collection for Ministry of Land and Resource is time-bound, this part of content is one year behind that of other environmental elements.

[④] Statistics by the Ministry of Agriculture.

need for basic crop infrastructure was met, the soil constrains were therefore barely noticed. Cropland of these grades was considered the key area to increase grain yield and to make new breakthrough. Up to 34.0 mil. ha. croplands attained Grade 7~10, accounting for 27.9%, in which, soil productivity was relatively low and the land was subject to obvious soil constraints. And it cannot be fundamentally improved in a short period of time. Efforts shall be made to construct more cropland infrastructure and improve the soil quality.

Areas and percentage of Graded Cropland in 2014

| Grades of Land Quality | Area ( mil. ha. ) | Pct. ( % ) |
|---|---|---|
| Grade 1 | 6.13 | 5.1 |
| Grade 2 | 9.53 | 7.8 |
| Grade 3 | 17.53 | 14.4 |
| Grade 4 | 20.27 | 16.7 |
| Grade 5 | 19.27 | 15.8 |
| Grade 6 | 15.00 | 12.3 |
| Grade 7 | 12.60 | 10.3 |
| Grade 8 | 9.27 | 7.6 |
| Grade 9 | 7.07 | 5.8 |
| Grade 10 | 5.07 | 4.2 |
| Gross | 121.73 | 100.0 |

## Status quo on Soil Pollution

According to the 1st investigation on national soil pollution (April, 2005-December, 2013), up to 16.1% of the monitoring sites exceeded the upper limit, of which, 11.2% were identified as slight pollution, 2.3% mild pollution, 1.5% moderate pollution and 1.1% heavy pollution. A total of 19.4% of monitored cropland sites were above the normal range, of which, 13.7% were slightly polluted, 2.8% were mildly polluted, 1.8% were moderately polluted and 1.1% were all heavily polluted. Up to 10.0% for forest land sites, 10.4% for the grassland sites and 11.4% for unused land sites were above the normal range.

In terms of the type of pollution, inorganic pollution was the leading contributor, followed by organic pollution and combination of inorganic with organic pollution which accounted for a slight proportion. Of all monitoring sites exceeding the upper limits, 82.8% were identified as inorganic pollution. With regard to the 8 inorganic pollutants, 7.0% of monitoring sites were recorded with over concentration of cadmium, 1.6% with excessive mercury, 2.7% with excessive arsenic, 2.1% with excessive copper, 1.5% with excessive lead, 1.1% with chromium, 0.9% with excessive zinc and 4.8% with excessive nickel. In terms of the organic pollutants, 0.5% of the monitoring sites were recorded with excessive HCH, 1.9% of the monitoring sites were recorded with excessive DDT and 1.4% of the monitoring sites were recorded with excessive PAH.

## Water Loss and Soil Erosion

According to the water and soil conservation findings of the first national census for water, the soil erosion in China totaled 2.9491 mil. $km^2$, which amounted to 31.12% of investigated land. Among others, 1.2932 mil. $km^2$ was caused by water erosion, and 1.6559 mil. $km^2$ by wind erosion.

## Agricultural Pollution

Currently, fertilizer use efficiency in China was only 33%, lower than the average of the developed countries which was about 50%. China is the leading pesticide producer and consumer in the world, however, the pesticide use efficiency was only 35%. Up to 1.3 mil. t of agricultural films were consumed every year in China, exceeding that of other countries combined. With the widespread use of agricultural film, which was called “white revolution”, problem of “white pollution” was caused at the same time.

### Greening and landscaping

Since 2014, the urban green space expanded steadily with all indicators improving. The percentage of greenery coverage in urban built-up area registered 40.1%, rate of green space totaled 36.3% and per capita green space reached 12.95 $m^2$.

The respective percentage of greenery coverage in the urban built-up area respectively registered 42.0% in the east region, 38.8% in the central region and 37.8% in the west region, respectively up 0 pps, 0.8 pps and 0.5 pps from a year earlier. The respective rate of green space in the urban built-up area of the east, central and west region of China registered 38.2%, 34.8% and 33.9%, with an increase of 0 pps, 1 pps and 0.5 pps each. The per capita green space in the east, central and west region of China totaled 13.6 $m^2$, 11.5 $m^2$ and 13.1 $m^2$, up 0.2 $m^2$, 0.4 $m^2$ and 0.3 $m^2$ respectively from last year.

## Measures and Actions

**【Integrated Environment and Health Management】** In 2014, the State Council printed and circulated *Suggestions on Stepping up Efforts to Promote Patriotic Health*, specifying the need to extensively promote patriotic health campaign, take actions to build a sound urban and rural environment and health, coordinate efforts of managing urban and rural environment and health, ensure the safety of drinkable water and accelerate the pace of latrine improvement in rural areas, so as to remarkably improve urban and rural environment and health and effectively bring under control the environmental factors that threaten public health. Patriotic Health Campaign Committee printed and circulated *Circular on Strengthening Efforts to Improve Rural Latrines,* specifying the targets and tasks for local departments to advance latrine improvement work, in an effort to accelerate the pace of restoring sanitary latrines in rural areas. Since the 12th Five-Year Plan, the central government has input over 21 bn. RMB to support 52,000 villages in rural environment management, bringing benefits to 90 mil. people. In 2014, a total of 1,610 villages and towns have met the national standard of ecological village and town construction. To date, there are a total of 4,596 ecological villages and towns of national level nationwide.

**【Solid Waste Disposal in Rural Area】** Up to 257,000 incorporated villages had their solid wastes disposed through this year, accounting for 47.0% of the total incorporated villages, up 10.4 pps from a year earlier. A total of 346,000 incorporated villages have set solid waste collection station, accounting for 63.2%, up 8.4 pps from last year. Environment and health input in rural area totaled 16.99 bn. RMB, of which waste disposal accounted for 6.31 bn.. Up to 55,000 incorporated villages had domestic sewage treated before discharging into the environment, accounting for 10.0% of the total incorporated villages, up 0.9 pps from the previous year. Sewage treatment input in rural area amounted to 6.38 bn. RMB. Furthermore, a total of 250,000 incorporated villages had carried out village renovation plan, accounting for 45.7%.

**【Monitoring Environmental and Health Hazards】** In 2014, up to 99,853 monitoring sites were set in all cities of prefecture level and counties as well as 60% of towns and villages to monitor the sanitary condition of drinking water during wet season and dry season. And damage to human health caused by air pollution was monitored through 77 monitoring sites distributed in all provinces and municipalities nationwide. Moreover, rural environmental sanitary conditions was monitored through 14,000 monitoring sites distributed in 700 counties nationwide, and the monitoring items included environmentally sound treatment of rural wastewater, solid wastes, feces, and soil sanitary conditions, as well as prevention and control of vectors.

**【Water Loss and Soil Erosion Governance】** A total of 74,000 $km^2$ areas were prevented and brought under control from further loss and erosion, of which areas of integrated governance totaled 54,000 $km^2$, areas of ecological restoration reached 20,000 $km^2$, 266,666.7 ha. sloping lands were converted to terrace, over 3,000 small watersheds were comprehensively managed and more than 300 ecological and clean small watersheds were constructed. Key projects on soil and water conservation were conducted in areas of serious water loss and soil erosion including upper and middle range of Yangtze River, upper and middle range of the Yellow River, black soil area of northeast China and stony desertification of southwest China to accelerate governance on water loss and soil erosion.

**【Safe Drinking Water Supply in Rural Areas】** The Central and local governments earmarked 33.92 bn. yuan this year for safe drinking water supply projects in rural areas, 24.0 bn. yuan of which was contributed by the Central Government, and 9.92 bn. yuan by local governments and public fund raising. As a result, almost 49,000 centralized water supply projects and 61,000 separate water supply projects were conducted, enabling 58.44 mil. rural residents and 8.12 mil. faculties and students in rural schools to have access to safe drinking water.

# Forest Environment

## General Situation

### Forest Resources

According to the findings of the 8th National Investigation on Forest Resources (2009-2013), the total forest area of the country was 208 mil. ha., up by 12.23 mil. ha., forest coverage at 21.63%, up by 1.27 pps, total growing stock of stumpage at 16.433 bn. $m^3$, and forest reserve at 15.137 bn. $m^3$, both up by 1.416 bn. $m^3$. The forest area of China ranked No.5 and its forest reserve ranked No.6 in the world, and artificial forest area ranked No.1 in the world.

The findings of the investigation show that China's forest resources have entered a stage at which its quantity and quality increased steadily. With increase of total forest resources and improvement of structure and quality, forest ecological functions have been further enhanced. The total biomass of forests in the country was 17.002 bn. t, and total carbon reserve reached 8.427 bn. t. There was 580.709 bn. $m^3$ for annual water conservation, 8.191 bn. t for annual soil fixation, 430 mil. t for annual conservation of nutrients, 38 mil. t for annual adsorption of pollutants and 5.845 bn. t for annual dust retention.

### Forest Biological Hazards

In 2014, a total of 11.93 mil. ha. forests across the country were under prevention and control of major forest biological hazards. The disaster rate of major forest hazardous organisms was controlled under 5‰, over 85% forests had been under prevention and control of biological hazards. The threat of major forest biological hazards such as pinewood nematode disease and fall webworms had been under effective control.

### Forest Fire

There were 3,673 forest fires across the country in 2014, affecting 18,800 ha. forests. The amount of fires decreased significantly over the average of the same period in the past 3 years.

## Measures and Actions

**【Comprehensive projects】** In 2014, the key project on ecological restoration had finished afforestation of 1.9279 mil. ha., the protection projects on natural forest resources finished afforestation of 410,500 ha., cultivated 1.6951 mil. ha. of young and middle-age forests and protected 115 mil. ha. of forests. The Grain for Green Project had finished afforestation of 379,600 ha. in the whole year. The Project on the Control of Sand Sources to Beijing and Tianjin finished afforestation of 239,100 ha. in the whole year. The project on comprehensive control of stonification had completed afforestation of 372,000 ha. in the whole year, and completion rate reached 100%. The number of key counties of comprehensive control reached 314, up by 14. Project on the full coverage of forests in counties with stonification in Yunan, Guangxi and Guizhou province and the shelter forests in North China, Northeast China and Northwest China and Yangtze River Basin have completed afforestation of 596,300 ha..

**【Forest protection】** In 2014, the authority launched special campaign to crack down on illegal encroachment of woodland, and initiated 2 large-scale and national crackdown campaign of "2014 Net of Heaven Action" and "2014 Sharp Sword Action". The state council issued *Suggestions on Strengthening the Prevention and Control of Biological Hazards*, which was effectively implemented by relevant departments and the ability of monitoring and early warning, quarantine, prevention and relief of disasters was significantly improved. The authority continued to strengthen the capacity building of law-based prevention and control of fire, emergent response, technological response and basic guarantee, and made great achievements in fire control and prevention.

# Grassland Environment

## General Situation

### Grassland Resources

Grassland area across the country was about 400 mil. ha. in 2014, accounting for about 41.7% of total land area. It is the largest terrestrial ecosystem and ecological shelter in China. The natural grassland was mainly distributed in north and west China. The grassland area of 12 provinces (autonomous regions, municipalities) in western part of China was 331 mil. ha., accounting for 84.2% of total grassland area of China. The total grassland area of 6 big pasture regions such as Inner Mongolia, Xinjiang, Tibet, Qinghai, Gansu and Sichuan was 293 mil. ha., accounting for three fourths of grassland area. The grassland in southern part of China was dominated by grass hills and grass slope, most of them were distributed at mountain areas and hills with total area about 67 mil. ha.

### Grassland Productivity

In 2014, the total fresh grass output of natural grassland across the country reached 1,022.1998 mil. t, down by 3.18% compared with that of last year, equivalent to about 315.0220 mil. t dry grass. The carrying capacity for livestock was about 247.6118 mil. sheep, both down by 3.20% compared with that of last year. The total fresh grass yield of 23 major provinces (autonomous regions, municipalities) across the country reached 943.7582 mil. t, taking up 92.33% of total national yield, down by 4.02% compared with that of last year, equivalent to about 295.3944 mil. t dry grass, down by 4.04%. The livestock carrying capacity was about 232.1112 mil. sheep, down by 4.10% compared with that of last year.

### Grassland Disaster

There were 158 grassland fires across the country in 2014. Among them, 150 were ordinary fires, 7 were relatively big grassland fires and 1 was major grassland fire. A total of 39,338.6 ha. grassland were affected with 22.046 mil. yuan economic loss, 2 people injured and 1,223 livestock loss. The number of grassland fires across the country increased by 68 times compared with that of last year, and the grassland affected increased by 4,261.3 ha.. Compared with the last year, a total of 34.812 mil. ha. grassland across the country were subject to rats, about 8.8% of total grassland area of the national grassland, down by 5.8% compared with last year. 13.881 mil. ha. grassland were subject to insects, accounting for about 3.5% of grassland across the country, down by 9.3% compared with that of last year.

## Measures and Actions

**【Implementing the subsidy and reward policy for grassland ecological conservation】** In 2014, the central government arranged 16.0694 bn. yuan as subsidy and reward for grassland ecological conservation and kept on the implementation of subsidy and reward mechanism for conservation of grassland ecology in 13 provinces (autonomous regions) such as Inner Mongolia, Xinjiang, Gansu and Qinghai. According to the basic principle of "identifying target, task, responsibility and funds of each province" and "identifying the tasks, subsidy, service and guidance, supervision and file or card for each household", the government has carried out policy measures for herdsman such as subsidy for grassland grazing prohibition, award for grass-livestock balance and subsidy for means of production of herdsman.

**【Implementation of the project on grassland protection and development】** In 2014, the central government invested 2 bn. yuan on the "pasture for grassland" project in Inner Mongolia, Sichuan, Gansu, Ningxia, Tibet, Qinghai, Xinjiang, Guizhou, Yunnan, Heilongjiang, Jilin, Liaoning and Xinjiang Production and Construction Corps. The central government has invested 858 mil. yuan for the program on the control of sand and dust in grassland of Beijing, Shanxi, Hebei, Inner Mongolia and Shaanxi. In addition, the central government invested 319 mil. yuan for the herdsman settlement project in Tibet, Xinjiang and

Xinjiang Production and Construction Corps, enabling 15,650 households of herdsmen to settle down. Pilot project for integrated management of stony desertification was carried out in Hubei, Hunan, Guangxi, Chongqing, Sichuan, Yunan and Guizhou. The central government invested 0.2 bn. yuan into the demonstration project of water-saving irrigation grassland.

**【Supervision on Grassland Law Enforcement】** In 2014, there were a total of 18,998 illegal cases of various types on grassland, of which, 17,848 cases were registered and 17,423 were settled, with the case settlement rate totaling 97.6%, among the cases, 25 of them were subject to administrative reconsideration or administrative litigation, 621 were transferred to judicial organs. Grassland illegal cases all through this year caused damage to 20,900 ha. of grassland. A total of 1,200 ha. of grassland were subject to illegal trading and transfer. The amount of grassland illegal case was down by 187 cases compared with last year. Area of grassland that was illegally reclaimed, and for temporary use was up by 5,600 ha., up by 36.6%, compared with that of last year. The number of suspected criminal cases transferred to the judicial organs was up by 342 from last year, 2.23 times of that of last year.

## Remote Sensing for Environmental Monitoring

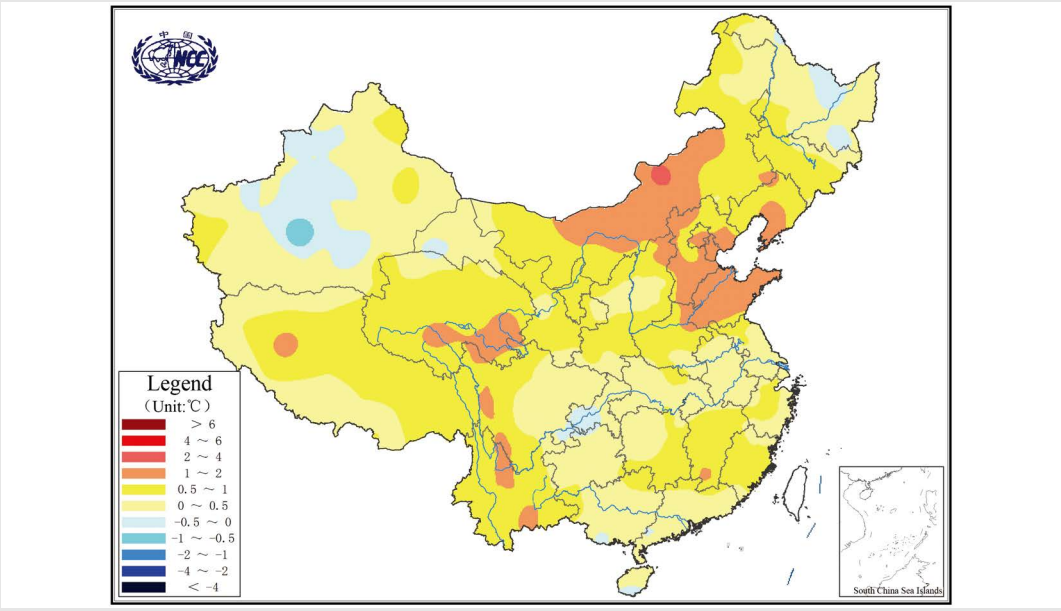
Environment satellites 1A, 1B, and 1C operated well in 2014, providing remote sensing of straw burning, haze and dust, particularly nightly monitoring of straw burning in key areas and at China-Russia border. Unmanned aerial vehicles (UAVs) were sent for over 40 times to examine air pollution sources in 19 key industrial clusters in the Beijing-Tianjin-Hebei region and the surrounding area. During the Beijing APEC meeting, satellite resources were mobilized for process-wide monitoring of the ambient air quality. Remote sensing continued to play a role in monitoring algal blooms, water quality and eutrophication of water bodies including Taihu Lake, Chaohu Lake and Dianchi Lake and helped to monitor 307 risky drinking water sources, 64 key lakes and reservoirs, 3 key watershed sources, and pollution sources along the routes of South-to-North Water Diversion Project. More than 20 emergency monitoring actions were taken on tide and oil spills in coastal waters. China has fully completed the remote sensing survey and evaluation of national ecological environment changes in 10 years (2000-2010) and stepped up the remote sensing of state-level nature reserves, biodiversity conservation priority areas and mineral resource development areas. More than 20 special monitoring programs were carried out, covering illegal construction of golf courses, coal mines in Muli of Qinghai, and ecological impact of Ludian earthquake. A satellite remote sensing survey of county-level ecological changes was conducted in 492 national key ecological functional areas, during which UAVs were mobilized for checks to 8 counties.

# Climate and Natural Disasters

## General Situation

### Air Temperature

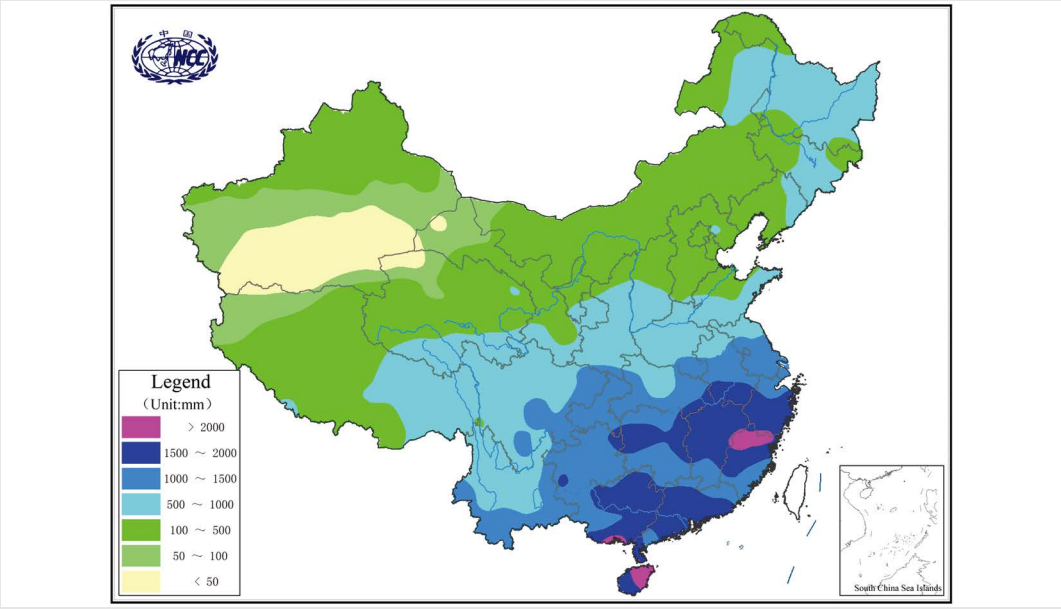
In 2014, the average air temperature across the country was 10.1℃, 0.5℃ higher than historical average, tying with 1999 as the 6th warmest year since 1961. In time distribution, the air temperature of each month was higher than that of the same month except February, August and December. The temperature in 30 provinces (autonomous regions and municipalities) is higher than the historical average. Among them, temperature of Tianjin is 1.4℃ higher, Shandong 1.3℃ higher, Beijing 1.2℃ higher, Hebei 1.1℃ higher, all highest since 1961. In 2014, there were 301 stations where the daily maximum temperature reached extreme high temperature event criteria. Among them, the daily maximum temperature of 73 stations was higher than the historical highest temperature. Most of those stations are located at Beijing, Hebei, Sichuan, Yunnan and Guangxi, and the highest temperature of Zhengding, Hebei reached 43.4℃.




Annual average air temperature departure value distribution in China in 2014

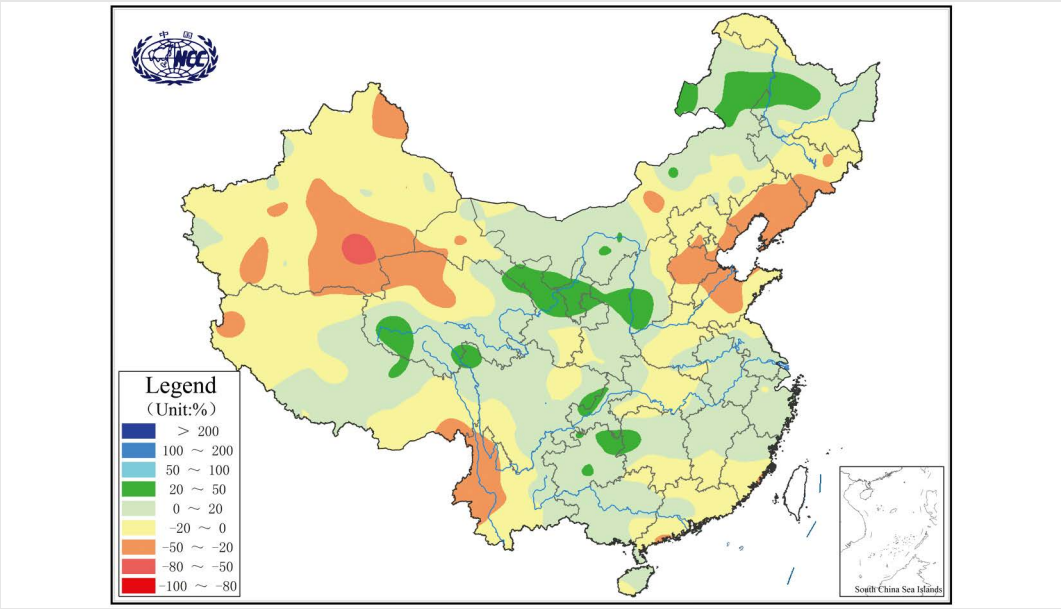
### Precipitation

In 2014, the precipitation across the country ranged from 7.8 mm (Ruoqiang, Xinjiang) to 3,221.2 mm (Fangchenggang, Guangxi) with the average at 636.2 mm, close to the historical average (629.9 mm) and 3% less than that of last year (653.5 mm). Precipitation varied greatly at different months. Precipitation in January, July, October and December is




Precipitation distribution in China in 2014

fewer than the historical average, precipitation in February, May, September and November was more than the historical average, precipitation in March, April, June and August was close to the historical average. In terms of spatial distribution, precipitation in the eastern parts of Hainan, northern parts of Fujian and southern parts of Guangxi is more than 2,000




Geographical distribution of precipitation anomaly percentage in China in 2014

mm, precipitation in the southern parts of the middle and lower range of Yangtze River, Chongqing, eastern parts of Sichuan, Guizhou, southern and eastern parts of Yunnan and Hainan ranged from 1,000 to 2,000 mm, precipitation in the most parts of Northeast China, southern parts of North China, eastern parts of Northwest China, northeastern parts of Inner Mongolia, western parts of Sichuan, western parts of Guizhou, northern parts of Yunnan, eastern parts of Tibet, southeastern parts of Qinghai ranged from 500 to 1,000 mm, precipitation in the northern parts of North China, central parts of Northwest China, most parts of Inner Mongolia, western parts of Tibet, northern parts of Xinjiang ranged from 100 to 500 mm, precipitation in the southern parts of Xinjiang, western parts of Gansu, northwestern parts of Qinghai, northwestern parts of Tibet, northwestern parts of Inner Mongolia was less than 100 mm.

In 2014, precipitation in most parts of Ningxia, central parts of Gansu, central parts of Shaanxi, southwestern parts of Shanxi, northeastern parts of Inner Mongolia, central and western parts of Heilongjiang, northeastern parts of Guizhou and northwestern parts of Qinghai was 20% to 50% more than the historical average, precipitation in southeastern parts of Xinjiang, northwestern parts of Qinghai, most parts of Liaoning, southern parts of Jilin, southern parts of Hebei, central parts of Shandong and western parts of Yunnan was 20% to 50% less than the historical average, precipitation in other areas was near the historical average.

## Meteorological Disaster

**【Storm】** In 2014, there were no major floods in river basins and the loss caused by the storms and flooding was less than historical average. Rainstorm appeared 36 times across the country and Southern China witnessed 31 times. From May to September, rainstorm appeared 29 times across the country and Southern China witnessed 25 times. Daily precipitation in 28 counties (cities) of Guangxi, Guizhou and Hunan exceeded the historical highest level. Parts of Fujian, Guangdong, Guangxi, Hunan, Guizhou, Yunnan, Chongqing witnessed severe storms, floods and flash floods.

**【Flood】** In 2014, except Beijing, Tianjin and Shanghai, 28 provinces (autonomous regions and municipalities) across countries suffered from floods of different degrees, with 5.92 mil. ha. areas of crops affected and 2.83 mil. ha. heavily devastated, 73.82 mil. people affected, 485 people dead, 92 people missing, 260,000 houses collapsed, causing a total loss of 157.4 bn. yuan. Compared with the historical average, the number of people dead from floods decreased by 66%, the lowest in the history, the number of people affected decreased by 43%, the area affected was down by 47%, and the number of collapsed houses down by 76%.

**【Typhoon】** In 2014, typhoon caused great damage. A total of 23 typhoons (wind near the center ⩾8 grade) formed, 2.5 less than the historical average (25.5), 5 of those typhoons landed in China, 2.2 less than the historical average (7.2). Based on preliminary statistics, the typhoon caused a total of 113 people dead and missing and a loss of 67.83 bn. yuan. The number of people dead and missing is less than the average and the economic loss is more than to the average from 1990 to 2013.

**【High temperature】** In 2014, the number of days with average highest temperature in Southern China was up to 25.6 days, 8.3 days more than the historical average, the 2$^{nd}$ most since 1961 and less than that in 2003. The high temperature caused adverse impacts on early rice in southern parts of Jiangxi, central parts of Fujian Province. North China, the region between the Yellow River and the Huaihe River and Yunnan in May suffered from heat waves with extreme temperatures.

**【Drought】** In 2014, 22.7 mil. ha. of crops was affected by drought. 12 mil. ha. of crops was affected, 5.68 mil. ha. was devastated, and 1.48 mil. ha. had no harvest, thus causing a loss of 20.06 mil. t in grain, 27.6 bn. yuan in economic crops, and a direct economic loss of 91 bn. yuan. 17.83 mil. people and 8.83 mil. livestock have difficult access to water. Compared with the historical average, the affected area was down by 43%, grain loss due to drought down by 33% and the number of people who have access to water due to drought down by 28%.

**【Snow disaster】** In 2014, the national average of snowy days was 14.7, 11.6 days less than the historical average, lowest since 1961. The number of snowy days in northern parts of Northeast China, northern parts of Xinjiang, northeastern parts of Inner Mongolia, central and northeastern parts of Qinghai-Tibet Plateau was more than 30. Compared with previous years, the number of snowy days in most parts of the country is less or near the historical average. Agricultural production in Xinjiang, Qinghai, Gansu and other places was adversely affected by snow disasters.

**【Wind-Hail Disaster】** In 2014, damage caused by wind-hail disaster was lighter. The national average number of days with strong convection was 14.0, 4.4 days less than the historical average. The affected area and the number of deaths due to strong convection was significantly less than the historical average, and the economic loss was near the historical average.The first wind-hail appeared on January 12 (Jiangchuan County, Yuxi, Yunnan), more than 10 days earlier than that in previous years (occurs in late January).

**【Low temperature】** In 2014, damage caused by low temperature is lighter. At the beginning of 2014, many

places in Southern China suffer from low temperature, in the spring, parts of Northern China suffered from phased low temperature, in summer, rainy days with low temperature and little sunshine lingered in the middle and lower range of Yangtze River. Low temperature adversely impacted the agricultural production in parts of China.

**【Sand and dust weather】** Impacts from sand & dust weather in 2014 was less. There were a total of 7 sand & dust weather incidents in northern parts of China, 10 less than the historical average (17) and 5.7 less than the average of the same period of 2001-2010 (12.7). There were 3 sandstorm and strong sandstorm, 5 less compared with the average of 2001-2010. The 1st sand & dust weather incident in 2014 occurred on March 19, 36 days later than the average time of the 1st sand & dust weather incident (February 11) of 2000-2013 and nearly a month later than the average time (February 24) of the 1st sand & dust weather incident of 2013.

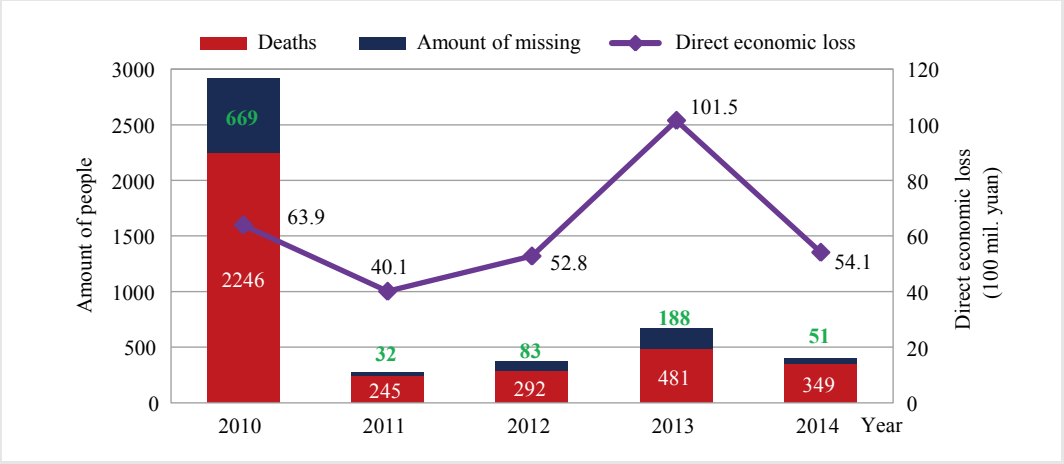
## Earthquake Disasters

In 2014, earthquake of over 5.0 magnitude happened for 30 times (22 in the mainland, 8 in Taiwan and China Sea). Among them, earthquake of 5.0 ~ 5.9 happened for 24 times, earthquake of 6.0 ~ 6.9 happened for 5 times, over 7.0 (inclusive) once.

There were 10 earthquake disasters in mainland China in 2014, according to earthquake categorization standards, 1 of them were major earthquake disasters, 4 were sub-major earthquakes disasters and 5 were ordinary earthquake disasters. The earthquake disasters in the whole year led to 624 deaths, 112 missing and 3,688 injured, and a direct economic loss of 35.85 bn. yuan. The earthquake disasters caused destruction and severe damage of 7.1351 mil. $m^2$ of houses, moderate and sub-moderate damage of 34.7799 mil. $m^2$ of houses and affected a total of 3.7231 mil. people in 35

The earthquake loss of mainland China in 2014

| No | Time | | Venue | Richter scale | Casualty | | House damage ($m^2$) | | | | Direct economic loss (10,000 yuan) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Date | Hour | | | Death | Injury | Destruction | Serious | Intermediate | Slight | |
| 1 | Feb. 12 | 17:19 | Yutian County in Xinjiang | 7.3 | 0 | 0 | 367,035 | 67,925 | 1,933,047 | 943,073 | 108,061 |
| 2 | Apr. 5 | 06:40 | Yongshan County in Yunnan | 5.3 | 0 | 32 | 36,429 | 2,725 | 560,007 | 393,358 | 44,510 |
| 3 | May. 24 | 04:49 | Yingjiang County in Yunnan | 5.6 | 0 | 61 | 174,892 | 11,539 | 1,439,579 | 574,077 | 180,060 |
| | May. 30 | 09:20 | | 6.1 | | | | | | | |
| 4 | Aug. 3 | 16:30 | Ludian County in Yunnan | 6.5 | 617 (112) | 3,143 | 4,824,241 | 327,076 | 12,771,428 | 3,500,759 | 2,014,000 |
| 5 | Aug. 17 | 06:07 | Yongshan County in Yunnan | 5.0 | 0 | 20 | 25,097 | 5,307 | 221,563 | 241,057 | 30,250 |
| 6 | Oct. 1 | 09:23 | Yuexi County in Sichuan | 5.0 | 0 | 1 | 4,000 | 0 | 174,000 | 0 | 15,000 |
| 7 | Oct. 7 | 21:49 | Jinggu County in Yunnan | 6.6 | 1 | 331 | 318,172 | 77,894 | 4,165,348 | 907,978 | 511,020 |
| 8 | Oct. 25 | 13:20 | Wencheng County in Zhejiang (swarm) | 4.2 | 0 | 0 | 235,432 | 0 | 854,390 | 670,217 | 21,743 |
| 9 | Nov. 22 | 16:55 | Kangding County in Sichuan | 6.3 | 5 | 78 | 456,183 | 36,015 | 1,814,236 | 2,357,971 | 423,177 |
| | Nov. 25 | 23:19 | | 5.8 | | | | | | | |
| 10 | Dec. 6 | 02:43 | Jinggu County in Yunnan | 5.8 | 1 | 22 | 136,826 | 28,280 | 1,042,098 | 215,693 | 237,660 |
| | Dec. 6 | 18:20 | | 5.9 | | | | | | | |
| Total | | | | | 624 | 3,688 | 6,578,307 | 556,761 | 24,975,696 | 9,804,183 | 3,585,481 |




Death and direct economic loss of geological disasters during 2010–2014

## Geological Disaster

There were 10,907 various kinds of geological disasters across the country in 2014. Among them, 8,128 were landslide, 1,872 were collapses, 543 were mud-stone flow, 302 were settling, 51 were cracks, and 11 were earth subsidence, leading to 349 deaths, 51 missing, 218 injured and 5.41 bn. yuan direct economic loss. The amount of geological disasters, the number of resulting deaths and missing and direct economic loss went down by 29.2%, 40.2% and 46.7% respectively as compared with that of last year.

There were geological disasters with different amount in 29 provinces (autonomous regions, municipalities) except Shanghai and Tianjin, which mainly occurred in provinces such as Hunan, Chongqing, Sichuan, Guizhou, Yunnan and Hubei.

## Marine Disaster

In 2014, marine disasters across the country were dominated by storm surge, sea waves, sea ice and red tides. The disasters such as green tides, coastal erosion, sea water invasion, soil salinization and saltwater intrusion occurred at different degrees. All kinds of marine disasters have incurred 13.614 bn. yuan direct economic loss and 24 deaths (including missing). Compared with average conditions of the marine disasters in the past 10 years (2005-2014), the direct economic losses and deaths (including missing) caused by marine disasters in 2014 were below average. Among various types of marine disasters in 2014, the disaster that caused the most serious direct economic loss was the storm surge, accounting for 99.7% of all direct economic losses, the disaster that led to most deaths (including missing) was sea waves, accounting for 75% of the total death. As for a single disaster, the one that incurred the greatest direct economic loss was typhoon storm surge "Rammasun" 1409, causing 8.08 bn. yuan direct economic loss.

**【Sea surge】** In 2014, storm surge was serious, causing a direct economic loss 1.41 times the average for the past 5 years (2009-2013, the same below). There happened 9 storm surges along China's coastal areas, causing 13.578 bn. yuan direct economic losses. Among them, typhoon storm surge happened for 5 times, all resulting in disasters, causing direct economic loss of 13.469 bn. yuan and 6 deaths (including missing), extratropical storm surge happened for 4 times, 2 of them resulting in disaster and causing the direct economic loss of 109 mil. yuan, with no deaths (including missing).

**【Sea waves】** In 2014, direct economic losses caused by sea waves was relatively less, 2% of the average in the last 5 years, deaths (including missing) was 22% of the average in the last 5 years. There happened 35 disastrous sea waves with height of effective waves over 4 m at the offshore, including 11 typhoon waves, 24 cold air waves and cyclone waves. Direct economic losses reached 12 mil. yuan, and the number of deaths was (including missing) 18.

**【Sea ice】** In the winter of 2013-2014, the direct economic loss reached 24 mil. yuan due to the impact of sea ice in the northern waters of the Yellow Sea and the Bohai

sea, 2% of the average in the previous 5 years and 7% of the average of 2012-2013.

**【Tsunami】** In 2014, there was no tsunami across the country. 97 pieces of tsunami information were released targeted at 53 undersea earthquakes in the surrounding waters and other waters. Among them, seven earthquakes triggered tsunamis, but none of them had disastrous impact on China.

**【Red tides and green tides】** There were 56 of red tides in 2014 with accumulated area of 7,290 $km^2$. The East China Sea had most (27) red tides. The Bohai Sea had the largest accumulated area of red tide at 4,078 $km^2$. The times and accumulative area of red tides increased over the last year, close to the average in the past 5 years. Most of the red tides happened in May. The area affected by enteromorpha prolifera green tide in Yellow Sea was the largest for the past 5 years, and the maximum distribution area increased by nearly 19,000 $km^2$ over the average of past 5 years, and the maximum coverage is close to the average of past 5 years.

**【Sea water invasion and soil salinization】** In 2014, sea water invasion and soil salinization in the coastal plains of Bohai Sea was serious, and the sea water invasion area in parts of the coastal plains of Bohai Sea increased. The area of sea water invasion and soil salinization in the coastal areas of Yellow Sea, East China Sea and South China Sea is relatively small, but the chlorine concentration and salinity of coastal monitoring sites of some monitoring areas had evident increase.

**【Coastal erosion in major coastal areas】** The erosion of sandy coast and silt coast was still serious, and the erosion in parts of coastal sections was worsening. Compared with 2013, the coastal erosion rate in Suizhong, Liaoning and Chikan Village, Leizhou of Guangdong increased, erosion range in Gaizhou, Liaoning reduced, the erosion rate of silt coast from Zhendong River Floodgate in Jiangsu to Sheyang estuary and eastern beach of Chongming, Shanghai slowed down.

## Measures and Actions

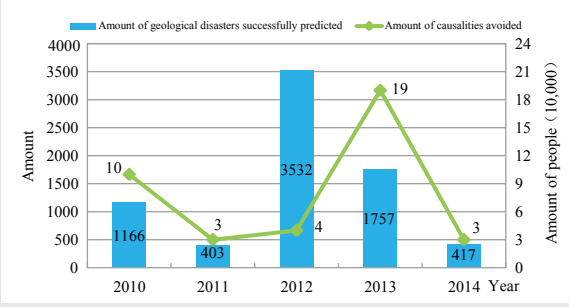
**【Earthquake rescue and relief】** After the Ludian earthquake, the National Earthquake Disaster Emergency Rescue Team and the provincial-level army, armed police and fire-fighting teams of Yunnan province carried out search and rescue, treatment of the wounded and elimination of dangers. 19 survivors were successfully rescued, 80 seriously injured were transferred to hospitals, 1,200 people were rescued and treated, 653 people were transferred and remains of 52 people were properly handled. Meanwhile, proactive measures were taken to prevent and control secondary disaster. Relevant departments took their due responsibilities and organized experts to check and control the hidden danger of geological disaster, the potential safety hazards of production for industrial and mining enterprises and potential environmental safety hazards as well as check on road traffic, reservoir and barrier lake right after the earthquake erupted. Hongshiyan barrier lake of Niulan River has been successfully controlled and serious danger in Changhai Reservoir has been checked and identified in time during the Jinggu Earthquake.

**【Observation and warning of marine disasters】** In 2014, Chinese government took measures to strengthen the capacity building of marine observation, and focus on improving the offshore observation capacity, promote the development of video surveillance system in coastal areas, carry out representative assessment of baseline tide verification and marine station observation environment, carry out the risk assessment of marine disasters and region division, investigation of marine disasters and impact assessment at the national, provincial, municipal and county level, launch the development of comprehensive demonstration area for marine disaster relief and improve the marine disaster warning ability at the provincial level, continue to improve the marine disaster integrated emergency response system of the country, governments of coastal areas of all levels and sea-related departments.

**【Flood control and drought relief】** In 2014, no dikes of major rives nor dams of large and medium-sized reservoirs breached. The number of deaths due to floods was the least in the history. The number of people affected by floods was reduced by 19.9 mil., a total of 6.75 mil. people were evacuated under emergency, a total of 770,000 people were evacuated from floods, and 286,000 person-time casualties, inundation of 1.34 mil. ha. arable land and 2.98 mil. t loss of grain, flood of 93 cities at or above county level were avoided. The economic benefits of flood prevention and disaster relief reached 37.9 bn. yuan. 19.3 mil. ha. of arable land was irrigated for drought relief. The drought relief has saved 31.39 mil. t of grain, 29.8 bn. yuan cash crops and overcome the temporary difficulty of 16.56 mil. rural residents and 7.9 mil. livestock in getting access to drinking water.

**【Prevention and control of geological disaster】** In 2014, the central government arranged 5 bn. yuan special fund for prevention and control of very big geological disasters and successfully predicted 417 geological disasters, avoiding 33,723 causalities and 1.81 bn. yuan direct economic loss, made good use of the publicity week of "4.22 Earth Day" and "5.12 Disaster Prevention and Relief Day" to publicize prevention and control of geological disasters and elevate

the public awareness of disaster prevention and relief. The authority improved the emergency response system and process for geological disasters, organized 24,000 times of drills with over 2.28 mil. participants, and has established an improved emergency drills system.




Avoidance of geological disasters during 2010–2014

## EIA Approval Reform

The reform of the environmental impact assessment (EIA) approval system deepened. The *Catalogue of Construction Projects Subject to the Approval of Environmental Impact Assessment Documents by Ministry of Environmental Protection (2014 Version)* was developed and the *Classified Catalogue of Construction Projects for Environmental Impact Assessment* revised. The *Circular on Strengthening the Environmental Impact Assessment Management of Urban Rail Transit Projects* was released this year to strengthen local EIA management. The strategic environmental assessment (SEA) of the central region was completed, while that of the Beijing-Tianjin-Hebei region, Yangtze River Delta and Pearl River Delta was under preparation. The planning environmental assessment (PEA) proceeded orderly in hydropower, coal-fired power and chemical fields as the PEA system was improved.

The EIA legislation advanced. China kicked off the amendment to the *Environmental Impact Assessment Law*, drafted the *Regulations for the Environmental Management of Construction Projects* and included its amendment into the 2015 legislative plan of the State Council. In addition, the *Measures for the Administration of Environmental Impact Post-assessment (Trial)* was drafted.

Information disclosure and public participation were enhanced. Ever since the *Guide to Government Information Disclosure of Environmental Impact Assessment of Construction Projects (Trial)* took effect on January 1, 2014, the national environmental protection system has fully disclosed information about EIA and acceptance of construction projects, qualification management, examination and approval, and particularly full texts of environmental impact statement (sheet) and approval documents.

# Transportation

## General Situation

Up to the end of 2014, the total railway length was 112,000 km across the country and the electrified length was 65,000 km. The total road length was 4.4639 mil. km across the country, 111,900 km of which were highway. The navigable inland river channels length across the country was 126,300 km. There were 31,705 berths in all ports and harbors across the country. Among them, the berths of coastal production ports and berths of production harbor of inland rivers accounted for 18.4% and 81.6% respectively. There were 202 certified civil airports across the country. The total mileage of in-service buses and trolley buses was 817,800 km, and that of rail transport operation was 2,816.10 km.

There are 21,100 railway locomotive vehicles, among them, electric locomotive vehicles and diesel locomotive vehicles account for 55.0% and 45.0% respectively. There were 15.3793 mil. commercial vehicles across the country, 94.5% of them were trucks and 5.5% were passenger vehicles. There were 172,000 transport ships across the country. Among them, 92.0% were inland river transport ships, 6.4% were coastal transport ships and 1.6% were ocean transport ships. There were 528,800 in-service buses and trolley buses in all cities (including county cities) across the country. Among them, diesel vehicles, natural gas vehicles and petrol vehicles accounted for 52.9%, 30.2% and 2.5% respectively of the total. There were a total of 17,300 vehicles for rail transport operation. Among them, 90.7% were subway vehicles and 7.9% were light rail vehicles. There were 1.3701 mil. taxis in the country.

Railway vehicles across the country finished the transport of 2.357 bn. passengers with passenger turnover at 1,160.475 bn. person·km, and 3.813 bn. t goods with goods turnover at 2,753.019 bn. t·km. Commercial passenger vehicles across the country finished the transport of 19.082 bn. road passengers with passenger turnover at 1,208.410 bn. person·km. Commercial trucks across the country finished 33.328 bn. t freight transport and 6,101.662 bn. t·km turnover of goods. A total of 263 mil. people were transported by waterway across the country with turnover of 7.434 bn. person·km. The transport of freight by waters across the country was 5.983 bn. t with turnover of 9,277.456 bn. t·km. Civil airlines finished the transport of 390 mil. passengers with passenger turnover at 633.42 bn. person·km, and transport of 5.9410 mil. t of goods and mails with turnover at 18.780 bn. t·km. The city public transport system finished the transport of 131.566 bn. passengers, among which public buses and trolley buses transported 78.188 bn. passengers with a total mileage of 34.669 bn. km, railway transport 12.666 bn. passengers with a total mileage of 327 mil. km, taxi 40.606 bn. passengers with a total mileage of 161.811 bn. km.

## Measures and Actions

**【Strengthen environmental protection of transportation】** China continuously put more input in facilities and funds for environmental protection of highway and waterway in 2014. Among them, 12.967 bn. yuan were invested in highway environmental protection, 68% of them for ecological conservation facilities. A total of 3.618 bn. yuan was invested for port environmental protection, 65% of them for pollution prevention and treatment facilities. By strengthening the top level design of green transport, Chinese government initiated the preliminary research and compilation of *Emission Reduction and Environmental Protection of Highway and Waterways for China's 13$^{th}$ Five-Year Plan* and finished the compilation of *Environmental Monitoring Networks Planning for National Highways and Waterways Transport*. Government took measures to regulate the impact assessment of transportation industry, and issued the *Technological Key Points for Environmental Assessment of Highway Networks Planning*, and began the environmental assessment of major planning such as integrated transport of Beijing, Tianjin and Hebei and Yangtze River economic belt comprehensive integrated transport corridor, strengthened air pollution control in transport sector, took part in air pollution control cooperation in key areas, promoted large-scale application of clean energy technologies in the industry, such as new energy

cars, natural gas powered ships, oil powered port facilities to electricity powered ones, launched the compilation of dock oil and gas recovery technology promotion and action plan, promoted the ecological and environmental protection in the transport sector, implemented 10 environmental protection pilot projects, launched environmental protection demonstration projects such as pollution control and prevention at JingjiangWaterway of Yangtze River, and launched results summary and promotion of pilot projects, strengthened capacity building in emergency response to oil spill and promoted the compilation of *National Plan for the Capacity Building in Emergency Response to Major Marine Oil Spills* and *National Emergency Response Program for Major Marine Oil Spills*.

**【Promote energy saving and emission reduction of transport industry】** In 2014, Chinese government continued to strengthen transportation energy conservation policy guidance, issued the *Transport Sector Implementation Suggestions on 2014-2015 Energy Saving and Emission Reduction and Low-Carbon Development Action Plan*, *Ministry of Transport Suggestions on Speeding Up the Promotion and Application of New Energy Vehicles*, *Standardized Subsidy Management Methods for Inland Ships*, promoted energy conservation and emission reduction pilot programs in transport sector, carried out 8 regional green transportation pilot projects in Jiangsu Province and Handan City, 5 green highways such as Hegang-Dalian Highway, 4 green ports such as Guangzhou Port, and 38 green transport facility thematic pilot projects including natural gas powered ships and cars at Shandong Province, as well as 17 transportation energy conservation and emission reduction capacity-building projects, started transport energy consumption monitoring pilot projects in 6 cities such as Beijing, and carried out 19 highway swap trailer transport programs.

## Mid–term Evaluation of the 12th Five–Year Plan for Environmental Protection and the 13th Five–Year Plan

The mid-term evaluation of the 12th Five-Year Plan for Environmental Protection was unveiled this year, pursuant to the *Circular on Carrying out the Mid-term Evaluation of the 12th Five-Year Plan for Environmental Protection*. A dedicated meeting was held to provide technical guidance to environmental protection departments of 2 pilot cities for assessment and 31 provinces (autonomous regions and municipalities) and the real-time online exchange platform for self-assessment was built. Research on the basic ideas and framework of mid-term evaluation report was conducted based on materials collected from departments under the State Council and provinces (autonomous regions and municipalities). The region-based check meeting for *Mid-term Evaluation of the 12th Five-Year Plan for Environmental Protection* this year accurately grasped the major indicators, work priorities and tasks, progress toward completion of policies and safeguards reflected in provincial self-assessment reports. On this basis, the *Report on the Mid-term Evaluation of the 12th Five-Year Plan for Environmental Protection* was finalized.

In compliance with the requirements for "open mind and brainstorming", China made preliminary studies and preparation according to the basic idea of "general strategy, research, planning and demonstration" and drafted the *General Idea for the Preparation of the 13th Five-Year Plan for Environmental Protection*for approval.

# Energy

## General Situation

In 2014, the total energy output was 3.6 bn. t coal equivalent. Among them, raw coal output was 3.87 bn. t, crude oil output was 211 mil. t, oil production was 317 mil. t, natural gas output grew fastest, reaching 130.16 bn. $m^3$, installed electric capacity was 1.36 bn. kW, and the electric energy production was 5.65 trillion kW•h.

Output and growth rate of primary energy in 2014

| Product name | Unit | Output | more than that of last year (%) |
|---|---|---|---|
| Total ouput of primary energy | 100 mil. t coal equivalent | 36.0 | 0.5 |
| Coal | 100 mil. t | 38.7 | -2.5 |
| Crude oil | 10 thousand. t | 21,142.09 | 0.7 |
| Natural gas | 100 mil. $m^3$ | 1,301.6 | 7.7 |
| Power generation | 100 mil. kW•h | 56,495.8 | 4.0 |
| Among them: Thermal | 100 mil. kW•h | 42,337.3 | -0.3 |
| Hydro | 100 mil. kW•h | 10,643.4 | 15.7 |
| Nuclear power | 100 mil. kW•h | 1,325.4 | 18.8 |

Note: Natural gas includes natural gas from gas field, natural gas of oil fields (including natural gas in gas layer and associated dissolved gas in oil field) and coal field natural gas (i.e. coal associated gas).

According to the primary estimate, the total energy consumption across the country in 2014 was 4.26 bn. t coal equivalent, up by 2.2% compared with that of last year. Among them, there was 2.9% decrease of coal consumption, 5.9% increase of crude oil consumption, 8.6% increase of natural gas consumption, and 3.8% rise of electricity consumption. The energy consumption per 10,000 yuan GDP of the country went down by 4.8%. Coal consumption of coal-fired electricity was 318 grams of standard coal per kW•h, down by 15 grams of standard coal per kW•h over 2010. Per capita energy consumption was 3.1 t standard coal, per capita energy consumption was 4,038 kW•h and per capita natural gas consumption was 135 $m^3$.

## Measures and Actions

**【Employ comprehensive measures to steadily reduce the coal consumption】** In 2014, measures were taken to speed up the development of non-fossil fuel. There were 22.08 mil. kW increase of installed capacity of hydropower in the whole year with total hydropower installed capacity at 302 mil. kW. 5 nuclear power generating units were put into use. A total of 22 nuclear power generating units were under operation and the total installed capacity of nuclear power reached 19.88 mil. kW. There were 19.50 mil. kW increase of on-grid installed capacity from wind power,

and the total on-grid installed capacity from wind energy reached 95.81 mil. kW. There were 10.64 mil. kW increase of on-grid installed capacity from solar energy. The total on-grid installed capacity of electricity from PV reached 26.52 mil. kW. Capacity of natural gas supply was enhanced. Pipeline acceptance capacity increased to 67 bn. $m^3$, and the total import of natural gas reached 59.3 bn. $m^3$, an increase of 12.1%. Formation capacity of shale gas was 1.8 bn. $m^3$ per year with an annual output of 1.3 bn. $m^3$. Extraction volume of coal bed methane was 17.1 bn. $m^3$, and the utilization volume was 7.7 bn. $m^3$. Measures were taken to promote the use of clean energy in key areas, strictly control the projects that consume coal in Beijing, Tianjin, Hebei, Yangtze River Delta and Pearl River Delta, and nail down the goals for substitution of bulk coal. It is projected that 35 mil. t of bulk coal will be substituted in 2017.

## Full Implementation of the New Ambient Air Quality Standards in 338 Cities at or above the Prefecture Level

The Central Committee of the Communist Party of China and the State Council of China attach great importance to the implementation of new ambient air quality standards and highlight it as a priority in the *Action Plan for Air Pollution Prevention and Control*. Ministry of Environmental Protection (MEP) developed a three-step plan for carefully implementing the new standards. At the end of 2014, there were 1,436 air quality monitoring sites in 338 cities at or above the prefecture level networked with the air quality information disclosure platform of China National Environmental Monitoring Center, completing the task one year ahead of schedule.

In the implementation of the new standards, MEP focused the efforts in five aspects. 1) Thoughtful planning for implementation by phase. Phase-specific programs have been designed, clarifying the work scope, content and requirements. 2) Fund raising and capacity building. A total of 1.89 bn. yuan was invested in the 338 cities, of which 1.2 bn. yuan was allocated by the central government and 690 mil. yuan local governments. The funds provided an effective guarantee for the enforcement of the new standards. 3) Process supervision. Considering the large coverage of standards, MEP strengthened supervision and guidance of implementation through regular scheduling, in order to ensure the work progress. 4) Technical system and data accuracy. MEP organized the comparison test of automatic air monitoring equipment, ensuring equipment quality and providing technical guidance for local equipment selection. A remote quality control platform was established to strengthen the supervision of local monitoring data quality. Professional training and technical guidance were beefed up, benefiting nearly 1,500 people in three years. 5) Information disclosure innovation and public opinion guidance. On the content, approach and media, air quality information should be disclosed in a manner that guides the public and connects with life in travel and living arrangements.

# Data Sources and Evaluation

Environmental quality statistics in the Report are mainly drawn from the data of national environmental monitoring network, while absorbing the ambient conditions data provided by the relevant ministries. In specific, the statistics about groundwater environmental quality, land resources and cultivated land, and geological disasters are provided by the Ministry of Land and Resources, the statistics about municipal discharge, landscaping, rural rubbish governance are provided by Ministry of Housing and Urban-Rural Development, the statistics about comprehensive improvement of environmental sanitation and monitoring of environmental health hazards are provided by the National Health and Family Planning Commission. Traffic statistics are collected from Ministry of Transport, statistics about trans-boundary water quality, groundwater quality, soil erosion and floods and droughts from Ministry of Water Resources, and statistics about groundwater quality, inland and marine fishery waters, invasive alien species, cultivated land, agricultural pollution, grassland environment from Ministry of Agriculture. Energy statistics are sourced from National Bureau of Statistics and National Energy Administration, forest environmental statistics from State Forestry Administration, and statistics about earthquakes disasters from China Earthquake Administration. The statistics about temperature, precipitation, and meteorological disasters are mainly provided by China Meteorological Administration and statistics about seawater environment, marine nature reserves, important wetlands and marine disasters by State Oceanic Administration. The official annual reports or bulletins of ministries and departments shall prevail.

The national environmental monitoring network consists of: ambient air monitoring network covering 1,436 sites in 338 cities at or above the prefecture level, surface water environmental monitoring network covering 972 sections (sites) in 423 rivers and 62 lakes (reservoirs), acid precipitation monitoring network covering nearly 1,000 sites in 470 cities (districts, counties), water environment monitoring network covering centralized drinking water sources in over 329 cities at or above the prefecture level, nearshore environmental monitoring network covering nearly 301 monitoring sites, urban sound environmental monitoring network covering nearly 80,000 sites in cities at or above the prefecture level, and ecological environment monitoring network covering 10 regional monitoring stations and 645 monitoring sites in 31 provinces (autonomous regions and municipalities).

In the Report hereof, the ambient air quality assessment of cities in Stages Ⅰ and Ⅱ rests on the *Ambient Air Quality Standards (GB 3095-2012)* and the major indicators are sulfur dioxide ($SO_2$), nitrogen dioxide ($NO_2$), particulate matter ($PM_{10}$), fine particulate matter ($PM_{2.5}$), carbon monoxide (CO) and ozone ($O_3$). The surface water quality assessment rests on the *Environmental Quality StandardsforSurface Water (GB 3838-2002)* and *Measures for Surface Water Environmental Quality Evaluation (Trial)*, and the indicators are pH, dissolved oxygen (DO), permanganate index ($COD_{Mn}$), COD, $BOD_5$, ammonia nitrogen, total phosphorus (TP), copper, zinc, fluoride, selenium, arsenic, mercury, cadmium, chromium (hexavalent), lead, cyanide, volatile phenol, petroleum pollutants, anionic surfactants and sulfide. The indicators for eutrophication evaluation of lakes (reservoirs) include chlorophyll a, TP, total nitrogen (TN), transparency and $COD_{Mn}$. The water quality assessment of centralized drinking water sources in cities at or above the prefecture level rests on *Environmental Quality StandardsforSurface Water (GB 3838-2002)* and *Groundwater Quality Standards (GB/T 14848-93)*. The nearshore seawater environmental quality is assessed based on *Seawater Quality Standards (GB 3097-1997)* and *Offshore Environmental Monitoring Standards (HJ 442-2008)*, which involves 28 indicators, namely pH, DO, COD, $BOD_5$, inorganic nitrogen, un-ionized ammonia (UIA), active phosphate, mercury, cadmium, lead, hexavalent chromium, total chromium, arsenic, copper, zinc, selenium, nickel, cyanide, sulfide, volatile phenol, petroleum pollutants, BHC, DDT, malathion, methyl parathion, benzo [a] pyrene, anionic surfactants and total coliforms. The sound environmental quality is evaluated according to the *Technical Specifications for Environmental Noise Monitoring: Routine Monitoring for Urban Sound Environment (HJ 640-2012)* and *Environmental Quality Standards for Noise (GB 3096-2008)*. Eco-environmental quality assessment rests on the *Technical Specifications for Eco-environmental Evaluation (HJ 192-2015)*.

*Note: The data about national situation in the Report, except data about administrative division, land area and earthquake, do not include Taiwan Province, Hong Kong Special Administrative Region and Macao Special Administrative Region.*

# Contributors to the 2014 Report on the State of the Environment in China

## Leading Department

Ministry of Environmental Protection

## Contributing Ministries and Administrations

Ministry of Land and Resources

Ministry of Housing and Urban–Rural Development

Ministry of Transport

Ministry of Water Resources

Ministry of Agriculture

National Health and Family Planning Commission

National Bureau of Statistics

State Forestry Administration

China Earthquake Administration

China Meteorological Administration

National Energy Administration

State Oceanic Administration