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China's lakes at present: Number, area and spatial distribution

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Based on 11004 satellite images from CBERS CCD and Landsat TM/ETM, changes in the spatial characteristics of all lakes in China were determined following pre-established interpretation rules. This dataset was supported by 6843 digital raster images (1:100000 and 1:50000), a countrywide digital vector dataset (1:250000), and historical literature. Comparative data were corrected for seasonal variations using precipitation data. There are presently 2693 natural lakes in China with an area greater than 1.0 km^2, excluding reservoirs. These lakes are distributed in 28 provinces, autonomous regions and municipalities and have a total area of 81414.6 km^2, accounting for ~0.9% of China's total land area. In the past 30 years, the number of newly formed and newly discovered lakes with an area greater than 1.0 km^2 is 60 and 131, respectively. Conversely, 243 lakes have disappeared in this time period.

China, lake number, lake area, spatial distribution

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Lakes constitute an important component of the terrestrial hydrosphere and are sensitive to climate change. Lakes are affected by both climate change and anthropogenic activities, making them significant indicators of global driver and regional response. Lakes provide vital services such as influencing river flow, providing biodiverse habitats and fisheries, supplying irrigation water, serving as transportation routes and supporting tourism. In addition to freshwater bodies, there are salt lakes with abundant valuable mineral deposits such as halite, trona, mirabilite, boron, lithium, and potassium. Improved understanding of the impacts of human activity and climate change on lakes could provide important information on changes in the surrounding regions.

China has a large number of lakes with rich cultural and economic importance. For several decades, the protection and sustainable management of these natural resources has been a priority. Between the 1960s and 1980s, the first nationwide lake investigation was conducted, which consisted of multiple surveys and focused on lake resources, and the findings showed [1, 2] that there were 2928 lakes with an area greater than 1.0 km^2 in China, covering a total area of 91019.6 km^2. In the last 30 years, China has undergone unprecedented economic growth. Management and protection strategies have lagged [3] and long-term exploitation of lake resources to promote economic growth has caused a number of lakes to dwindle in size and ecological function; some have even disappeared. These changes have had negative impacts on some regional economies. To determine the extent of lake changes in recent decades, we conducted a sec-

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ond lake investigation with the support of the National Special Basic Research Project "Lake Water Quality, Water Quantity and Biological Resources Investigation in China", initiated by the Ministry of Science and Technology of China. This investigation about lake numbers, areas and spatial distribution was conducted at the baseline time of 2005–2006, combining remote sensing interpretation, field investigation, expert consultation, and data validation, reconciliation and correction. The results allowed us to make an extensive comparison of the number of lakes, their area, and their spatial distribution with the first survey. These findings will be used as the basis for development of a national strategy for environmental protection, ecological restoration and the sustainable use of lake resources.

1 Data and methods

1.1 Definitions

(1) Lake (Natural lake). A lake is a water body of a specific size which has a limited water exchange. It is located in a basin or lowland. In Chinese, "lake" can have different names, including Bei (pond), Ze (damp), Chi (pool), Hai (large lake), Pao (small lake), Dang (marsh), Dian (shallow lake), Po (moor), and Zhuo (mire).

(2) Lake Water Surface Boundary. This is the demarcation between land and the water surface of a lake. It is also called the shoreline.

(3) Lake Boundary. This is the average water surface boundary over a certain number of years. Because water surface boundaries are subject to constant change, the determination of the lake boundary must follow a set of consistent rules to allow for temporal and spatial comparisons, as listed in section 1.3.

(4) Newly formed lakes. Water bodies of sufficient size (>1.0 km^2) that meet the following selection rules: (a) they were not recorded in the *Chinese Lake Catalogue* [1], *Code for China Lake Name* (*No. SL261-98*) [2], or on topographic maps (1:250000) published in 2000; (b) they are located where non-lake land cover was recorded previously, which includes wetlands and marshes reported in the 1964 edition of 1:100000 topographic maps; (c) they are permanent water bodies confirmed by multi-phase images acquired in 2004–2008 and field investigations.

(5) Newly discovered lakes. Water bodies of sufficient size (>1.0 km^2) that meet the following selection rules: (a) they were not listed in the first nationwide lake investigation in the 1960s–1980s; (b) they were not recorded in the *Chinese Lake Catalogue* [1], *Code for China Lake Name* (*No. SL261-98*) [2], or depicted on topographic maps (1:250000) published in 2000; (c) they can be verified by the 1964 edition of 1:100000 topographic maps and other documents including multi-phase images, and field investigations. The newly discovered lakes existed at some points during the 1960s–1980s, and at that time fulfilled the investigation criteria of this study, but were not previously recorded because of some restrictions in terms of technology and transportation conditions at that time. They are considered to have been unchanged between the two investigations.

(6) Vanished lakes. Water bodies of sufficient size (>1.0 km^2) that meet the following selection rules: (a) they were recorded in the *Chinese Lake Catalogue* [1] or *Code for China Lake Name* (*No. SL261-98*) [2], and in the 1964 edition of 1:100000 topographic maps; however, (b) they are not present in multi-phase images acquired in 2004–2008.

1.2 Lake-zone division

China is a vast territory characterized by significant variations among regions in climate, geography and geological conditions. The formation and evolution of each lake corresponds to the natural and human drivers of a region. Therefore, when determining how to divide China's lakes into different zones, not only geographic but also political boundaries must be taken into account. Based on China being topographically high in the west and low in the east, and climatologically dry in the north and wet in the south, as well as the administrative division of provinces, China can be divided into five lake-zones, as previously reported: (1) Tibetan Plateau Lake Zone (TPL), including Qinghai Province and Tibet Autonomous Region, (2) Yunnan-Guizhou Plateau Lake Zone (YGPL), encompassing Yunnan, Guizhou and Sichuan provinces and Chongqing Municipality, (3) Inner Mongolia-Xinjiang Lake Zone (IMXL), covering Inner Mongolia, Xinjiang Uygur and Ningxia Hui autonomous regions, and Gansu, Shaanxi and Shanxi provinces, (4) Northeast Plain and Mountain Lake Zone (NPML), covering Liaoning, Jilin and Heilongjiang provinces, and (5) Eastern Plain Lake Zone (EPL), consisting of Shanghai, Beijing and Tianjin Municipalities, Hong Kong and Macao special administrative regions, and Taiwan, Jiangxi, Hunan, Hubei, Anhui, Henan, Shandong, Zhejiang, Jiangsu, Hainan, Fujian, Guangdong and Guangxi provinces [1].

The TPL and IMXL lake zones are generally considered parts of internal drainage systems with enclosed lagoons or salt lakes in arid or semiarid climates. The other three lake-zones (NPML, YGPL, EPL) are located in the Asian monsoon climate zone, belong to external drainage systems, and are characterized by abundant rainfall, and are out-flowing freshwater lakes. This division highlights the major geomorphologic and climatologic characteristics of China. It should be noted that the boundary of TPL differs from that of the Tibetan Plateau, IMXL covers the Loess Plateau, YGPL includes Sichuan Province and Chongqing Municipality, and NPML is smaller than conventionally acknowledged because the eastern region of Inner Mongolia is included in the IMXL.

1.3 Rules for remote sensing interpretation of lake boundaries

The delineation of lake boundaries conformed firstly to universal rules, and secondary rules were applied when necessary.

Universal rules. (1) For lakes with an embankment (either artificial or natural), the boundaries were delineated by its inner border. The boundary at river mouths was delineated according to the natural lake shape; (2) in the case of new lakes, satellite images from several years were used to confirm lake dimensions; (3) in the case of vanished lakes, multi-phase satellite images from more than 2 years and topographic maps were used to confirm their absence; (4) for lakes with no embankment, lake dimensions (borders, islands, bottomlands, reclamation areas and basin) were delineated from clearly dated images from both rainy and dry seasons; (5) when wetlands were present within the main water body or adjacent to it, the area was included in the lake dimensions; (6) when determining lake boundaries, the water level was ascertained and supported by reference hydrological and meteorological data; (7) where long-standing definitions of lake boundaries were defined (lakes of national interest), these boundaries were used as a final reference; and (8) the lake area included all areas of the water surface, islands, reclaimed lands and internal/adjacent wetlands.

Secondary rules for the IMXL lake zone. (1) For lakes with partial embankments, the boundary was delineated by the inner border of the embankment while the water surface boundary for the remainder was determined in the rainy season with satellite images. Wetlands and reclaimed lands that were internal or adjacent to the lake were included in the boundary while those outside the border were excluded; (2) for a lake on the desert margins, its border was defined by the water surface boundary in the rainy season; and (3) for lakes susceptible to artificial modification, clearly dated images from two or more years were used.

Secondary rules for the TPL lake zone. For lakes with seasonally submerged wetlands multi-phase images were used with topographic maps to ascertain wetland location; if they lay outside the water surface boundary, they were not part of the lake; if they were within the boundary in one seasonal image but outside in another, the lake boundary was delineated at the center line of the boundaries from the two images.

Secondary rules for the NPML lake zone. In saline/alkaline areas, the distinction between lakes and man-made pits was confirmed by field investigations or other documentation, e.g., Sanjiang Plain Area.

Secondary rules for the EPL lake zone. (1) Lake boundaries included reclaimed lands and were based on satellite images during 2005–2006, using the *Chinese Lake Catalogue* [1], topographic maps and corresponding thematic maps as references; (3) aquaculture areas were included in the lake boundaries and noted; and (4) where water level control was performed in flood seasons, lake boundaries were determined at the maximum lake water level, and confirmed using data provided by the water conservancy department.

Secondary rules for the YGPL lake zone. For lakes without distinct embankments, boundaries were defined by the water surface borders delineated in rainy seasons.

1.4 Data

Remotely-sensed satellite images were used to delineate lake boundaries after geo-correction using topographic maps. The images were selected according to the following rules: (a) <20% average cloud cover in the whole image and cloud-free cover above the lakes; (30%–35% average cloud cover in the western regions); (b) images after unusually heavy rains (determined by hydro-meteorological data) were not used to avoid short-term seasonal variability; (c) images with a spatial resolution of 20–30 m were given priority to meet requirements of cartographic precision with a scale of 1:100000 (images with lower spatial resolution were used as supplementary information); (d) images from multiple phases during 2005–2006 were used to delineate lake boundaries: at least two phases for the EPL (one from March to April and the other from September to November), NPML (one from May to June and the other from August to September) and IMXL (one from April to May and the other from August to September); and (e) for the YGPL, one phase from August to October was sufficient because of the stable water surface area in the rainy and dry seasons. The images of the YGPL lake zone were more susceptible to cloud cover so the image acquisition period was extended to between 2004 and 2007.

A large geographical dataset was used, including: (a) 10494 CBERS (China-Brazil Earth Resources Satellite) CCD satellite images for at least two phases (rainy season and dry season) for all the lake zones in 2005–2006, and three to ten phases for some specific regions or lakes in 2004–2008; (b) 510 Landsat TM/ETM satellite images, with at least one phase covering all the lake zones and two to six phases for some specific regions or lakes in 1999–2000; (c) 6843 sheets of digitalized topographic data published during the 1960s–1980s covering the whole country, among which were 3946 sheets with a scale of 1:100000 and 2897 sheets with a scale of 1:50000; and (d) the water (river, lake and reservoir) layer data from a topographic map (digital vector data) with a scale of 1:250000 published in 2000. In addition, we also used data from Google Earth, hydro-meteorological institutes and historical documents including: *Chinese Lake Catalogue* [1], *Gode for Chinese Lake Name* [2], *Lake Resources in China* [4], *Water Resources of Lake in China* [5], *Salt Lakes in the Tibetan Plateau* [6], *Salt Lakes in Inner Mongolia* [7], *Salt Lakes in Xinjiang Autonomous*

Region [8], and *Salt Lakes in Qaidam Basin* [9].

1.5 Methods

A longitude/latitude grid covering most of the country was created at a scale of 1:50000 (longitude 15′ × latitude 10′), and at a scale of 1:100000 in the Tibet Autonomous Region (longitude 30′ × latitude 20′). A 1-km grid was delineated across the country, with a 2-km grid in the Tibet Autonomous Region. The longitude/latitude and kilometer grid formed the first-level control in the 1954 Beijing coordinate system with 6° Gauss-Kruger projection, which was used to geographically rectify topographic maps with scales of 1:100000 and 1:50000. These geo-rectified maps, taken as the second-level control, were transformed into the Albers Equivalent Conical Projection with a central meridian of 105°E, and standard parallels of 25°S and 47°N. Geo-rectified maps or geo-corrected images were used to geographically correct radiance-calibrated CBERS CCD and Landsat TM/ETM+ images, with root-mean-square errors of 1.5 pixels in TPL and YGPL, and one pixel in other lake-zones. Based on the 2005 and/or 2006 rectified images, together with topographic maps, we verified the existence of all lakes recorded in the *Chinese Lake Catalogue* [1] and the *Code for China Lake Name* [2]. For questionable lakes, other satellite images and historical documents were consulted (e.g., *Lake Resources in China* [4] and *Resources of Lakes in China* [5]), and field investigations and interviews with local experts were conducted. For the lakes remaining uncertain after the first two verification rounds, seminars were held to seek definitive conclusions which were recorded in the third form. The three forms were then examined by an expert committee for evaluation, and an on-site verification of all the newly formed lakes was conducted. The 2005–2006 CBERS CCD and/or Landsat TM/ETM+ images covering all the country were used to extract boundaries of the new lakes. Reservoirs were excluded using the reservoir database and assessment of reservoir dams. From this information, the definitive number of lakes was determined. Following the determination rules for lake boundaries, ArcView and/or ArcGIS software were employed to delineate water surface boundaries and lake boundaries in both rainy and dry seasons. Verification was made by direct field investigations in the four lake-zones (YGPL excluded), interviews with local experts and assessment of historical records of water level-area curves for specific lakes (e.g., Poyang Lake in Jiangxi Province and Dongting Lake in Hunan Province). Based on this information, definitive lake boundaries were determined and used to calculate lake areas. Finally, each lake was inventoried using 50 attributes, including lake names and data sources in accordance with the *Technical Regulations for Lake Investigations Mainly using Remotely-sensed Satellite Images in China* [10].

2 Results

2.1 Number, area and distribution

At present in China there are 2693 natural lakes with an area >1.0 km^2 (including Hong Kong and Macao Special Administrative Regions and Taiwan Province) (Figure 1), covering a total area of 81414.6 km^2 and accounting for 0.9% of China's land area. They are distributed over 28 provinces, municipalities and autonomous regions apart from Hainan, Fujian and Guangxi Provinces, Chongqing Municipality, and Hong Kong and Macao Special Administrative Regions. There are 10 lakes with an area greater than 1000.0 km^2: Seling Co (lake), Nam Co (lake), Qinghai Lake, Bosten Lake, Khanka Lake, Poyang Lake, Dongting Lake, Taihu Lake, Hongze Lake and Hulun Lake. Also, there are 2000 lakes with an area of 1.0–10.0 km^2, 456 lakes with an area of 10.0–50.0 km^2, 101 lakes with an area of 50.0–100.0 km^2, 109 lakes with an area of 100.0–500.0 km^2 and 17 lakes with an area of 500.0–1000.0 km^2 (Table 1). As expected, the number of smaller lakes is higher than the number of larger lakes. However, there is no trend between the lake size division and the total lake area (Figure 2).

Regarding the number of lakes, the most important regions are the Tibet (833) and Inner Mongolia (395) autonomous regions and Heilongjiang Province (243), accounting for 30.9%, 14.7%, and 9.0%, respectively, of the total lake numbers in China. Regarding lake area, the top three regions are Tibet Autonomous Region (28616.9 km^2), Qinghai (13214.9 km^2) and Jiangsu (6372.9 km^2) provinces, where lakes comprise 35.1%, 16.2% and 7.8%, respectively, of the total lake area. Jiangsu, Anhui and Jiangxi provinces have the highest percentage of surface area covered by lakes (= total lake area/total provincial land area × 100), with values of 6.4%, 2.6% and 2.4%, respectively. These are followed by, in decreasing order from fourth to tenth: Tibet Autonomous Region, Qinghai, Hunan and Hubei provinces, Shanghai Municipality, and Jilin and Shandong provinces. Qinghai Lake is the largest lake in China, followed, in decreasing order, by: Poyang, Dongting, Taihu and Hulun lakes. Of these, both Qinghai and Hulun lakes are saltwater lakes. Poyang Lake is the largest freshwater lake, followed by Taihu and Hulun lakes.

The TPL has both the highest number of lakes (1055, 39.2%) and largest total lake area (41831.7 km^2, 51.4%). The EPL has 634 lakes totaling 21053.1 km^2, accounting for 23.5% of the number of lakes and 25.9% of the total national lake area. Of these, 138 are >10.0 km^2 and occupy a combined area of 19412.0 km^2. Ranked third, the IMXL has 514 lakes covering an area of 12589.9 km^2, 88 of which are >10.0 km^2 and cover 11307.7 km^2; fourth, the NPML has 425 lakes covering an area of 4699.7 km^2, of which 65 are >10.0 km^2 covering 3623.5 km^2; and fifth, the YGPL has 65 lakes (2.4% of the total number), with a total area of 1240.3 km^2 (1.5% of the total area), among which 1103.3 km^2 is

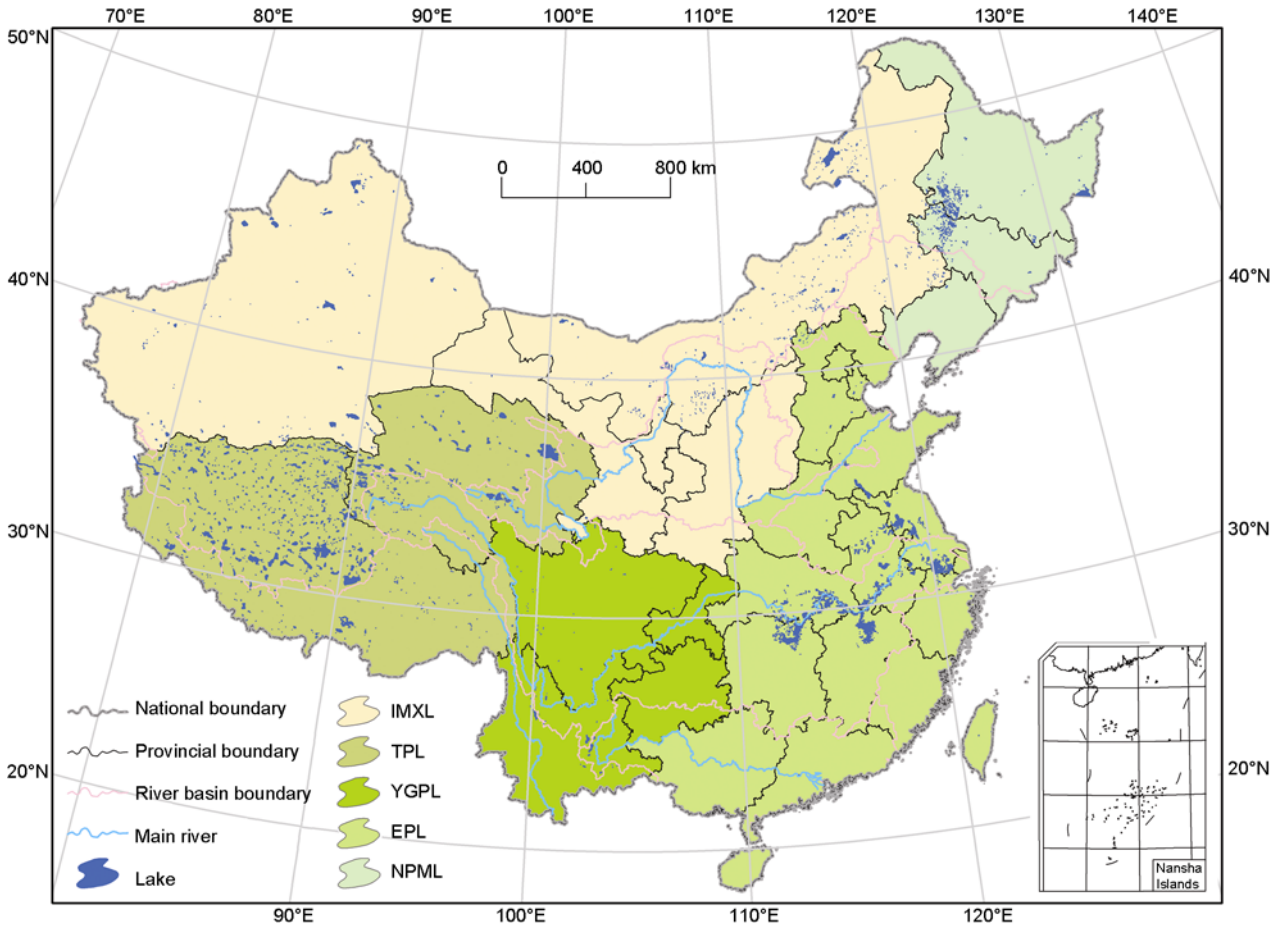

Figure 1 Present spatial distribution of Chinese lakes.

comprised of 13 lakes with an area >10.0 km^2.

In terms of lake numbers, the top three primary river basins are the Northwest (1072), Yangtze (648) and Songhuajiang (504), comprising 39.8%, 24.1% and 18.7%, respectively, of the national total. These are followed by the Southwest (172), Yellow (135), Huaihe (70), Liaohe (60), Haihe (11), Southeast (11), and the Pearl (10) river basins. When ranked by total lake area the order is slightly different: Northwest (54.8%) > Yangtze (21.2%) > Songhuajiang (9.8%) > Huaihe (6.0%) > Southwest (4.3%) > Yellow (3.0%) > Pearl (0.4%) > Liaohe (0.3%) > Haihe (0.2%) > Southeast (0.1%) river basins. The percentages of nationwide total are in parentheses.

Our analysis showed that in the past three decades there were 60 newly formed lakes with an area >1.0 km^2, of which 22 are each in the Tibet and Inner Mongolia autonomous regions, eight in Qinghai Province, five in the Xinjiang Uygur Autonomous Region, and one each in Sichuan, Gansu and Jilin provinces. The numbers of newly formed lakes in Tibet and Inner Mongolia rank the first and the second, account for 36.7% each of the total. The one newly formed lake in Sichuan, the Tangjiashan Barrier Lake, was formed through blockage of the Minjiang River by landslides resulting from the Wenchuan Earthquake. This investigation also showed 131 newly discovered lakes, among which 67 were in Tibet, 31 in Inner Mongolia, 15 in Heilongjiang, six in Qinghai, four in Yunnan, two in Jilin, two each in Ningxia and Sichuan and one each in Xinjiang and Henan.

In the past three decades, a total of 243 lakes (>1.0 km^2) have disappeared, with 62 in Xinjiang (including completely dry salt lakes), 55 in Hubei, 59 in Inner Mongolia, 11 in Jiangsu, 10 in Anhui, 10 in Jiangxi, nine each in Hebei and Hunan, four in Shaanxi, three each in Tibet and Heilongjiang, two each in Zhejiang and Qinghai and one each in Shandong, Shanghai, Ningxia and Jilin. Of the 243 former lakes, 147 were <10.0 km^2, 48 between 10.0 to 100.0 km^2, four between 100.0 and 500.0 km^2, and one >1000.0 km^2 (Lop Nor in Xinjiang, with an original area of 5500.0 km^2). Unfortunately, there are 43 former-lakes with no records of the exact areas in the *Chinese Lake Catalogue* [1] and the *Code for China Lake Name* [2].

2.2 Characteristics of spatial distribution

The formation, evolution, and physical, chemical and biological properties of these lakes are all subject to regional conditions of the physical geography. Because biological

Table 1 Number and area of lakes with an area greater than1.0 km^2 in China[a)]

Province/Municipality/ Autonomous Region	>1000 km^2	500–1000 km^2	100–500 km^2	50–100 Km^2	10–50 km^2	1–10 km^2	Number in total	Area in total (km^2)
Tibet	2	5	50	57	185	534	833	28616.9
Qinghai	1	5	18	13	53	132	222	13214.9
Inner Mongolia	1	1	6	3	31	353	395	6151.2
Xinjiang	1	3	7	5	24	68	108	6236.4
Ningxia					2	3	5	38.7
Gansu					2	1	3	49.1
Shaanxi					1	1	2	44.2
Shanxi				1			1	70.3
Yunnan			3	2	6	20	31	1115.2
Guizhou					1		1	24.3
Sichuan					1	32	33	100.7
Heilongjiang	1		3	4	35	200	243	3241.3
Jilin			2	1	18	160	181	1402.8
Liaoning				1			1	55.6
Beijing						1	1	2.0
Shanghai				1	0	1	2	60.6
Tianjin					2	1	3	66.4
Henan					1	0	1	11.7
Hebei					3	16	19	146.7
Jiangxi	1		1	3	9	41	55	3882.7
Anhui		1	9	4	16	74	104	3426.1
Hunan	1			2	14	100	117	3355.0
Hubei			4	2	39	143	188	2527.2
Shandong		1	1	0	0	7	9	1105.8
Jiangsu	2	1	5	2	12	77	99	6372.8
Zhejiang					1	31	32	80.2
Guangdong						1	1	5.5
Taiwan						3	3	10.3
Number in total	10	17	109	101	456	2000	2693	
Area in total (km^2)	22711.8	11807.6	22989.4	7243.6	10297.8	6364.4		81414.6

a) Lakes investigated in this study cover 9605.3 km^2 less than those recorded in *Chinese Lake Catalogue*. The reasons are mainly: (1) This investigation excluded 90 dry salt lakes (44 in Xinjiang and the rest in Inner Mongolia), which cover a total area of 7191.2 km^2, including historical dry salt lakes recorded in *Chinese Lake Catalogue and Code for China Lake Name*, and salt lakes that dried completely between the period 1960s–1980s and 2005–2006, e.g., Lop Nor; (2) Subsurface salt crusts without evident spectral characteristics were also excluded; (3) Some lakes previously recorded have vanished.

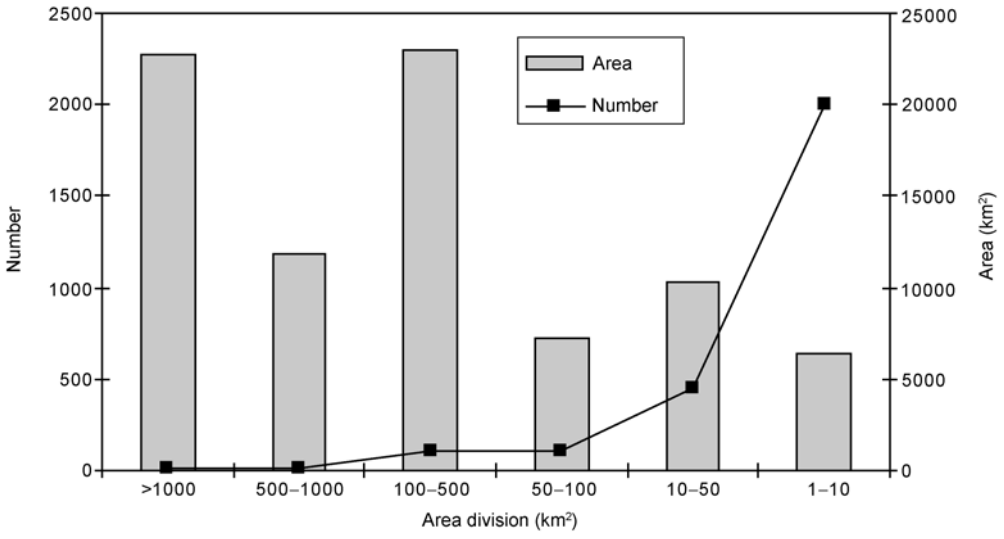

Figure 2 Comparison of the lake number and its corresponding area between six lake groups.

and geographic environments have both east-west and north-south gradients, there is a distinct spatial distribution of lakes within China.

(1) Lakes are distributed extensively across the country, but intensively within some regions. A total of 2693 lakes >1.0 km^2 are scattered over 28 provinces, municipalities and autonomous regions; however, Fujian, Guangxi, Hainan, Chongqing, Hong Kong and Macao only have lakes <1.0 km^2. Lakes occur in areas ranging from the humid islands of the south (e.g., Taiwan) to the dry and cold prairies north of the Great Wall, and from the eastern coastal plain to the Tibetan Plateau in the west, which is also known as "the roof of the world" and "the third pole". Even remote areas receiving little precipitation such as in the Badain Jaran, Tengri and Mu Us deserts contain lakes. However, the spatial distribution of lakes is very uneven. Of the five lake zones, EPL and TPL possess 1689 lakes (62.7% of the total) with an area of 62884.8 km^2 (77.2% of the total), comprising two lake clusters at the western and eastern ends of the country. The middle and lower reaches of the Yangtze and Huaihe rivers in the EPL lake zone are more densely covered with lakes. The other three lake zones have 1004 lakes (37.3% of the total) covering an area of 18529.8 km^2 (22.8% of the total). Only 65 lakes are distributed sparsely in YGPL, the smallest of the five lake-zones in number and area.

(2) Lakes have diverse styles with distinct zonalities. China has the highest-altitude lakes in the world, as well as lakes below sea level (e.g. Aydingkol Lake). Regarding lake formation, there are tectonic, crater, barrier, glacial, karst and aeolian lakes. The geographic chain formed from the northeast to the southwest by the western margins of the Great Khingan Mountains-southern edge of Inner Mongolia plateau-Yinshan Mountains-Helan Mountains-Qilian Mountains-Riyue Mountains-Bayan Har Mountains-Nyenchen Tonglha Mountains-Gangdise Mountains demarcates the boundary between internal and external drainage systems in the country. All areas east of this geographic line have external drainage areas except for some small inland river basins located in the Songnen Plain, the Ordos Plateau and the Yamdrok lake area to the south of the Yarlung Zangbo River. West of this line are internal drainage areas, except for the Ertix River that flows into the Arctic Ocean. Lakes in the external drainage areas are primarily open, characterized by high rainfall, well-developed water-courses and low mineralization, while those in internal drainage areas are mainly lagoon and salt lakes characterized by small water supplies under arid climate, poorly-developed water systems, and clear seasonal changes and high mineralization.

3 Conclusions

(1) At present China has 2693 natural lakes (>1.0 km^2) which are distributed in 28 provinces, municipalities and autonomous regions. These lakes cover an area of 81414.6 km^2 or 0.9% of the total land area of the country. Among them, there are 2000 lakes with areas ranging from 1.0 to 10.0 km^2, 456 from 10.0 to 50.0 km^2, 101 from 50.0 to 100.0 km^2, 109 from 100.0 to 500.0 km^2, 17 from 500.0 to 1000.0 km^2 and 10 more than 1000.0 km^2.

(2) The Tibet and Inner Mongolia autonomous regions and Heilongjiang Province have the highest number of lakes and Jiangsu, Anhui and Jiangxi provinces have the largest total provincial lake areas. Qinghai Lake is the largest salt-water lake, Poyang Lake is the largest fresh-water lake and Jingpo Lake is the largest barrier lake. Of the five lake-zones, the TPL (Tibetan Plateau Lake Zone) has both the highest number of lake and largest total lake area, accounting for 39.2% in number and 51.4% in area of the national total. The Northwest, Yangtze and Songhuajiang river basins have the highest number of lakes and largest total areas of all the river basins in China.

(3) There were 60 newly formed lakes in the last three decades, and 131 newly discovered (>1.0 km^2) lakes. There are 243 former lakes that are no longer present in China.

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