

Delineation of China's reservoirs and lakes using remote sensing techniques

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Abstract We used remote sensing images to provide the first complete picture of the reservoirs and lakes located within China. We extracted 89 691 reservoirs, covering about 26 755 km² of the land surface. By applying an empirical formula relating reservoir storage capacity and surface area, we estimated the total storage capacity to be about 770 km³. Also, we delineated more than 180 000 lakes and ponds, with a total surface area of about 79 767 km². These include 2721 lakes larger than 1 km². Through comparison with previous studies, we found that dramatic changes have occurred over the past decades. Reservoir construction and water diversion have changed the spatial distribution and seasonal variation of water resources and have made the river systems fragmented. Additionally, this study found that more than 200 lakes of >1 km² on the Mongolia-Xinjiang Plateau and the Eastern Plain have disappeared, but about 50 lakes >1 km² have appeared on the Tibetan Plateau. The disappearing lakes on the Mongolia-Xinjiang Plateau and the newly appearing lakes on the Tibetan Plateau could be a result of climate change; whereas the disappearance of lakes on the Eastern Plain, especially in the middle–lower reaches of the Yangtze and Huaihe River basin, reflect the impact of human activities, such as land reclamation and urbanization. The database of delineated reservoirs will be employed to estimate the total amount of sediment trapped behind dams.

Key words lakes; reservoirs; satellite images; remote sensing; hydropower; China