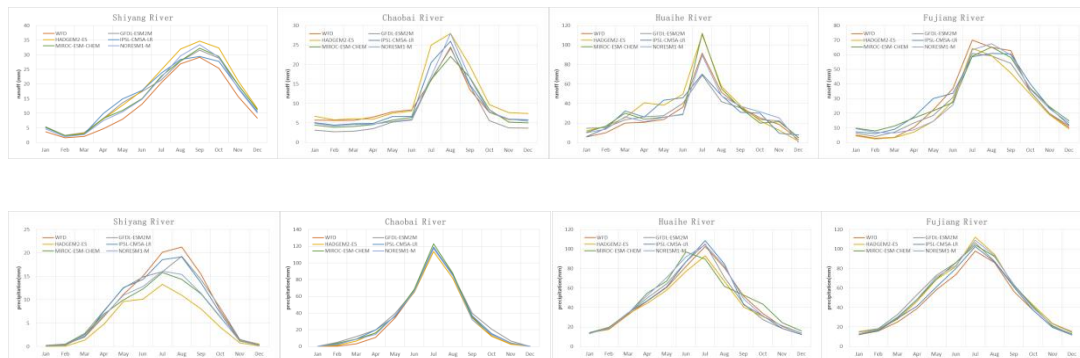


**Table S3. Sensitivity results for pre-define parameters by SWAT for the four river basins**

Rank	Shiyang River	Chaobai River	Huaihe River	Fujiang River
1	ALPHA_BF	CN2	CN2	CN2
2	GWQMN	ALPHA_BF	GWQMN	ESCO
3	TIMP	GW_DELAY	RCHRG_DP	SOL_AWC
4	CN2	ESCO	ESCO	CANMX
5	SMTMP	GWQMN	SOL_AWC	GWQMN
6	SOL_AWC	CH_N	GW_REVAP	RCHRG_DP

**Table S4. Definition of identified sensitive parameters in SWAT hydrological model for the four river basins**

Parameters	Definition	Processes
ALPHA_BF	Baseflow recession constant (days)	Groundwater
CANMX	Maximum canopy storage (mm H <sub>2</sub> O)	Runoff
CH_N	Manning coefficient value	Channel
CN2	SCS runoff curve number for moisture condition II	Runoff
ESCO	Soil evaporation compensation factor	Evaporation
GW_DELAY	Delay time for aquifer recharge (days)	Groundwater
GW_REVAP	Groundwater “Revap” coefficient (days)	Groundwater
GWQMN	Threshold water level in shallow aquifer for base flow (mm)	Soil
RCHRG_DP	Deep aquifer percolation coefficient (fraction)	Groundwater
SMTMP	Threshold temperature for snow melt ( °C)	Snow
SOL_AWC	Soil available water capacity (mm/mm soil)	Soil
TIMP	Snow temperature lag factor	Snow

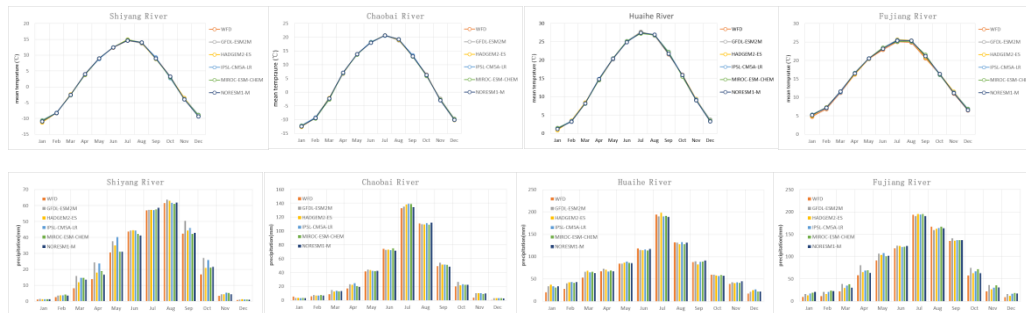


**Figure S3. The agreements in simulated mean monthly runoff and mean monthly evapotranspiration based on WFD and downscaling climate data from 5 GCMs during 1961-2001 for the four river basins.**

**Table S2. The agreements in annual mean, maximum and minimum temperature, and mean annual precipitation based on WFD and downscaling climate data from five GCMs for during 1961-2001 for the four river basins.**

River	GFDL-ES M2M	HadGEM2- ES	IPSL-CM 5A-LR	MIROC-ES M-CHEM	NorESM1-M
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	Difference in mean annual temperature (°C)				
Shiyang	-0.01	-0.03	0.02	-0.00	-0.03
Chaobai	-0.01	-0.02	0.08	-0.03	-0.01
Huaihe	-0.01	0.01	0.07	-0.03	-0.05
Fujiang	0.31	0.31	0.36	0.33	0.29
River	Difference in mean annual maximum temperature (°C)				
Shiyang	0.00	0.07	0.04	0.02	0.04
Chaobai	0.02	0.10	-0.02	0.00	0.02
Huaihe	0.07	0.13	0.03	0.01	0.06
Fujiang	0.24	0.29	0.25	0.23	0.27
River	Difference in mean annual minimum temperature (°C)				
Shiyang	-0.01	0.03	0.01	-0.01	0.01
Chaobai	-0.03	0.08	-0.02	-0.01	0.00
Huaihe	0.00	0.05	-0.05	-0.07	-0.04
Fujiang	0.37	0.41	0.39	0.34	0.35
River	Difference in mean annual precipitation (%)				
Shiyang	14.8	7.8	13.3	6.3	5.2
Chaobai	9.7	8.2	9.1	8.0	6.3
Huaihe	4.9	5.4	5.3	3.9	4.8
Fujiang	11.0	5.6	8.7	10.4	7.2



**Figure S2.** The agreements in monthly mean temperature and mean precipitation based on WFD and downscaling climate data from five GCMs for during 1961-2001 for the four river basins.

**Table S5.** The mean of middle-year of the 30-year samples for all GCMs under RCPs and under 1.5°C or 2°C global warming scenarios.

threshold	RCP2.6	RCP4.5	RCP6.0	RCP8.5
1.5°C	2029	2030	2032	2025
2.0°C	×	2049	2053	2038