

Supplementary Materials

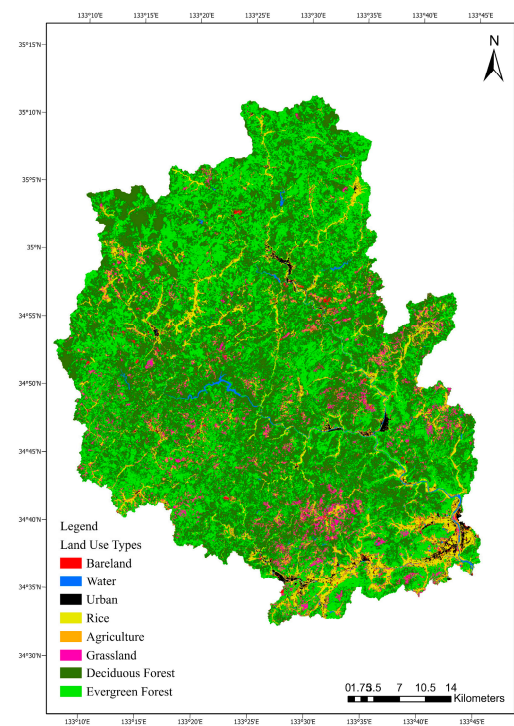


Figure S1. Land cover types of Takahashi catchment

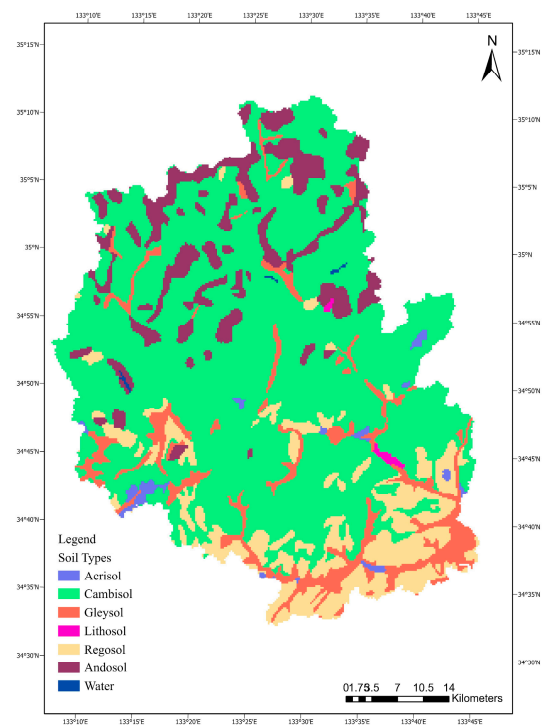


Figure S2. Soil types in Takahashi catchment

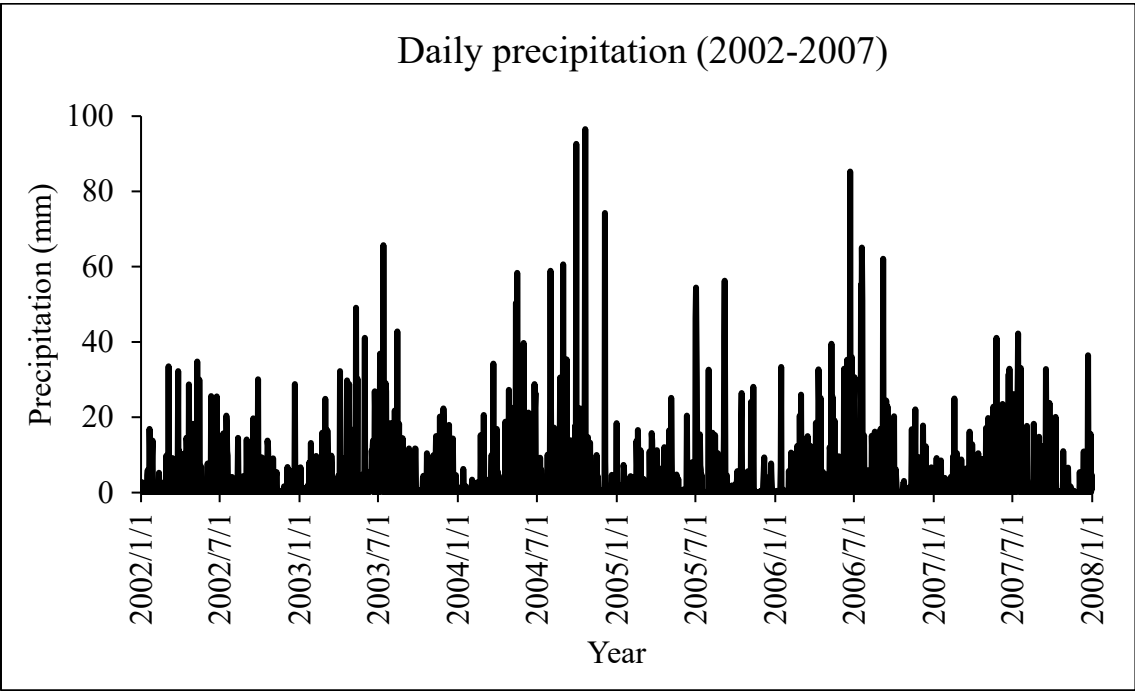


Figure S3. Daily average precipitation across the Takahashi catchment

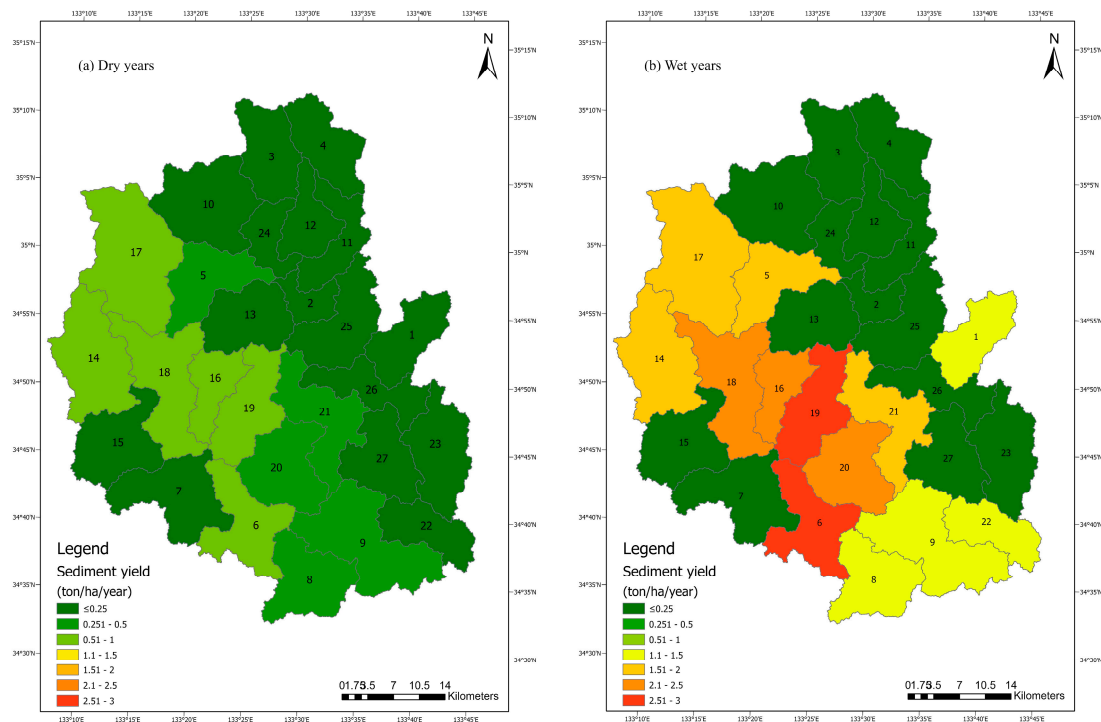


Figure S4. Comparison of annual sediment yield spatial variation between (a) dry years and (b) wet years

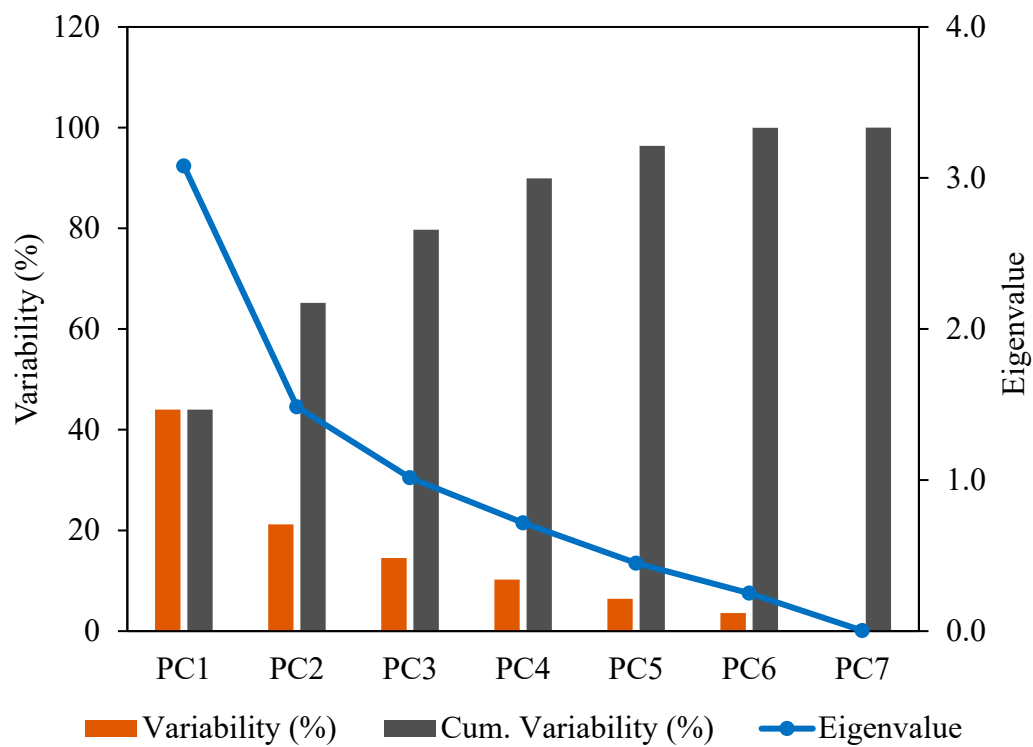
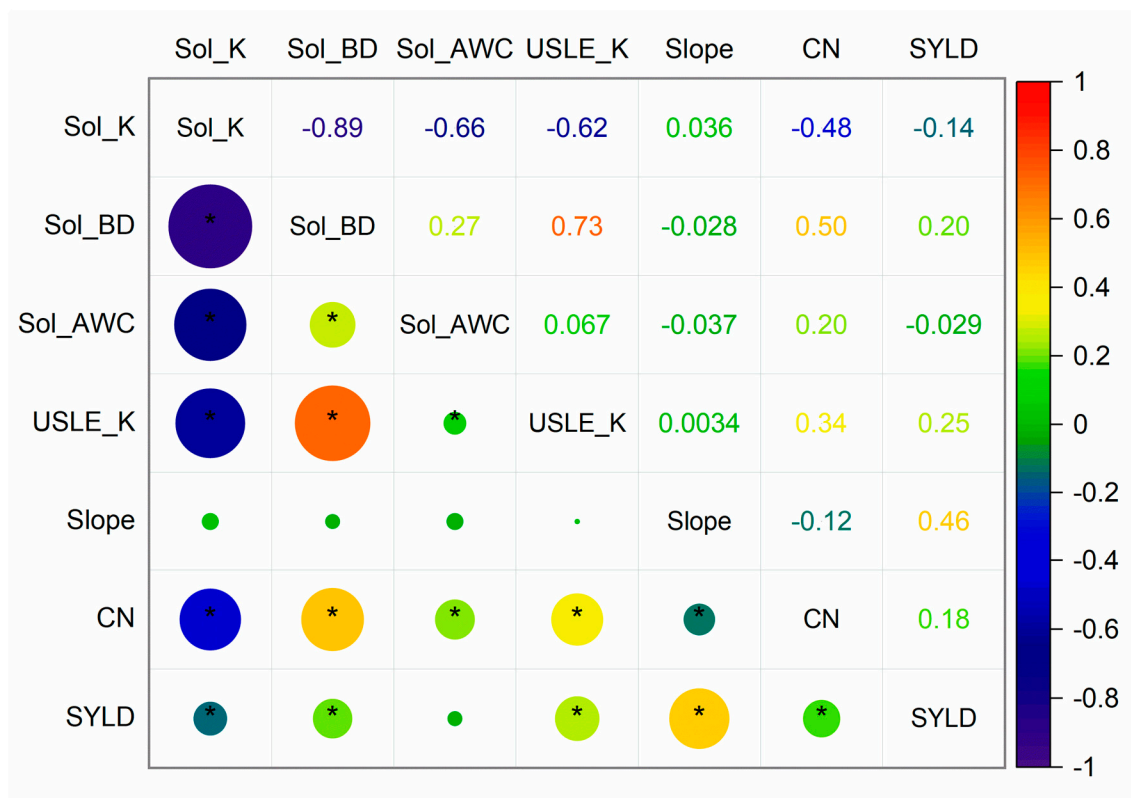


Figure S5. Eigenvalues and explained variance by principal components



Note: Values marked as ‘*’ are different from 0 at a significant level $\alpha = 0.05$.

Figure S6. Correlation matrix of the identified components

Table S1. Calibrated parameters for streamflow and sediment

	Modification type	Parameter Name	Description	Minimum	Maximum	Fitted	Remark
Flow	r	CN2	SCS runoff curve number	-0.2	0.1	-0.018	FRSD
						0.04	FRSE
						-0.05	GRAS, RICE
						-0.1	AGRL
						-0.159	BARR
						-0.2	URBN
	v	RCHRG_DP	Deep aquifer percolation fraction	0.25	0.35	0.31	
	v	ESCO	Soil evaporation compensation factor	0.15	0.8	0.181	FRSD, FRSE
						0.675	AGRL, RICE
						0.66	GRAS
						0.8	BARR, URBN
	r	SOL_K	Saturated hydraulic conductivity	-0.2	0.2	-0.098	
	r	SOL_AWC	Available water capacity of the soil layer	-0.2	0.2	0.011	
	r	SOL_BD	Moist bulk density	-0.2	0.2	0.018	
	v	GWQMN	Threshold depth of water in the shallow aquifer required for the return flow to occur (mm)	150	3000	200*	1-5,10- 21,24- 27
						2000	6-9
						3000	22,23
	v	CH_N2	Manning's "n" value for the main channel	0.02	0.1	0.069	1-5,10- 21,24- 27
						0.055	6-9
						0.068	22,23
	v	ALPHA_BF	Baseflow alpha factor (days)	0.2	0.7	0.375	
	r	HRU_SLP	Average slope steepness	-0.35	-0.1	-0.28	

	Modification type	Parameter Name	Description	Minimum	Maximum	Fitted	Remark
Sediment	v	CANMAX	Maximum canopy storage	5	25	11.2	
	v	CH_COV1	Channel erodibility factor	0.01	0.06	0.037	
	v	CH_COV2	Channel cover factor	0.01	0.1	0.057	
	v	USLE_P	Support practice factor	0	0.5	0.005	
	r	USLE_C	Minimum USLE cover factor	-0.25	0.25	0.018	RICE
						0.01	FRSD, FRSE, GRAS
	r	PRF_BSN	Peak rate adjustment factor for sediment routing in the main channel	0	1	0.85	
	v	SPCON	Linear parameter for calculating the maximum amount of sediment that can be reentrained during channel sediment routing	0.001	0.01	0.009	
	v	SPEXP	Exponent parameter for calculating sediment reentrained during channel sediment routing	1	1.5	1.39	

r indicates that the parameter value is changed relatively, and v indicates that the default parameter is replaced, * represents the value for limestone-influenced subbasins.