

1 Table 1. The introduction of SWAT parameters adjusted for the calibration.

Parameter	Unit	Definition	Range		Value					
			LB	UB	YDD	DCD	SJW	GJW	BJW	
CN2	-	Initial SCS runoff curve number for moisture condition II	35	98	57	59	54	63	57	
CH_N(2)	-	Manning's "n" value for the main channel	0.01	0.3	0.06	0.03	0.02	0.02	0.04	
ESCO	-	Soil evaporation compensation factor	0	1	0.95	0.65	0.65	0.65	1	
GW_DELA	days	Groundwater delay time	0	500	180	31	31	31	31	
GWQMN	mm H ₂ O	Threshold depth of water in the shallow aquifer required for return flow to occur	0	5000	100	1200	1000	1000	1000	
ALPHA_BF	1/days	Baseflow alpha factor	0	1	0.7	0.3	0.048	0.048	0.048	
SOL_K	mm/hr	Saturated hydraulic conductivity	0	2000	40.5	45.4	39.6	60.9	60.3	
SOL_AWC	$\frac{mm H_2O}{mm soil}$	Available water capacity of the soil layer			0.13	0.14	0.14	0.13	0.06	
SFTMP	°C	Snowfall temperature	-5	5	-1					
SMTMP	°C	Snow melt base temperature	-5	5	0					

RES_ESA	ha	Reservoir surface area- when the reservoir is filled to the emergency spillway	-	3700	7420	350	350	350
RES_EVOL	10 ⁴ m ³	Volume of water- needed to fill the reservoir to the emergency spillway	-	81500	14900	560	1560	2500
RES_PSA	ha	Reservoir surface area- when the reservoir is filled to the principal spillway	-	3390	6750	350	300	300
RES_PVOL	10 ⁴ m ³	Volume of water- needed to fill the reservoir to the principal spillway	-	74250	12416	560	1554	2471
RES_VOL	10 ⁴ m ³	Initial reservoir volume-	-	61200	76900	560	1550	2471

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5 Table 2. Statistical summary of two multipurpose dam calibration.

Index	Statistic	YDD			DCD		
		Cal	Val	Total	Cal	Val	Total
	R ²	+0.77	+0.68	+0.73	+0.84	+0.80	+0.82
Dam	NSE	+0.84	+0.79	+0.81	+0.79	+0.75	+0.77
inflow	RMSE	+2.58	+2.12	+2.35	+1.71	+1.42	+1.57
	PBIAS	+4.81	-9.87	-2.51	-8.96	-7.91	-8.44

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9 Table 3. Statistical summary of three multifunction weir calibration.

Index	Statistic	SJW			GJW			BJW		
		Cal	Val	Total	Cal	Val	Total	Cal	Val	Total
	R ²	+0.81	+0.78	+0.79	+0.87	+0.75	+0.81	+0.86	+0.79	+0.82
Dam	NSE	+0.79	+0.71	+0.75	+0.84	+0.66	+0.75	+0.82	+0.72	+0.77
inflow	RMSE	+0.79	+0.27	+0.53	+0.78	+0.31	+0.54	+0.84	+0.32	+0.58
	PBIAS	+6.50	-0.07	+3.21	+13.08	+10.39	+11.74	+13.89	+7.57	+10.73

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13 Table 4. The summary of the hydrologic responses obtained from three scenarios.

Scenario	TR	ET	SR	PE	SM	GF	GWR	LF
	(mm/ year)	(mm/ year)	(mm/ year)	(mm/ year)	(mm/ year)	(mm/ year)	(mm/year)	(mm/ year)
1980s	775.0	565.2	368.3	226.8	78763.6	198.8	13.0	207.9
1 GA1990	768.0	565.2	368.3	226.8	78763.6	191.8	20.0	207.8
s	(-0.9%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(-3.5%)	(+53.1%)	(0.0%)
GA2000	750.9	565.2	368.3	226.8	78763.6	174.8	37.0	207.7
s	(-3.1%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(-12.0%)	(+183.5%)	(-0.1%)
GA2010	730.1	565.2	368.3	226.8	78763.6	153.9	57.9	207.8
s	(-5.8%)	(0.0%)	(0.0%)	(0.0%)	(0.0%)	(-22.6%)	(+343.8%)	(0.0%)
2 FG1990s	771.6	568.1	367.9	224.9	78705.4	196.9	13.0	206.8
	(-0.4%)	(0.5%)	(-0.1%)	(-0.9%)	(-0.1%)	(-0.9%)	(-0.7%)	(-0.5%)
FG2000s	764.6	573.8	366.9	220.9	78552.3	193.1	12.7	204.6
	(-1.3%)	(1.5%)	(-0.4%)	(-2.6%)	(-0.3%)	(-2.8%)	(-2.3%)	(-1.5%)
FG2010s	759.2	578.6	366.0	217.5	78401.4	189.9	12.6	203.3
	(-2.0%)	(2.4%)	(-0.6%)	(-4.1%)	(-0.5%)	(-4.5%)	(-3.6%)	(-2.2%)
3 1990s	764.8	568.1	367.9	224.9	78705.4	190.2	19.6	206.7
	(-1.3%)	(0.5%)	(-0.1%)	(-0.9%)	(-0.1%)	(-4.3%)	(+50.5%)	(-1.2%)
2000s	740.8	573.8	366.9	220.9	78552.3	169.2	36.7	204.7
	(-4.4%)	(1.5%)	(-0.4%)	(-2.6%)	(-0.3%)	(-14.9%)	(+181.5%)	(-3.7%)
2010s	714.3	578.6	366.0	217.5	78401.4	145.1	57.4	203.2
	(-7.8%)	(2.4%)	(-0.6%)	(-4.1%)	(-0.5%)	(-27.0%)	(+339.9%)	(-4.7%)

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17 Table 5. The temporal reduction percentage of TR in different time durations.

Scenario		Q90	Q180	Q275	Q355
		(%)	(%)	(%)	(%)
1	GA1990s	1.0	1.5	1.6	3.1
	GA2000s	3.6	4.2	5.1	8.2
	GA2010s	5.6	6.6	8.1	13.2
2	FG1990s	0.6	0.6	0.7	2.3
	FG2000s	1.3	1.4	1.5	3.3
	FG2010s	1.8	1.9	2.1	3.9
3	1990s	1.5	1.9	1.9	4.3
	2000s	4.7	5.5	6.3	10.6
	2010s	7.3	8.3	9.5	16.8

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