Analysis of Runoff Changes in the Wei River Basin, China: Confronting Climate Change and Human Activities

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Table S1
Information of the hydrological stations.

River	Hydrological stations	Longitude (E)	Latitude (N)	Time series	Average Runoff (10^8 m^3)
BLR	Wuqi	108.20	36.88	1970-2108	0.81
	Liujiahe	108.77	36.55	1970-2108	2.11
	Zhangcunyi	109.13	35.90	1970-2108	1.01
	Jiaokouhe	109.35	35.65	1970-2108	4.27
	Zhuangtou	109.83	35.03	1970-2108	6.14
JR	Hongde	107.20	36.77	1970-2108	0.55
	Maojiahe	107.58	35.52	1970-2108	1.57
	Yangjiaping	107.73	35.33	1970-2108	5.55
	Yuluoping	107.88	35.33	1970-2108	4.01
	Zhangjiashan	108.60	34.63	1970-2108	13.44
WR	Qin'an	105.67	34.90	1970-2108	2.15
	Gangu	105.33	34.77	1970-2108	0.57
	Wushan	104.88	34.73	1970-2108	5.01
	Linjiacun	107.05	34.38	1970-2108	15.51
	Xianyang	108.70	34.32	1970-2108	31.62
	Huaxian	109.77	34.58	1970-2108	56.51

Table S2

The information of hydro-meteorological characteristics of the 16 sub-regions in the Wei River Basin.

River	Number	Sub-regions	Drainage Area (km^2)	Long term mean value				n
				Annual R (mm)	Annual P (mm)	Annual PET (mm)	PET /P	
BR	1	Wuqi	3487	23.28	453.16	876.80	1.93	2.79
	2	Wuqi-Liujiahe	3950	32.74	453.16	876.80	1.93	2.44
	3	Zhangcunyi	4885	20.62	530.17	966.61	1.82	3.28
	4	Liujiahe-Zhangcunyi-Jiaokouhe	5086	22.73	568.00	1034.74	1.82	3.25
	5	Jiaokouhe-Zhuangtou	8066	23.10	593.40	1033.37	1.74	3.46
JR	6	Hongde	4729	11.60	395.58	1070.29	2.71	2.55
	7	Hongde-Yuluoping	14619	23.63	479.36	1014.86	2.12	2.61
	8	Maojiahe	7283	21.50	471.02	1020.18	2.17	2.63
	9	Maojiahe-Yangjiaping	7117	55.89	509.60	995.73	1.95	2.00
	10	Yangjiaping-Yuluoping-Zhangjiashan	10229	37.97	582.52	957.75	1.64	3.00
WR	11	Wushan	8285	60.40	523.92	854.47	1.63	2.30
	12	Gangu	2531	22.57	469.24	843.52	1.80	3.08
	13	Qinan	10046	21.37	448.02	912.85	2.04	2.73
	14	Gangu-Qinan-Linjiacun	10636	73.05	532.27	921.88	1.73	1.97
	15	Linjiacin-Xianyang	16975	91.98	630.57	951.51	1.51	2.17
	16	Xianyang-Zhangjiashan-Huaxian	15456	75.31	593.84	1020.68	1.72	2.08

Table S3

The change of hydro-meteorological characteristic and the contribution of climatic and human activities factors to runoff changes in sixteen catchments.

River and regions number		Change before and after the abrupt year				Abrupt year	Runoff change induced by P/PET/n (mm)			Contribution rate to runoff change (%)		
		R (mm)	P (mm)	PET (mm)	n		ΔR_P	ΔR_{PET}	ΔR_n	C_P	C_{PET}	C_n
BLR	1	–13.6	4.9	0.2	0.7	2002 **	0.9	0.0	-15.4	–6.2	0.1	106.1
	2	–14.3	4.9	0.3	0.5	2002 **	1.1	0.0	-16.0	–7.6	0.2	107.4
	3	–2.4	–4.8	38.5	–0.1	1994 (NS)	-0.7	-2.5	1.0	34	113	–47
	4	6.2	52.2	19.6	0.0	2009 (NS)	8.3	-1.3	0.7	107.2	–16.5	9.3
	5	–13.4	21.8	24.8	0.4	1994 (NS)	3.5	-1.8	-7.9	–58.2	28.9	129.3
JR	6	–5.1	29.2	32.0	0.4	2001 (NS)	2.9	-0.8	-6.5	–66.4	19.1	147.3
	7	–6.9	11.3	54.7	0.2	1996 *	1.9	-3.0	-4.8	–31.8	51.1	80.7
	8	–11.9	8.5	61.0	0.5	1996 **	1.3	-3.1	-10.9	–10.5	24.6	85.9
	9	–29.7	–10.6	22.0	0.4	1985 *	-3.1	-2.1	-24.2	10.6	7.1	82.3
	10	–41.3	10.3	48.5	1.0	1996 **	2.4	-5.1	-29.5	–7.6	15.8	91.8
WR	11	–34.1	–25.6	56.6	0.4	1993 **	-8.5	-7.5	-20.4	23.4	20.6	56
	12	–12.9	–3.2	34.3	0.5	1992 **	-0.6	-2.6	-10.3	4.3	19	76.7
	13	–19.5	–13.0	42.5	0.8	1993 **	-2.2	-2.5	-16.6	10.2	11.7	78.1
	14	–69.2	–45.7	63.4	0.8	1993 **	-16.2	-8.0	-50.8	21.7	10.6	67.7
	15	–37.3	–28.6	30.2	0.3	1990 (NS)	-11.2	-5.0	-22.0	29.5	13	57.5
	16	18.3	45.7	33.7	–0.2	2008 (NS)	15.6	-4.2	12.5	65.1	–17.7	52.6

P: precipitation; PET: potential evapotranspiration; n: watershed characteristic parameter

Abrupt year: **: significant at $P < 0.01$; *: significant at $P < 0.05$; NS: no significance.

ΔR_P, ΔR_{PET}, ΔR_n are the runoff change induced by change of P, PET, parameter n after the abrupt year, respectively. C_P, C_{PET}, C_n are the relative contribution of P, PET, parameter n to runoff change.