Supplementary files

Table S1. Meteorological station distribution and its average annual precipitation (2007-2021).

Station Name	Latitude	Longitude	Elevation (m)	Average annual Precipitation (mm)
Kawazoe	33.15	130.30	2	1760.12
Kurume	33.30	130.49	7	2064.53
Saga	33.26	130.30	6	2063.73
Yanagawa	33.16	130.40	7	1836.20
Kuroki	33.22	130.64	144	2146.37
Asakura	33.40	130.69	38	2039.37
Tuso	33.42	130.45	852	1874.97
Mt Mino	33.29	130.63	607	2241.90
Mt Hideko	33.49	130.92	823	2691.80
Hita	33.32	130.92	82.9	1931.67
Minami Okuni	33.10	131.06	448	2412.60
Tsubakigahana	33.19	130.92	843	3289.95
Dazaifu	33.50	130.49	52	1987.40

Table S2. Annual Mean Observed and Simulated Precipitation in the Chikugo Catchment

Year	Annual mean observed Precipitation (mm)	Annual mean simulated Precipitation (mm)
2007	1694.83	1760.29
2008	1877.96	1783.21
2009	1874.14	1914.11
2010	2190.85	1856.12
2011	2269.22	2094.09
2012	2444.65	2285.18
2013	2108.52	2085.11
2014	2018.60	1927.67
2015	2210.02	2156.26
2016	2708.31	2509.28
2017	1935.72	1704.62
2018	2068.41	2058.52
2019	2080.33	1905.9
2020	2829.46	2572.46
2021	2389.68	2266.87
Average	2180.05	2058.65

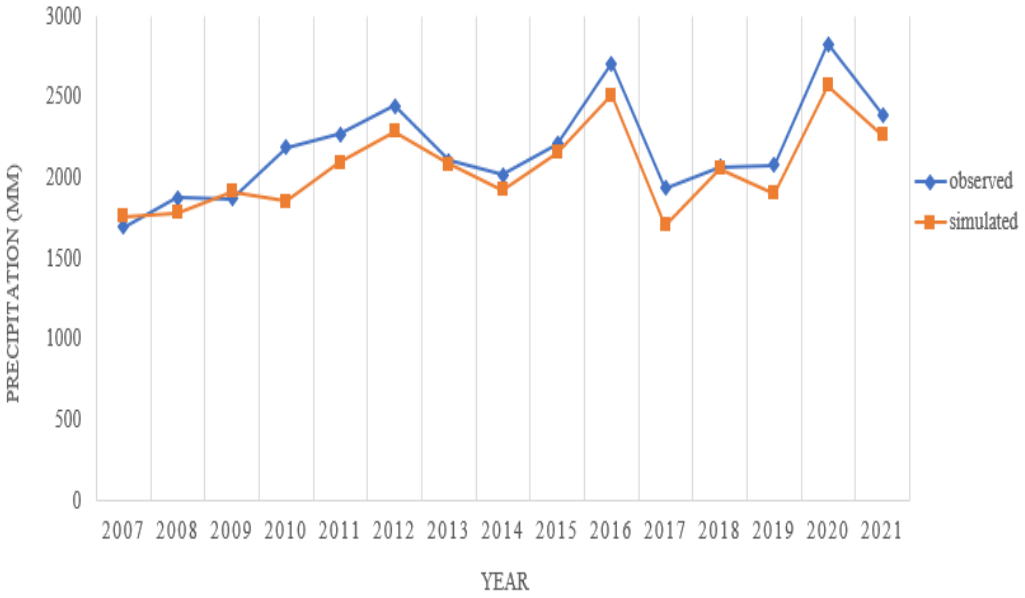


Figure S1. Comparison of Annual Mean Observed and Simulated Precipitation in the Chikugo Catchment

Table S3. Correspondence between MLIT and SWAT land use code classification.

MLIT class	SWAT classes	SWAT Code	Area (Ha)	% Watershed
Forest	Mixed Forest	FRST	154,488.70	57.37
Road	Urban Transportation	UTRN	12,261.62	4.55
Railway	Urban Transportation	UINS		
Rice Paddy	Rice	RICE	46,653.53	17.33
Urban area	Urban High Density	URBN	28,042.04	10.41
Other Agricultural land	Agricultural Land- Generic	AGRL	19,357.45	7.19
Water	River and lake	WATR	7,606.10	2.82
Golf Course	Range	RNGE	854.17	0.32

Table S4. Distribution of Soil Types by Area and Percentage in the Watershed

Soil Type	Area (Ha)	% Watershed
Dystric Rhegosols	16,717.54	6.21
Ochric Cambisols	41,379.12	15.37
Humic Cambisols	64,162.01	23.83
Fluvic Gleysols	55,589.77	20.65
Helvic Acrisols	4,554.89	1.69
Rhodic Acrisols	1,874.38	0.70
Haplic Andosols	69,031.51	25.64
Gleysols	9,686.31	3.60
Water	2,009.08	0.75
Lithosols	3,613.32	1.34
Histosols	216.24	0.08
Gleyic Andosols	429.4	0.16

Table S5. Land use classes coverage and comparison of land use change in 2006 and 2021

Land use Type	**2006**		**2021**		**Area of change (km^2)**	**Area of change (%)**
	Area (km^2)	**% Area**	**Area (km^2)**	**% Area**	**2007- 2020**	**2007- 2020**
Water Bodies	23.6	0.9	20.2	0.8	-3.4	-0.1
Built up	231.4	8.7	456.3	17.1	224.9	8.4
Paddy field	646.3	24.2	386.0	14.5	-260.3	-9.7
Grassland	182.7	6.8	202.4	7.6	19.7	0.7
Deciduous forest	134.0	5.0	319.8	12.0	185.8	7.0
Evergreen forest	1440.3	53.9	1249.7	46.9	-190.6	-7.1
Bareland	9.6	0.4	23.9	0.9	14.3	0.5
Wetland	2.0	0.0	7.7	0.3	5.7	0.3

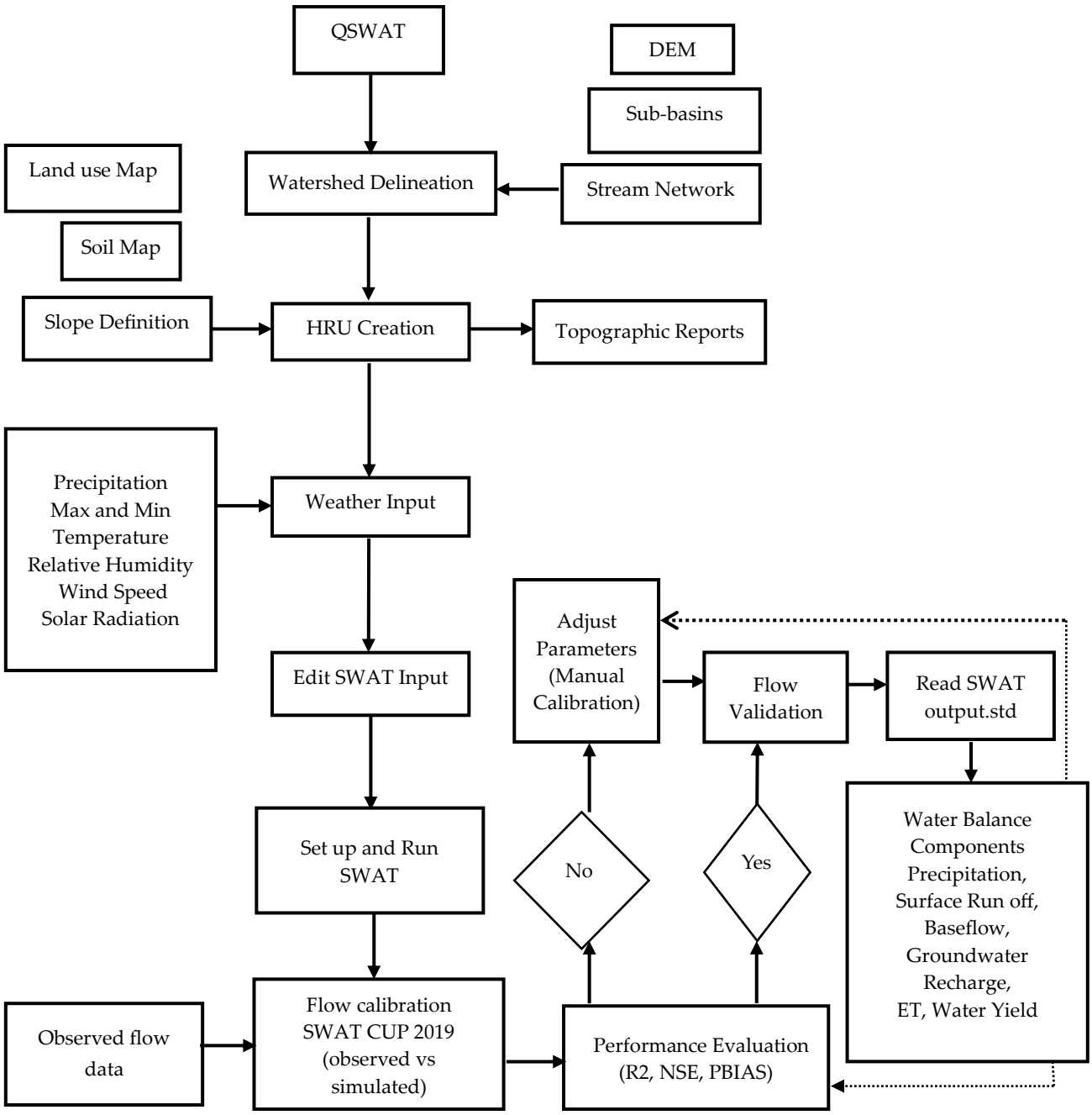


Figure S2. Flow chart of water balance estimation methodology

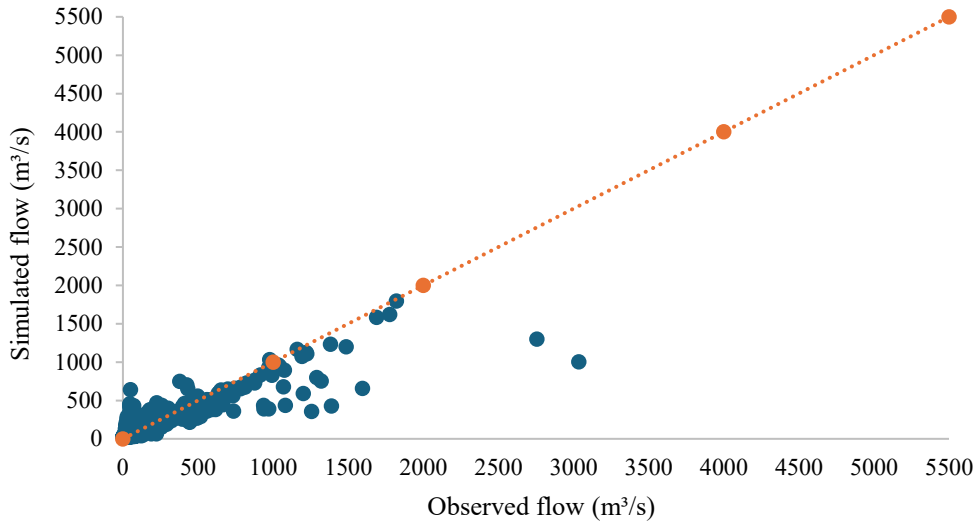


Figure S3. Scatter plots for stream flow calibration (2007-2014)

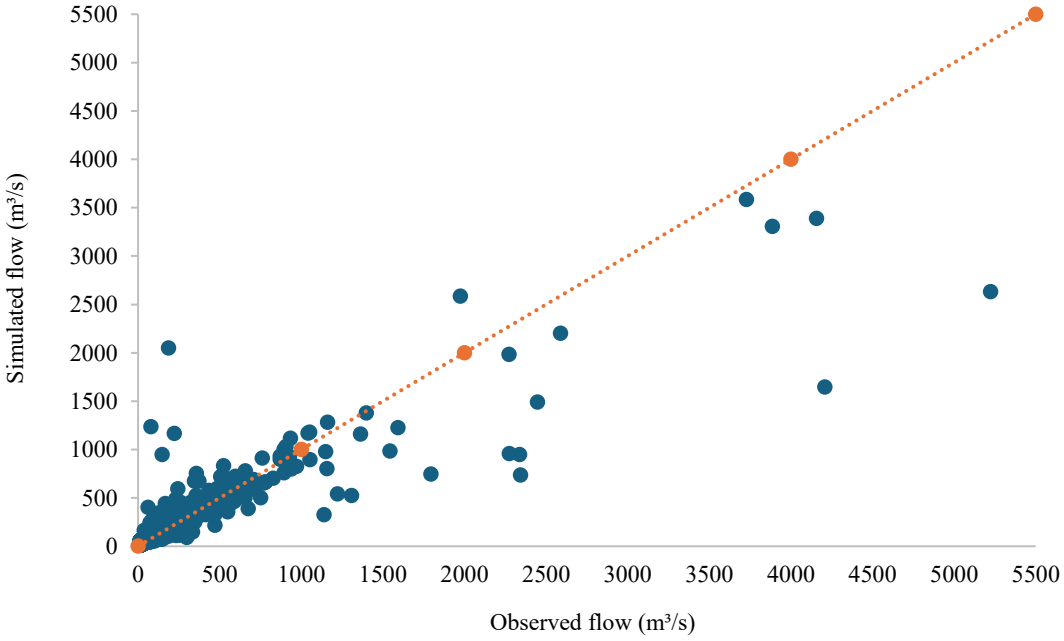


Figure S4. Scatter plots for stream flow validation (2015-2021)