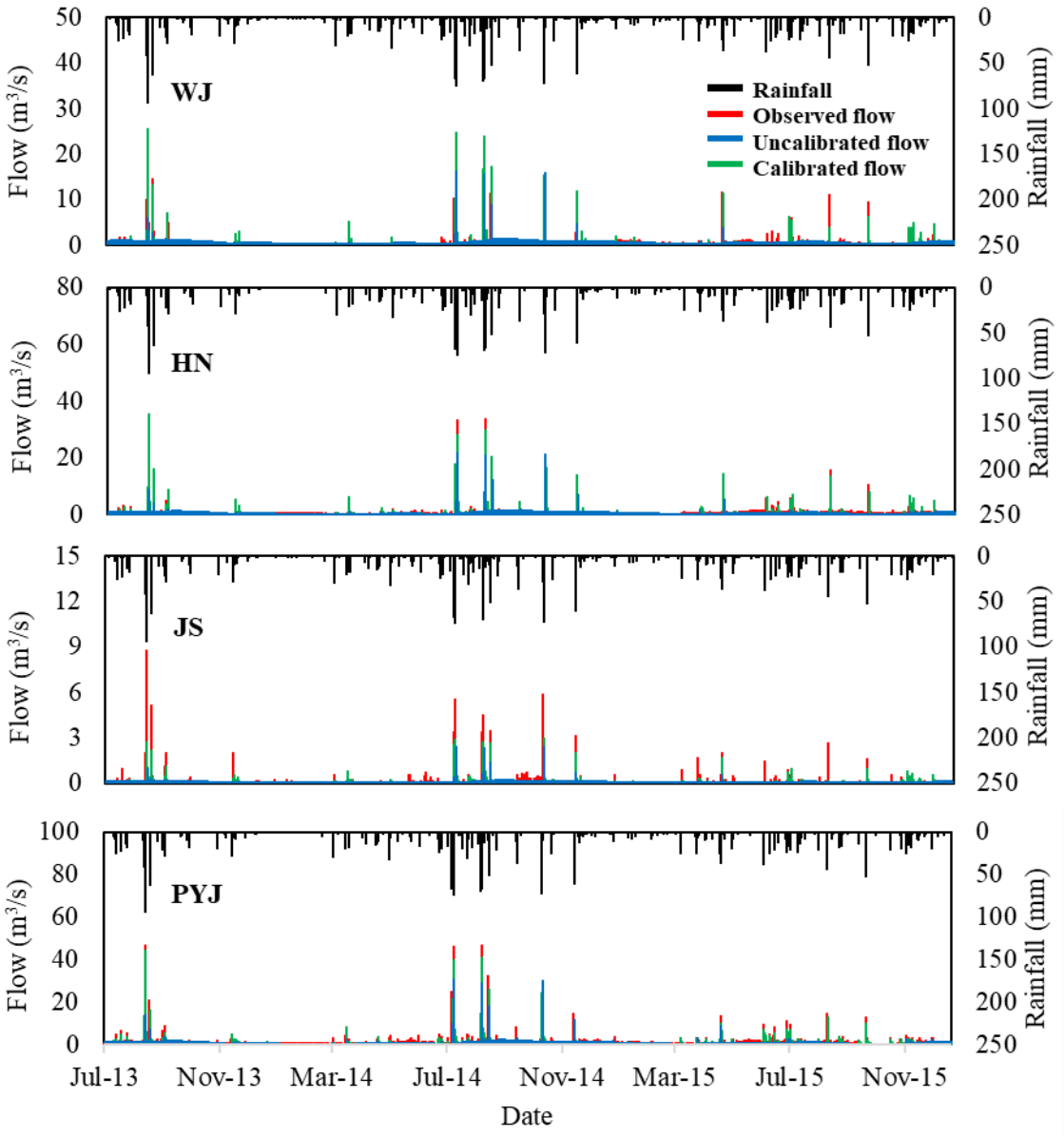


Figure S1. Comparison of daily streamflow predicted using the mechanistic models (i.e., uncalibrated and calibrated SWAT models) and observed during the training period (July 12, 2013, to December 31, 2015).

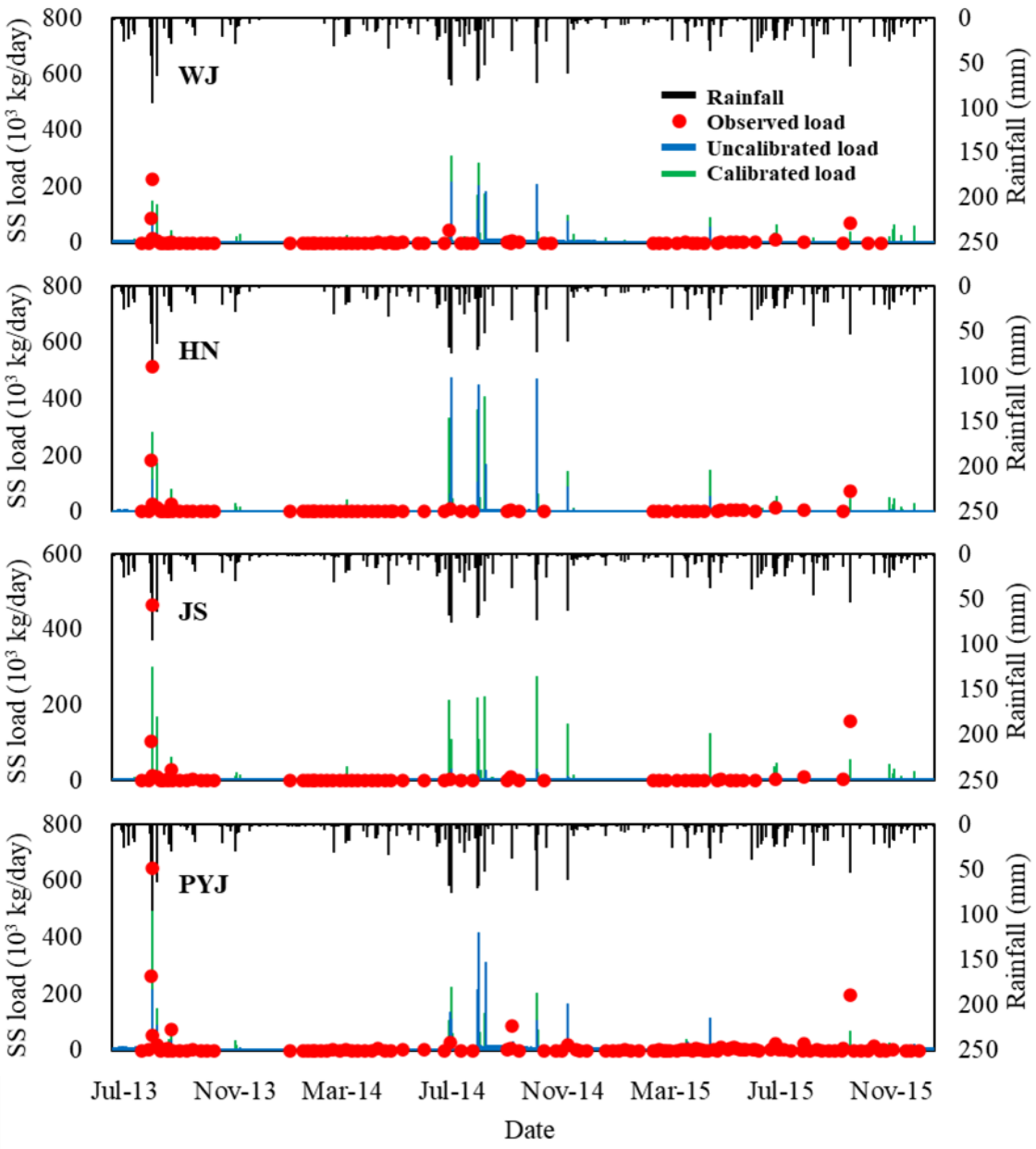


Figure S2. Comparison of daily SS loads predicted using the mechanistic models (i.e., uncalibrated and calibrated SWAT models) and observed during the training period (July 12, 2013, to December 31, 2015).

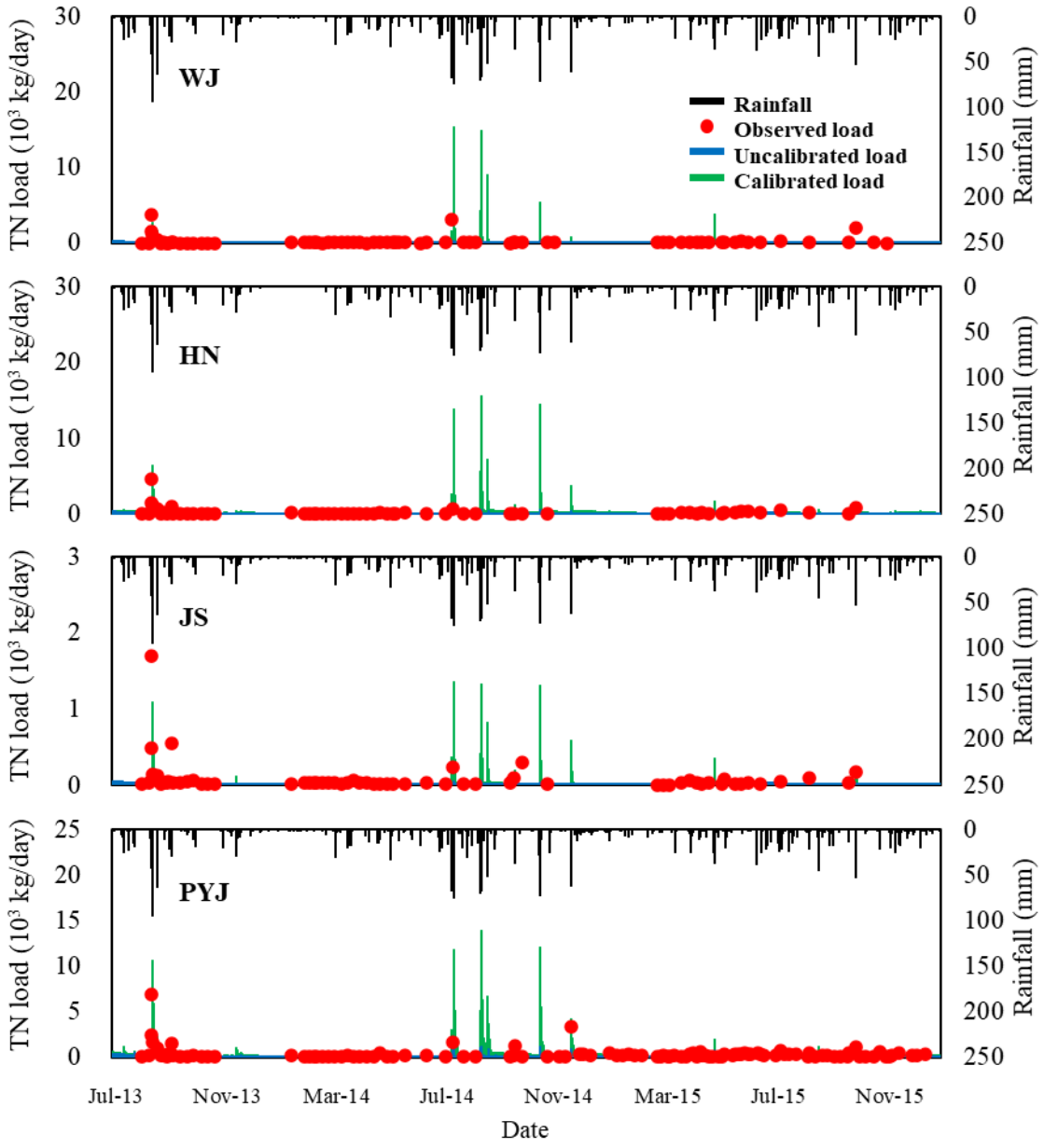


Figure S3. Comparison of daily TN loads predicted using the mechanistic models (i.e., uncalibrated and calibrated SWAT models) and observed during the training period (July 12, 2013, to December 31, 2015).

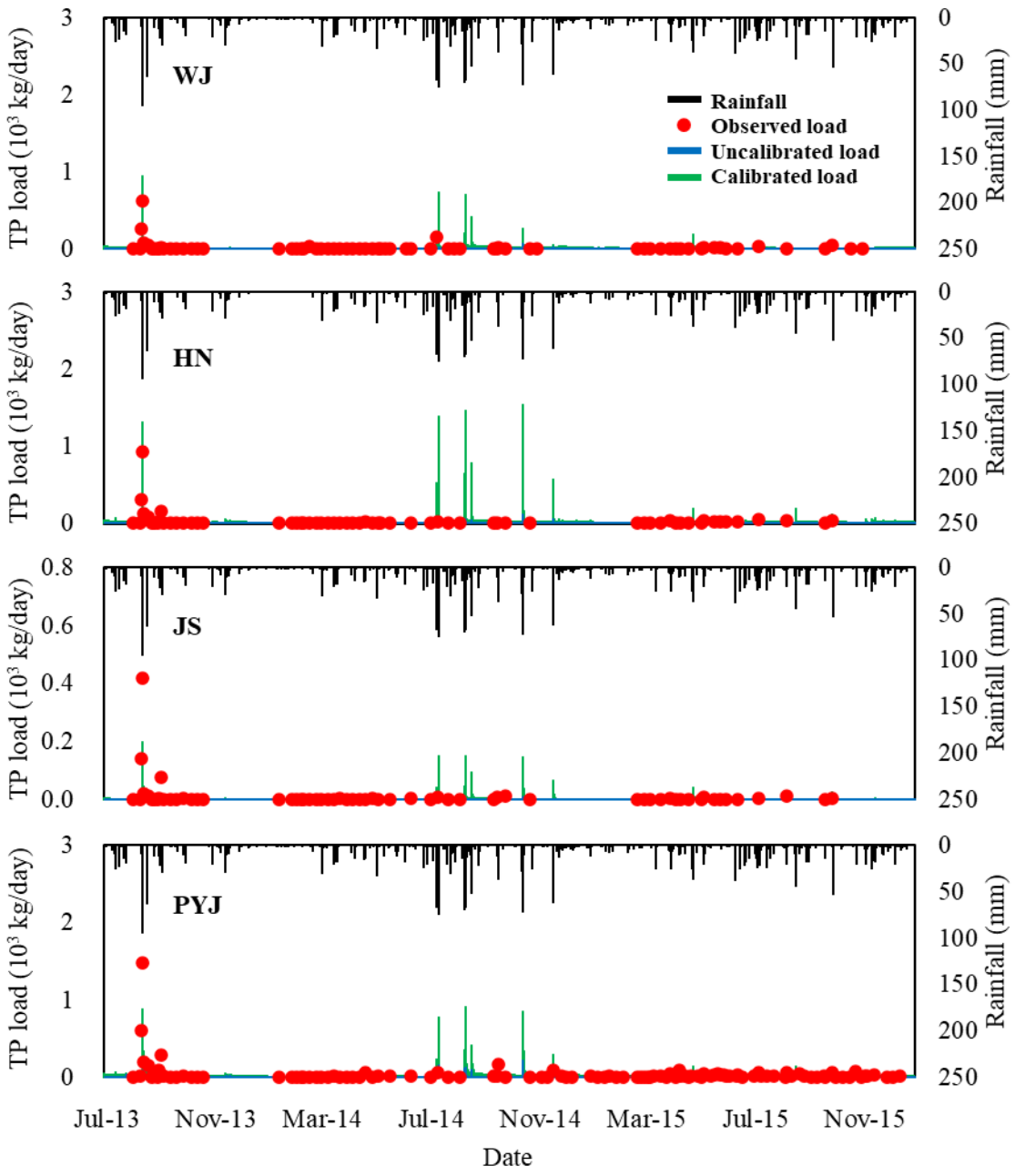
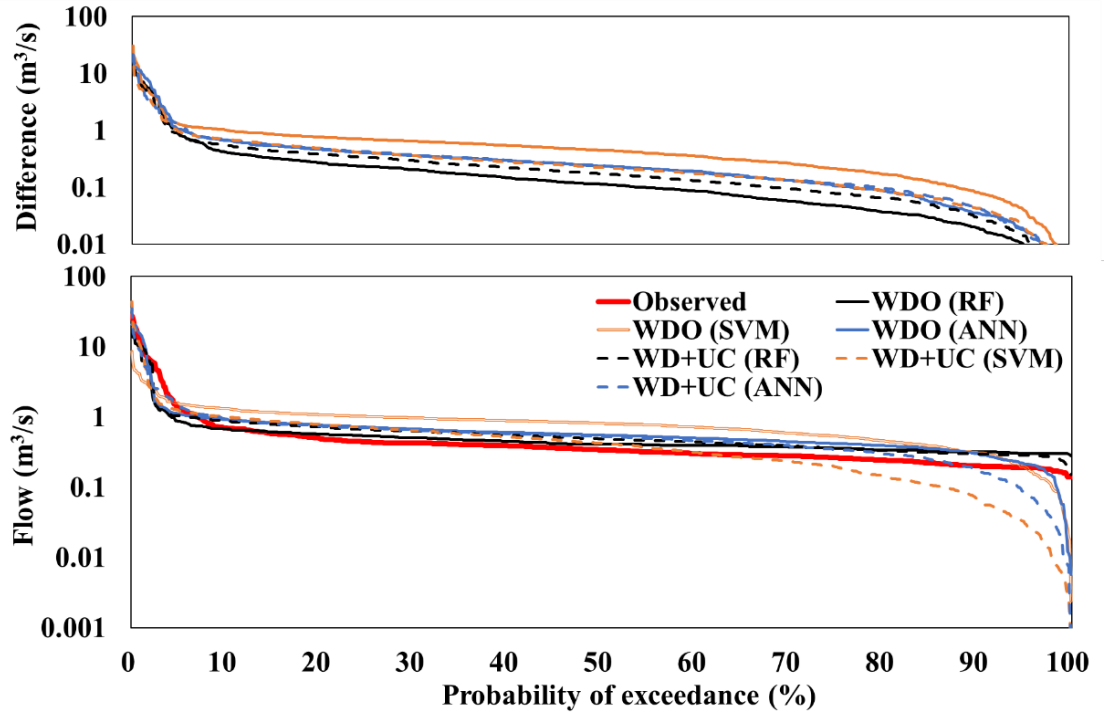
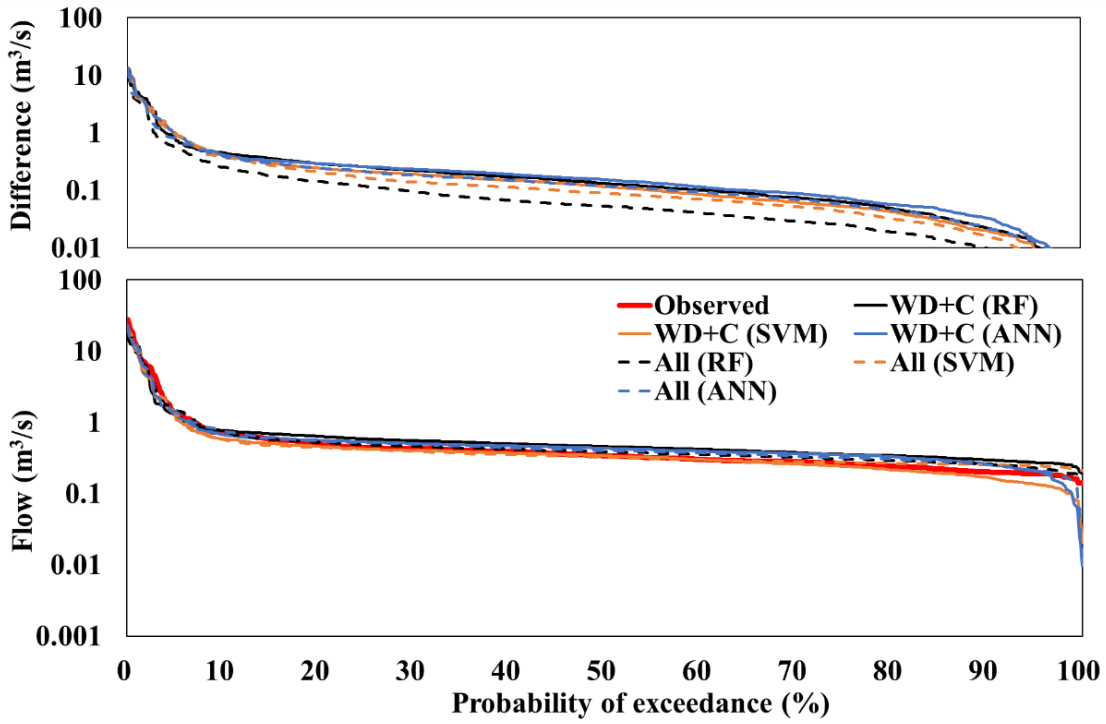


Figure S4. Comparison of daily TP loads predicted using the mechanistic models (i.e., uncalibrated and calibrated SWAT models) and observed during the training period (July 12, 2013, to December 31, 2015).

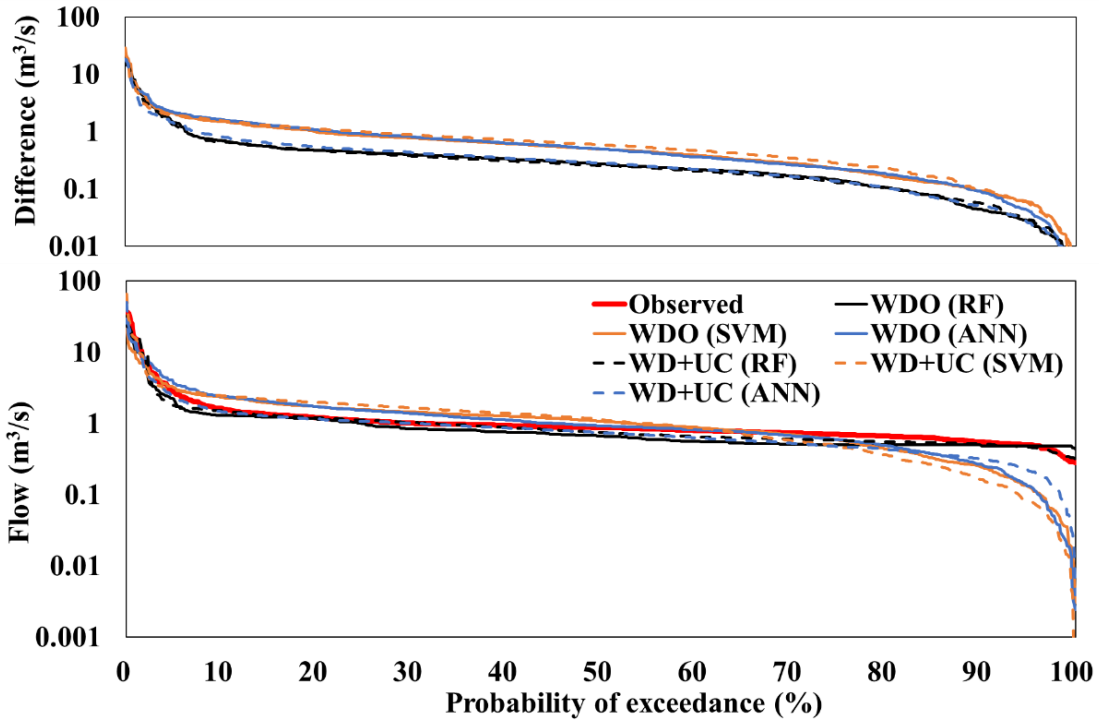


(a) the WDO and WD+UC cases.

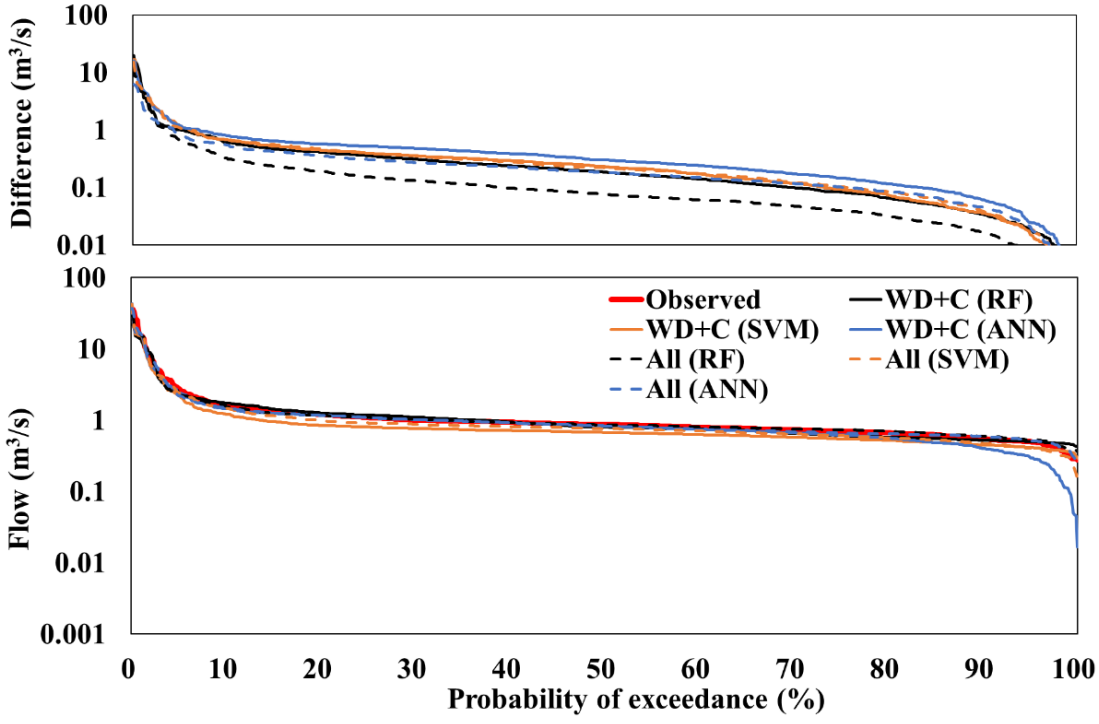


(b) the WD+C and All cases.

Figure S5. Comparison of flow duration curves (FDC) predicted using the ML models and observed at the outlet of the WJ watershed.

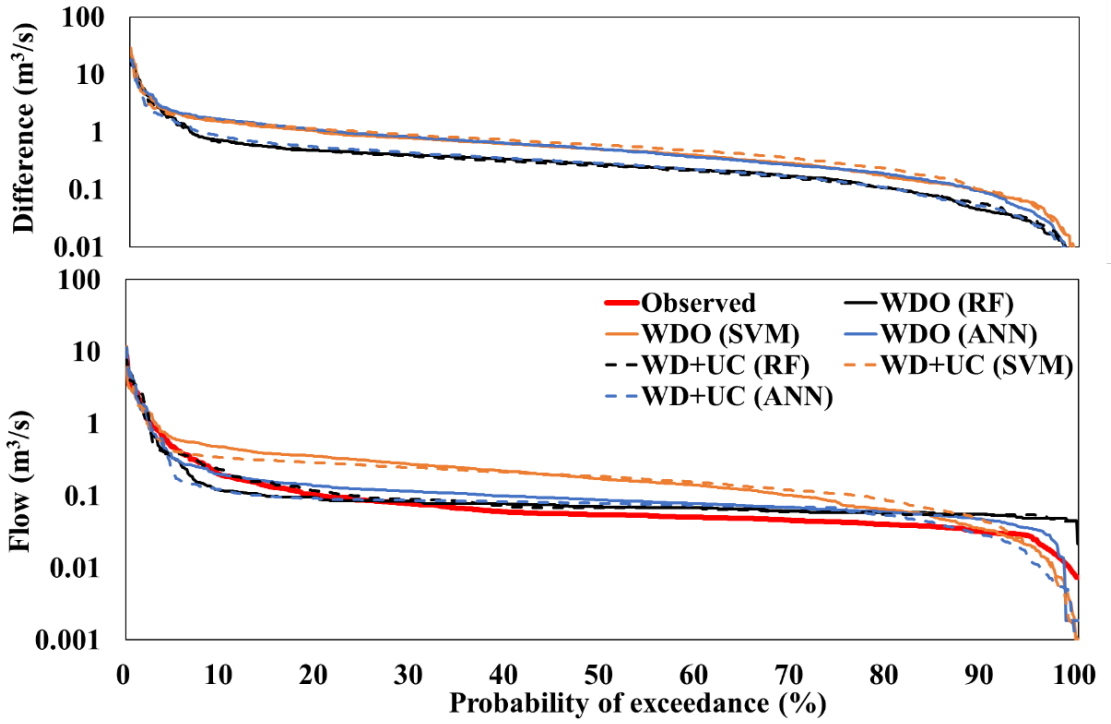


(a) the WDO and WD+UC cases.

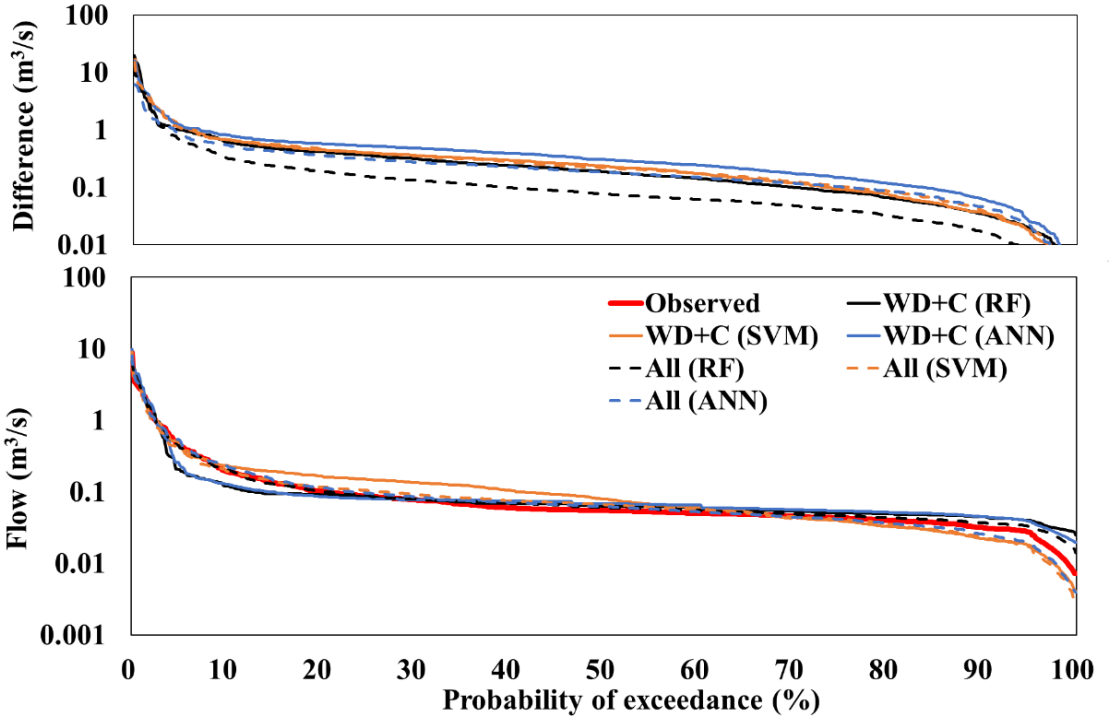


(b) the WD+C and All cases.

Figure S6. Comparison of flow duration curves (FDC) predicted using the ML models and observed at the outlet of the HN watershed.



(a) the WDO and WD+UC cases.



(b) the WD+C and All cases.

Figure S7. Comparison of flow duration curves (FDC) predicted using the ML models and observed at the outlet of the JS watershed.

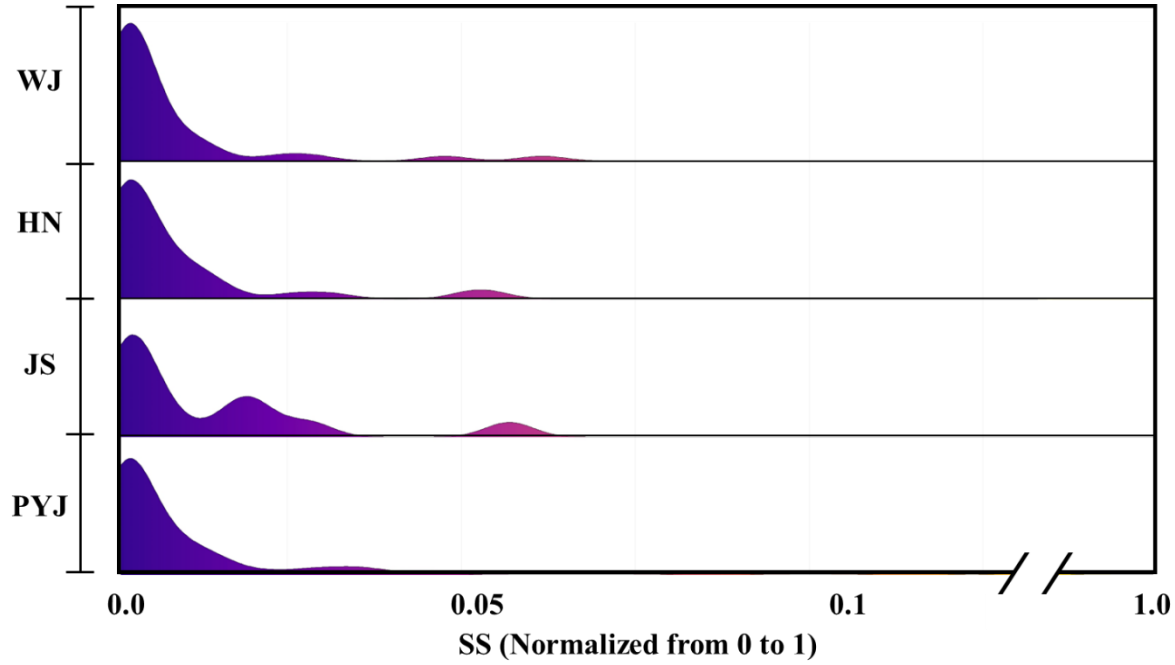


Figure S8. Density (or frequency) distributions of observed SS concentrations during the training period. The SS concentrations were normalized from 0 to 1 for each watershed.

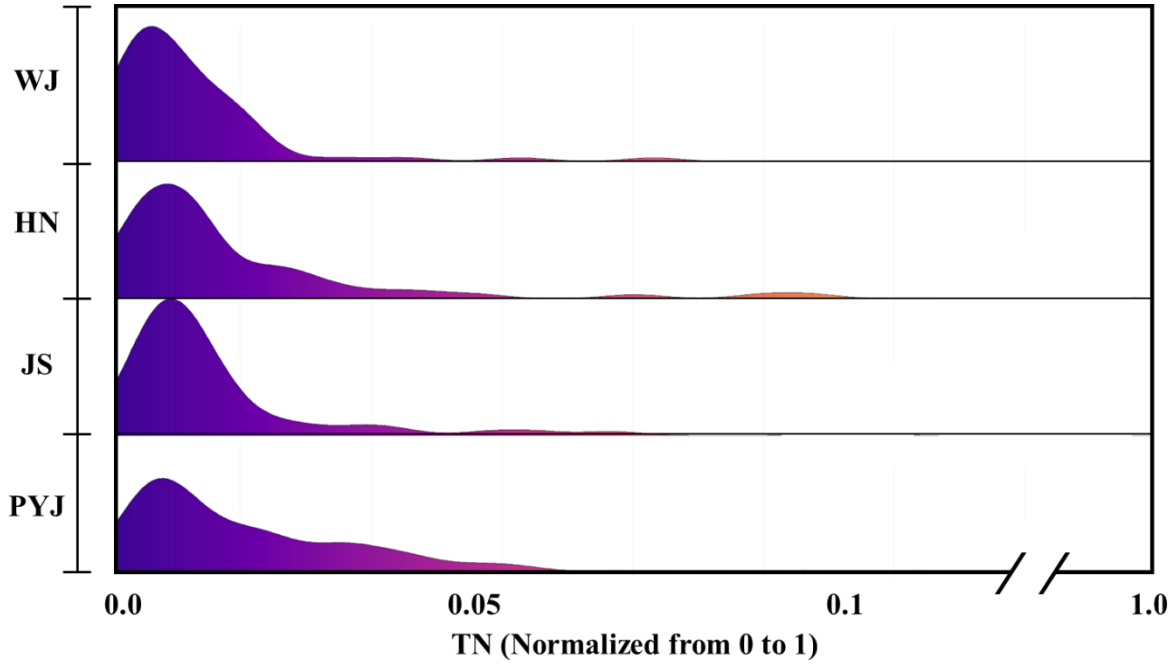


Figure S9. Density (or frequency) distributions of observed TN concentrations during the training period. The TN concentrations were normalized from 0 to 1 for each watershed.

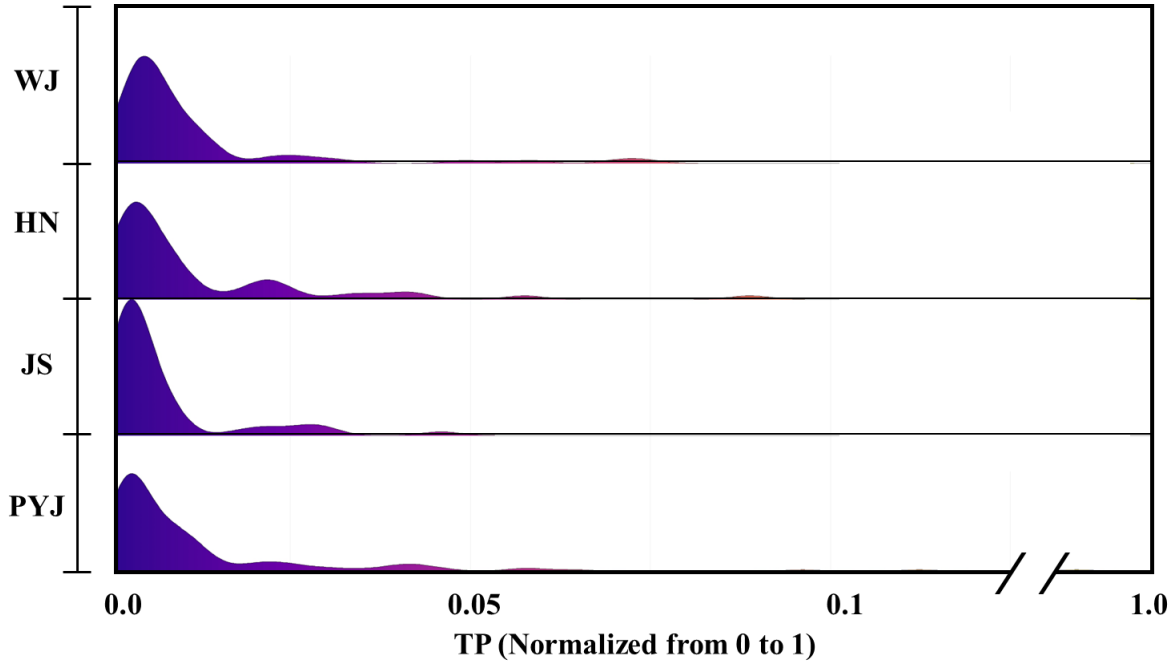


Figure S10. Density (or frequency) distributions of observed TP concentrations during the training period. The TP concentrations were normalized from 0 to 1 for each watershed.

Table S1. Land use and cover statistics of the study watersheds.

Study Watersheds	Average Slope (%)	Land uses and Covers (km^2)					
		Urban	**Field**	**Paddy field**	**Forest**	**Other**	**Total**
WJ	6.43	1.88 (5%)	6.63 (19%)	14.77 (43%)	8.45 (24%)	3.02 (9%)	34.75 (100%)
HN	5.49	5.68 (13%)	9.28 (21%)	17.19 (38%)	9.33 (21%)	3.62 (8%)	45.09 (100%)
JS	4.39	2.40 (31%)	1.21 (15%)	2.07 (26%)	1.73 (22%)	0.42 (5%)	7.83 (100%)
PYJ	4.85	11.46 (19%)	22.36 (36%)	11.23 (18%)	11.45 (19%)	4.90 (8%)	61.40 (100%)

Table S2. Descriptive statistics of observations and training data.

Variables	WS*	Unit	Min	Mean	Max	Std. Dev. **	CoV (%)***	Number of observations
P	-	mm	0.00	2.98	135.0	9.66	324.2	1,634
AT	-	°C	-9.50	15.0	31.5	9.34	62.3	1,634
WS	-	m/s	0.40	1.71	5.30	0.74	43.3	1,634
RH	-	%	23.9	68.7	99.0	14.6	21.3	1,634
SR	-	MJ/m^2	0.0	14.1	32.1	7.06	50.1	1,634
E	-	mm	0.29	3.66	9.60	2.02	55.2	1,634
Flow	WJ	m^3/s	0.09	0.68	27.7	1.89	276.9	1,634
	HN		0.22	1.21	36.7	2.65	219.6	1,634
	JS		0.00	0.16	8.91	0.53	336.9	1,634
	PYJ		0.24	1.69	70.0	3.75	221.6	1,634
SS	WJ	mg/L	1.73	25.1	244.0	33.6	133.6	121
	HN		3.21	28.8	236.4	39.0	135.5	109
	JS		3.35	100.2	1,110.0	209.1	208.8	109
	PYJ		1.70	25.1	384.6	43.7	174.1	229
TN	WJ	mg/L	0.08	2.29	6.52	0.83	36.1	121
	HN		0.98	2.39	7.86	0.87	36.3	109
	JS		1.17	3.01	6.72	0.84	27.8	109
	PYJ		0.70	2.19	5.74	0.69	31.4	229
TP	WJ	mg/L	0.01	0.17	1.70	0.16	94.0	121
	HN		0.04	0.18	1.13	0.13	72.7	109
	JS		0.02	0.20	0.82	0.12	61.2	109
	PYJ		0.04	0.14	0.72	0.10	69.1	229

* WS: Study Watershed, ** Std. Dev.: Standard Deviation, *** CoV: Coefficient of Variation.

Table S3. Information use efficiency achieved by ML models trained with the different combinations of training data sets (unit: none or fraction). The highest efficiency statistics are in bold.

ML Models	Training Data Sets	Flow		SS		TN		TP	
		ME	**TE**	**ME**	**TE**	**ME**	**TE**	**ME**	**TE**
RF	WD+UC	0.009	**5.583**	0.003	1.645	0.011	**4.674**	**0.023**	2.473
	WD+C	**0.017**	1.240	0.002	1.046	**0.025**	2.994	0.021	**4.161**
	All	0.014	1.571	**0.015**	**2.137**	0.012	3.368	0.017	1.562
SVM	WD+UC	0.031	**9.222**	0.062	**3.913**	0.012	1.807	0.019	2.936
	WD+C	**0.048**	4.033	**0.140**	3.527	**0.031**	**2.825**	**0.036**	**7.264**
	All	0.027	2.046	0.061	3.654	0.016	2.174	0.030	3.435
ANN	WD+UC	0.010	0.777	0.021	2.004	0.041	2.215	0.021	0.564
	WD+C	**0.018**	**1.470**	**0.074**	**2.033**	**0.070**	**4.453**	**0.053**	**3.007**
	All	0.011	0.968	0.036	1.513	0.033	4.063	0.031	2.417

Table S4. Summary statistics of TE of the training data sets by the watersheds with different machine learning algorithms.

Watershed	Training Data Sets	Flow			SS			TN			TP		
		RF	**SVM**	**ANN**	**RF**	**SVM**	**ANN**	**RF**	**SVM**	**ANN**	**RF**	**SVM**	**ANN**
WJ	WDO	0.299	0.315	0.265	0.385	0.210	0.174	0.215	0.240	0.276	0.174	0.281	0.246
	WD+UC	0.304	0.348	0.451	0.190	0.297	0.214	0.223	0.214	0.388	0.207	0.314	0.315
	WD+C	0.394	0.486	0.485	0.294	0.415	0.381	0.263	0.327	0.312	0.210	0.335	0.340
	All	0.424	0.529	0.469	0.535	0.539	0.514	0.253	0.315	0.324	0.404	0.367	0.349
HN	WDO	0.290	0.328	0.378	0.282	0.173	0.125	0.251	0.173	0.167	0.349	0.375	0.101
	WD+UC	0.395	0.345	0.467	0.291	0.449	0.218	0.325	0.284	0.323	0.382	0.533	0.535
	WD+C	0.439	0.509	0.457	0.461	0.433	0.432	0.312	0.420	0.274	0.387	0.488	0.456
	All	0.472	0.637	0.535	0.527	0.536	0.487	0.387	0.528	0.353	0.620	0.598	0.606
JS	WDO	0.354	0.355	0.333	0.333	0.225	0.213	0.368	0.379	0.173	0.365	0.258	0.137
	WD+UC	0.337	0.415	0.451	0.358	0.325	0.423	0.403	0.499	0.370	0.435	0.364	0.370
	WD+C	0.481	0.470	0.482	0.447	0.511	0.394	0.485	0.531	0.439	0.409	0.343	0.285
	All	0.502	0.589	0.567	0.375	0.424	0.527	0.425	0.558	0.411	0.443	0.466	0.424
PYJ	WDO	0.314	0.386	0.376	0.345	0.358	0.191	0.281	0.351	0.400	0.285	0.337	0.218
	WD+UC	0.432	0.459	0.496	0.455	0.419	0.311	0.446	0.454	0.534	0.526	0.430	0.475
	WD+C	0.417	0.429	0.449	0.402	0.450	0.361	0.316	0.400	0.461	0.413	0.358	0.355
	All	0.479	0.581	0.596	0.588	0.563	0.490	0.403	0.457	0.531	0.524	0.461	0.439