

## Description of Additional Supplementary Files

**File name:** Supplementary Data 1

**Description:** Subsector water withdrawal of 13 prefectures from the Beijing-Tianjin-Hebei agglomeration in 2012, for data quality and improvements.

Regarding discussion on data quality and improvements, we may wish to compare with Zhou et al. (2020)<sup>1</sup>, which is an important and previous publication in the field. Zhou et al. (2020) provided data before 2013. In details, we compared water withdrawal gaps between our estimates and Zhou et al. (2020)<sup>1</sup>. We chose 13 Beijing-Tianjin-Hebei prefectures in 2012, considering these prefectures to be ones with the most severe water-scarcity issues. For validation, we additionally estimated 2012 data using an identical methodology<sup>2</sup>. In the Supplementary Data 1, these data were attached separately and extendedly as time-series datasets.

Water withdrawals for farming were basically close in these two studies. Total water withdrawal of Zhou et al. (2020) was 2% lower than that of this study, on average. For industry, water withdrawal was 10% lower than that in this study, on average. For rural households (defined as water withdrawal for livestock and poultry-breeding, according to Zhou et al. (2020)), water withdrawal was 22% higher than this study, on average. For urban households (including service, according to Zhou et al. (2020)), water withdrawal was 57% higher than this study, on average. Overall total water withdrawal was 4% lower than this study, on average. The reasons could be twofold: 1) We have different calibres for agriculture/industrial water use. Data were from different sources i.e., prefecture Water Resources Bulletins (this study), and provincial and national Water Resources Bulletins simulation (Zhou et al. (2020)); and 2) there are mergence and separation between prefectures in historical statistics.

### References:

1. Zhou, F. *et al.* Deceleration of China's human water use and its key drivers. *Proc. Natl. Acad. Sci. U. S. A.* **117**, 7702–7711 (2020).
2. Zhang, Z. *et al.* City level water withdrawal and scarcity accounts of China. *Sci. Data* **11**, 1–14 (2024).