

## Supplementary Materials

### 1.Preconditioning methods of IO-tables.

The input-output table of each province in China is a data table compiled by the National Bureau of Statistics every five years (every "2" and every "7" years). The input-output table can reflect the input-output relationship among all sectors of the national economy in a comprehensive and systematic way, and at the same time show the production and water consumption situation of each sector and the water consumption constraint or promotion relationship between each sector, so as to provide a basis for formulating and checking economic plans and quantitative analysis.

The input-output method based on the static value input-output table is used to calculate the production water footprint of human activities, The static input-output table consists of the following four parts: the first quadrant (I) is the Intermediate Demand Matrix, which reflects the sources of products and services among the production sectors in a certain region and shows the interdependence among the production sectors, and is the core part of the static input-output table. The second quadrant (II) is the Final Demand Matrix, which can be combined with Intermediate Demand Matrix to reflect the input source and value composition of each production department in a certain region in production activities. The third quadrant (III) is the original input matrix, which can be combined with the first quadrant matrix to reflect the input sources and value composition of each production sector in production activities in a region. The fourth quadrant (IV) is the redistribution matrix, which is not covered in the input-output table compiled by the National Bureau of Statistics at present.

Firstly, we process the sixteen sectoral water consumptions of each province in 2002-2017 to make them conform to the input-output table calculation form. Secondly, then we set any data which  $< 0$  to 0. Thirdly, we use intermediate demand weights to clear the impact of exports on intermediate and final demand:

$$n * \left(1 - \frac{m}{x+m}\right) = z, \quad g * \left(1 - \frac{m}{x+m}\right) = f, \quad o * \left(1 - \frac{m}{x+m}\right) = e \quad (1)$$

where,  $n$ ,  $g$  and  $o$  are the intermediate demand, final demand and export respectively. And  $z$ ,  $f$  and  $e$  are the intermediate demand, final demand and export after removing the import weight, respectively.

Finally, we balance the total output by modifying the data, and assign 0.0001 to the data of 0 in the

total output.

## 2. Sectoral water consumption calculation methods.

Reference crop evapotranspiration  $ET_0$  is calculated by formula FAO56-PM, as shown:

$$ET_0 = \frac{0.408\Delta(R_n - G) + \gamma \frac{900}{T + 273} u_2 (e_s - e_a)}{\Delta + \gamma(1 + 0.34u_2)} \quad (2)$$

Where,  $R_n$  is the amount of radiation on the canopy surface, MJ/m<sup>2</sup>.  $G$  is soil heat flux, MJ/m<sup>2</sup>.  $\Delta$  is the slope of saturated vapor pressure temperature relation curve, kPa/°C.  $\gamma$  is hygrometer constant, kPa/°C.  $T$  is average temperature, °C.  $u_2$  is the wind speed 2m above the ground, m/s.  $e_s$  is saturated vapor pressure of air, kPa;  $e_a$  is actual vapor pressure of air, kPa.

The  $ET_0$  used in the calculation is from the station observation data, which is transformed into the  $ET_0$  of each province by Kriging interpolation method. The data related to temperature, rainfall, wind speed and so on are from China Meteorological data network.

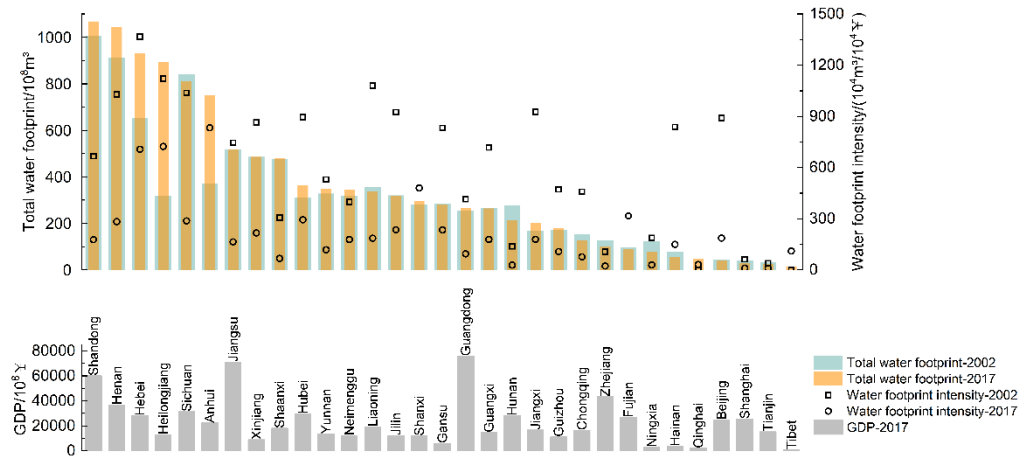
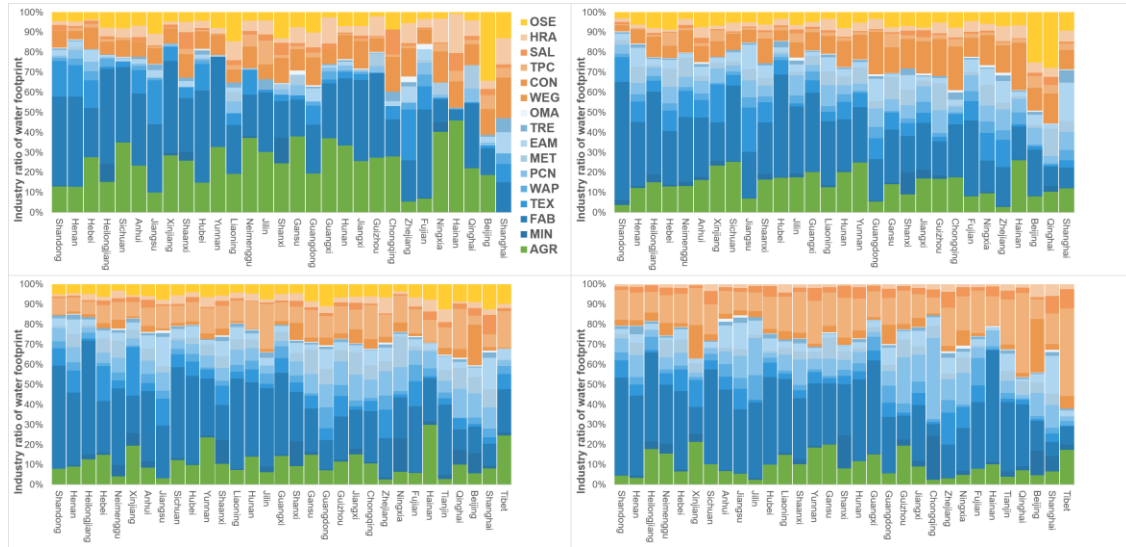
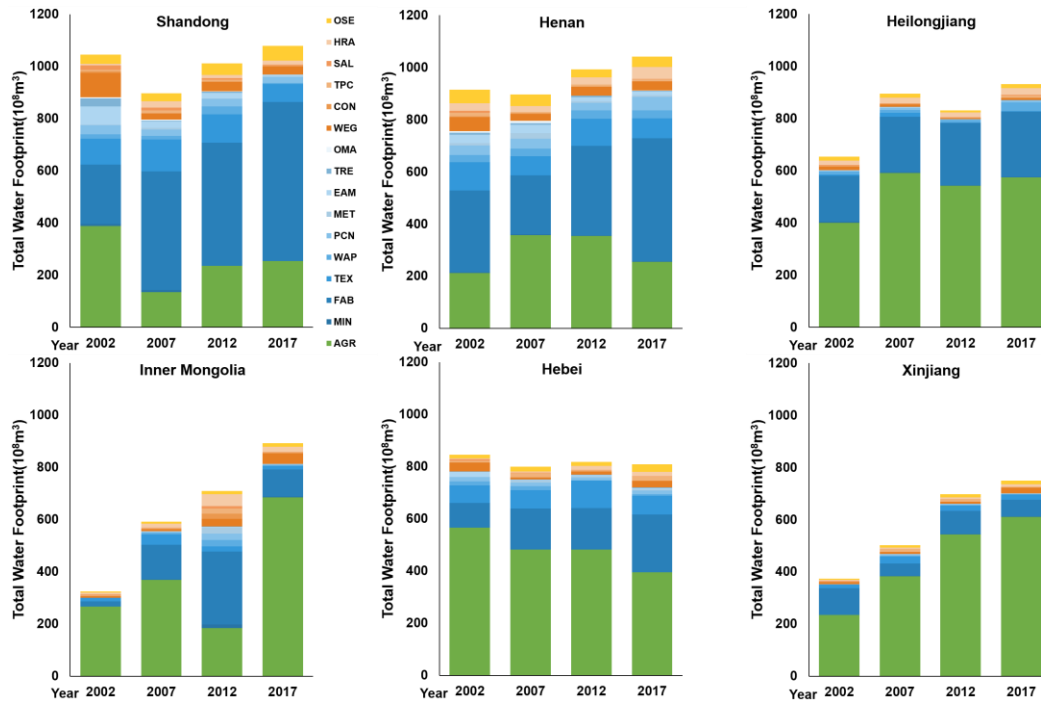


Figure S1 Comparison of WF and WFI in each province.



**Figure S2 Proportion of sectoral WF in each province from 2002 to 2017.**



**Figure S3 Sectoral WF of typical provinces in China from 2002 to 2017.**

**Table S1. Chinese Geographical Division**

Name	Provinces
the Central of China	Henan
	Hubei
	Hunan
North China	Beijing
	Tianjin
	Hebei
	Shanxi
	Inner Mongolia
East China	Shanghai
	Jiangsu
	Shandong
	Zhejiang
	Anhui
	Jiangxi
	Fujian
	Taiwan
South China	Guangdong
	Guangxi
	Hainan
	Hongkong
	Macao
the Northwestern China	Shaanxi
	Gansu
	Qinghai
	Ningxia
	Xinjiang
the Southwestern China	Chongqing
	Sichuan
	Guizhou
	Yunnan
	Tibet
the Northeastern China	Liaoning
	Jinlin
	Heilongjiang
	Inner Mongolia