

**Table S1.** GCMs used for SWAT simulation.

Model	Institute	Resolution (m×m)	Reference
ACCESS-CM2	Commonwealth Scientific and Industrial Research Organisation (Australia)	144 × 192	Bi et al. [45]
ACCESS-ESM1-5	Commonwealth Scientific and Industrial Research Organisation (Australia)	144 × 192	Bi et al. [45]
CanESM5	Canadian Centre for Climate Modelling and Analysis (Canada)	128 × 64	Swart et al. [46]
CNRM-CM6-1	Centre National de Recherches Meteorologiques (France)	256 × 128	Voldoire et al. [47]
CNRM-ESM2-1	Centre National de Recherches Meteorologiques (France)	256 × 128	Voldoire et al. [47]
GFDL-ESM4	Geophysical Fluid Dynamics Laboratory (USA)	360 × 180	John et al. [48]
INM-CM4-8	Institute for Numerical Mathematics (Russia)	180 × 120	Volodin et al. [49]
INM-CM5-0	Institute for Numerical Mathematics (Russia)	180 × 120	Volodin et al. [50]
IPSL-CM6A-LR	Institute Pierre-Simon Laplace (France)	144 × 143	Boucher et al. [51]
MIROC6	Japan Agency for Marine-Earth Science and Technology/Atmosphere and Ocean Research Institute/National Institute for Environmental Studies/RIKEN Center for Computational Science (Japan)	256 × 128	Tatebe et al. [52]
MPI-ESM1-2-HR	Max Planck Institute for Meteorology (Germany)	384 × 192	Mauritsen et al. [53]
MPI-ESM1-2-LR	Max Planck Institute for Meteorology (Germany)	192 × 96	Wieners et al. [54]
MRI-ESM2-0	Meteorological Research Institute (Japan)	320 × 160	Yukimoto et al. [55]
NorESM2-LM	NorESM Climate modeling Consortium consisting of CICERO (Norway)	144 × 96	Seland et al. [56]
UKESM1-0-LL	Met Office Hadley Centre (UK)	144 × 192	Good et al. [57]

**Table S2.** Definition of extreme precipitation indices

Index	Definition	Unit
RX1day	Monthly maximum 1-day precipitation	mm
RX5day	Monthly maximum consecutive 5-day precipitation	mm
SDII	Annual total precipitation divided by the number of wet days (PRCP $\geq$ 1.0 mm) in the year	mm/day
R10	Annual count of days when PRCP $\geq$ 10 mm	Days
R20	Annual count of days when PRCP $\geq$ 20 mm	Days
Rnn	Annual count of days when PRCP $\geq$ nn mm, with nn being a user defined threshold	Days
CDD	Maximum number of consecutive days with RR < 1 mm	Days
CWD	Maximum number of consecutive days with RR $\geq$ 1 mm	Days
R95p	Annual total PRCP from days > 95 <sup>th</sup> percentile	mm
R99p	Annual total PRCP from days > 99 <sup>th</sup> percentile	mm
PRCPTOT	Annual total PRCP in wet days (RR $\geq$ 1 mm)	mm

PRCP: precipitation

**Table S3.** Adjusted SWAT parameters

Parameter	Definition	Value
CN2	SCS curve number for moisture condition	71
CH_N(2)	Manning's "n" value for main channel	0.05
ESCO	Soil evaporation compensation coefficient	0.72
GW_DELAY	Delay time for aquifer recharge (days)	90
ALPHA_BF	Baseflow recession constant	0.4
GWQMN	Threshold water level in shallow aquifer for baseflow (mm)	400