

Model of water regulation in the Yangtze River Basin and its effects using remote sensing techniques

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Abstract Based on remotely sensed images, about 42 000 dams, with a total storage capacity of about 270 km³, have been constructed in the Yangtze River Basin. This large volume of water amounts to nearly one-third of the total annual discharge of the Yangtze River. Reservoir construction has dramatically changed the spatial distribution of water resources in the basin. Substantial amounts of water are now impounded in the upper reaches of the basin for energy generation and the pattern of seasonal water discharge has been altered. Future anthropogenic changes could further worsen the situation as additional large hydropower projects are completed in the upper reaches of the basin. This will cause more serious ecosystem disconnectivity through the elimination of free-flowing streams. Free-flowing streams are vanishing on the mainstem and major tributaries, such as the Jinshajiang, Wujiang, Dadu, Yuanjiang and Jialingjiang, because of reservoir construction. At present, 4688 km of streams are regulated by dams and this figure could increase to 7298 km by 2025 when all the dams currently under construction are put into operation. If all the planned dams are completed, the figure could jump to 10 675 km, or about 43% of the total length of the streams. At that time, almost all the mainstem and major tributaries will be fully regulated and this could lead to very serious negative ecosystem effects by disconnecting sediment/nutrient transport and fish migration.

Keywords water regulation; reservoirs; free flowing; the Yangtze River basin; hydropower