

Table S1. Details of the sampled cascade hydroelectricity dams in Wujiang Catchment. Table S1 Characteristics of the sampled cascade hydroelectricity dams in Wujiang Catchment. Flood control level is the storage water table just above the dead storage level up to minimum draw-down level. Normal level is the high flood water level or high reservoir level. Maximum flood level is the highest reservoir water table that can be maintained without spillway discharge or through sluice ways.

Regulation Type	Label	Name of Dam	Flood Control Level (m)	Normal Level (m)	Maximum Flood Level (m)	Storage Capacity (10 ⁹ m ³)	Catchment Area (km ²)	Installed Capacity (MW)	Opening Date	Retention Time (d)	Annual Average Runoff (10 ⁹ m ³)
Yearly	HJD	Hongjiadu	1138	1140	1145.4	4.9	9597.9	600	2005	368.8	4.8
Seasonally	DF	Dongfeng	968	970	977.5	1.0	15,467.5	570	1995	28.1	10.8
	WJD	Wujiangdu	755	760	762.8	2.3	25,406.7	1130	1982	49.3	15.8
	GPT	Goupitan	626	630	638.3	6.4	39,063	3000	2009	89.8	22.6
Weekly	SL	Silin	435	440	449.3	1.2	46,006.2	1080	2008	16.5	26.6
	ST	Shatuo	357	365	369.3	0.6	52,149.4	1120	2009	7.7	30
	PS	Pengshui	287	293	298.9	0.5	65,842.2	1750	2008	11.1	41
Daily	YP	Yinpan	213	215	225.5	0.3	72,587.3	600	2011	1.6	41
	SFY	Suofengying	835	837	842.3	0.2	19,338.9	600	2006	4.3	13.4

(Wang et al., 2018).

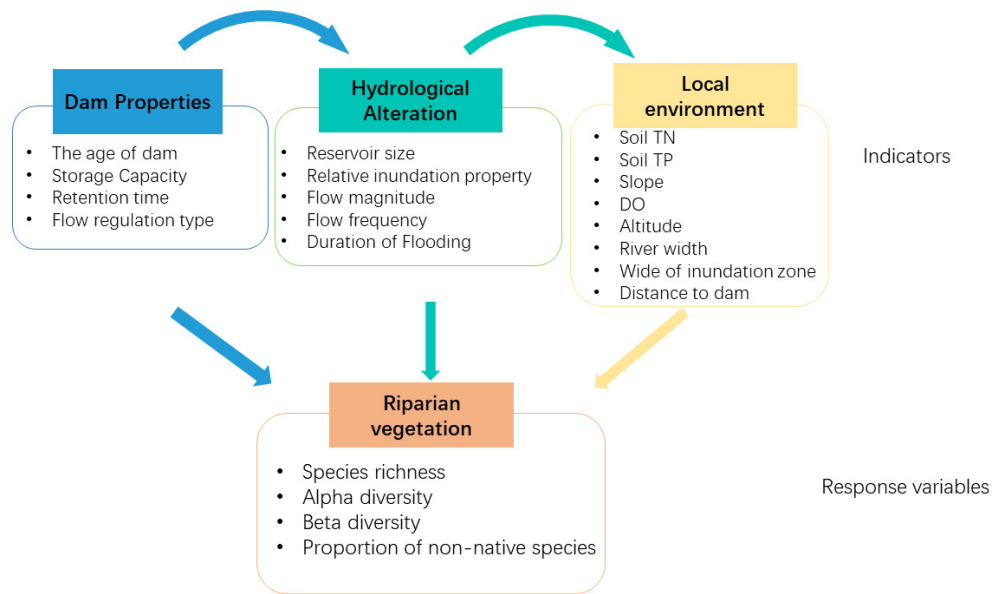


Figure S1. Data classification framework for the effect of dam and reservoir properties on the riparian vegetation.

Table S2. The numbers of the zonation, sampling sites and quadrats in inundation zone, transitional zone and unflooded zone in the study reservoirs. Reservoirs where the sampling sites in vegetation zones were fewer than the number of sampling sites were marked in italic and bold.

Regulation	Reservoir (Study Site)	Samling Sites in Each Reservoir	Vegetation Zones			Total
			Sampling Sites in Inundation Zone	Sampling Sites in Transitional Zone	Sampling Sites in Unflooded Zone	
Yearly	HJD	15	15	<i>10</i>	<i>13</i>	38
	Subtotal	15	15	10	13	38
	DF	4	4	4	4	12
Seasonally	GPT	2	2	2	2	6
	<i>WJD</i>	12	<i>11</i>	<i>11</i>	12	34
	Subtotal	18	17	17	18	52
	<i>PS</i>	6	<i>5</i>	<i>4</i>	6	15
Weekly	SL	9	9	<i>8</i>	9	26
	<i>ST</i>	8	7	8	8	23
	Subtotal	23	21	20	23	64
Daily	<i>SFY</i>	9	<i>0</i>	<i>8</i>	9	17
	<i>YP</i>	7	7	7	<i>6</i>	20
	Subtotal	16	7	15	15	37
Total	Total	72	60	62	69	191

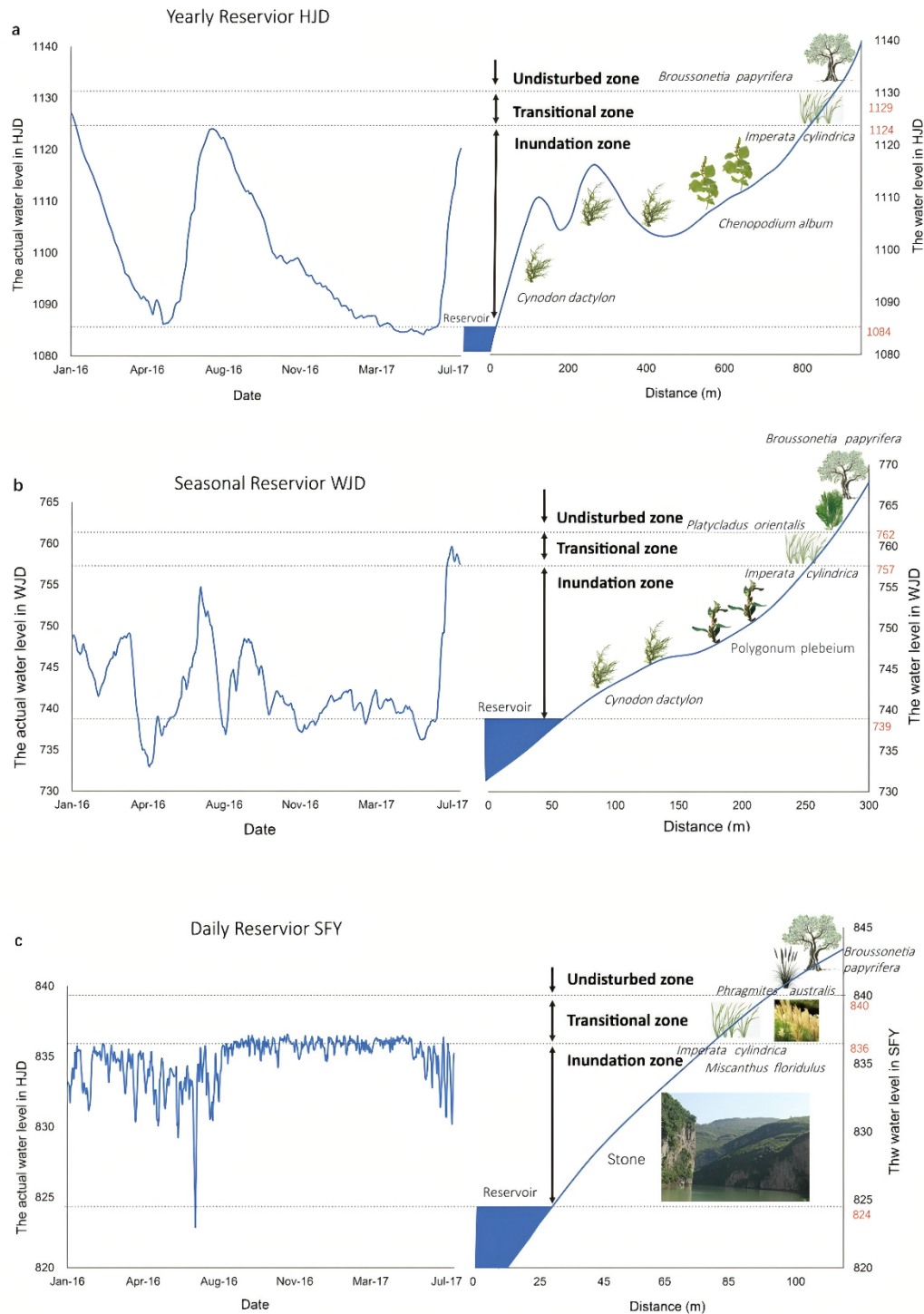


Figure S2. Schematic representations of the vegetation in the water level fluctuation zone of three different regulated reservoirs: (a) yearly, (b) seasonal and (c) daily or weekly, showing the transition from shoreline to the upper riparian zones. Station abbreviations: HJD—Hongjiadu; SFY—Suofengying; WJD—Wujiangu. Values in red indicate the elevation of the boundary between zones. Shoreline profile was constructed from the Digital Elevation Model for each reservoir.

Table S3. The list of the study riparian species with their binary classification, growth form, family and label abbreviation.

Species	Life Span	Growth Form	Family	Label
<i>Abelmoschus manihot</i>	Annual	Herb	Malvaceae	Ab. ma
<i>Adiantum hispidulum</i>	Perennial	Herb	Adiantaceae	Ad. fl
<i>Agrimonia pilosa</i>	Perennial	Herb	Rosaceae	Ag. pi
<i>Ailanthus altissima</i>	Perennial	Tree	Simaroubaceae	Ai. al
<i>Akebia trifoliata</i>	Perennial	Vine	Lardizabalaceae	Ak. tr
<i>Albizia julibrissin</i>	Perennial	Tree	Leguminosae	Al. ju
<i>Alchornea davidii</i>	Perennial	Tree	Euphorbiaceae	Al. da
<i>Aletris spicata</i>	Annual	Herb	Liliaceae	Al. sp
<i>Allium chrysanthum</i>	Perennial	Herb	Liliaceae	Al. ch
<i>Alopecurus aequalis</i>	Annual	Herb	Gramineae	Al. ae
<i>Alternanthera philoxeroides</i>	Perennial	Herb	Amaranthaceae	Al. ph
<i>Ampelopsis delavayana</i>	Perennial	Vine	Vitaceae	Am. de
<i>Argentina anserina</i>	Perennial	Herb	Rosaceae	Ar. an
<i>Arisaema heterophyllum</i>	Perennial	Herb	Araceae	Ar. he
<i>Artemisia argyi</i>	Perennial	Herb	Compositae	Ar. ar
<i>Artemisia gmelinii</i>	Perennial	Herb	Compositae	Ar. gm
<i>Artemisia lancea</i>	Perennial	Herb	Compositae	Ar. la
<i>Artemisia scoparia</i>	Perennial	Herb	Compositae	Ar. sc
<i>Arthraxon hispidus</i>	Annual	Herb	Gramineae	Ar. hi
<i>Aster indicus</i>	Perennial	Herb	Compositae	As. in
<i>Astragalus mongholicus</i>	Perennial	Herb	Leguminosae	As. mo
<i>Astragalus sinicus</i>	Biennial	Herb	Leguminosae	As. si
<i>Berchemia floribunda</i>	Perennial	Shrub	Rhamnaceae	Be. fl
<i>Biancaea decapetala</i>	Perennial	Vine	Leguminosae	Bi. de
<i>Bidens alba</i>	Annual	Herb	Compositae	Bi. al
<i>Bidens pilosa</i>	Perennial	Herb	Compositae	Bi. pi
<i>Blumea megacephala</i>	Perennial	Shrub	Compositae	Bl. me
<i>Boehmeria nivea</i>	Perennial	Shrub	Urticaceae	Bo. ni
<i>Bromus japonicus</i>	Annual	Herb	Gramineae	Br. ja
<i>Broussonetia × kazinoki</i>	Perennial	Tree	Moraceae	Br. ka
<i>Broussonetia kaempferi</i>	Perennial	Shrub	Moraceae	Br. ka
<i>Broussonetia papyrifera</i>	Perennial	Tree	Moraceae	Br. pa
<i>Buddleja lindleyana</i>	Perennial	Shrub	Loganiaceae	Bu. li
<i>Camellia japonica</i>	Perennial	Shrub	Theaceae	Ca. ja
<i>Camellia oleifera</i>	Perennial	Shrub	Theaceae	Ca. ol
<i>Canna indica</i>	Perennial	Herb	Cannaceae	Ca. in
<i>Capillipedium parviflorum</i>	Perennial	Herb	Gramineae	Ca. pa
<i>Capsella bursa-pastoris</i>	Annual	Herb	Cruciferae	Ca. bu
<i>Cardamine lyrata</i>	Perennial	Herb	Cruciferae	Ca. ly
<i>Carex dimorpholepis</i>	Perennial	Herb	Cyperaceae	Ca. di
<i>Carpesium abrotanoides</i>	Perennial	Herb	Compositae	Ca. ab
<i>Carpinus turezaninovii</i>	Perennial	Tree	Betulaceae	Ca. tu
<i>Castanea mollissima</i>	Perennial	Tree	Fagaceae	Ca. mo

<i>Catalpa ovata</i>	Perennial	Tree	<i>Bignoniaceae</i>	<i>Ca. ov</i>
<i>Causonis japonica</i>	Perennial	Vine	<i>Vitaceae</i>	<i>Ca. ja</i>
<i>Celtis biondii</i>	Perennial	Tree	<i>Ulmaceae</i>	<i>Ce. bi</i>
<i>Celtis sinensis</i>	Perennial	Tree	<i>Ulmaceae</i>	<i>Ce. si</i>
<i>Cerastium glomeratum</i>	Annual	Herb	<i>Caryophyllaceae</i>	<i>Ce. gl</i>
<i>Chenopodium album</i>	Annual	Herb	<i>Chenopodiaceae</i>	<i>Ch. al</i>
<i>Chimonanthus nitens</i>	Perennial	Shrub	<i>Calycanthaceae</i>	<i>Ch. ni</i>
<i>Chloranthus fortunei</i>	Perennial	Herb	<i>Chloranthaceae</i>	<i>Ch. fo</i>
<i>Choerospondias axillaris</i>	Perennial	Tree	<i>Anacardiaceae</i>	<i>Ch. ax</i>
<i>Chrysanthemum indicum</i>	Perennial	Herb	<i>Compositae</i>	<i>Ch. in</i>
<i>Cipadessa baccifera</i>	Perennial	Shrub	<i>Meliaceae</i>	<i>Ci. ba</i>
<i>Citrus × aurantium</i>	Perennial	Tree	<i>Rutaceae</i>	<i>Ci. au</i>
<i>Citrus maxima</i>	Perennial	Tree	<i>Rutaceae</i>	<i>Ci. ma</i>
<i>Citrus trifoliata</i>	Perennial	Tree	<i>Rutaceae</i>	<i>Ci. tr</i>
<i>Clematis chinensis</i>	Perennial	Vine	<i>Ranunculaceae</i>	<i>Cl. ch</i>
<i>Clematis florida</i>	Perennial	Vine	<i>Ranunculaceae</i>	<i>Cl. fl</i>
<i>Clematis lasiandra</i>	Perennial	Vine	<i>Ranunculaceae</i>	<i>Cl. la</i>
<i>Clinopodium chinense</i>	Perennial	Herb	<i>Labiatae</i>	<i>Cl. ch</i>
<i>Cnidium monnieri</i>	Annual	Herb	<i>Umbelliferae</i>	<i>Cn. mo</i>
<i>Cocculus orbiculatus</i>	Perennial	Vine	<i>Menispermaceae</i>	<i>Co. or</i>
<i>Compositae</i> sp.	Perennial	Herb	<i>Compositae</i>	<i>Co. sp</i>
<i>Conoclinium coelestinum</i>	Perennial	Herb	<i>Compositae</i>	<i>Co. co</i>
<i>Coriariaceae</i> sp.	Perennial	Shrub	<i>Coriariaceae</i>	<i>Co. sp.</i>
<i>Cornus controversa</i>	Perennial	Tree	<i>Cornaceae</i>	<i>Co. co</i>
<i>Cornus quinquenervis</i>	Perennial	Shrub	<i>Cornaceae</i>	<i>Co. qu</i>
<i>Corydalis edulis</i>	Annual	Herb	<i>Papaveraceae</i>	<i>Co. ed</i>
<i>Cotinus coggygria</i>	Perennial	Tree	<i>Anacardiaceae</i>	<i>Co. co</i>
<i>Crataegus maximowiczii</i>	Perennial	Shrub	<i>Rosaceae</i>	<i>Cr. ma</i>
<i>Crepidiastrum lanceolatum</i>	Annual	Herb	<i>Compositae</i>	<i>Cr. la</i>
<i>Crotalaria linifolia</i>	Perennial	Herb	<i>Leguminosae</i>	<i>Cr. li</i>
<i>Cupressus pendula</i>	Perennial	Tree	<i>Cupressaceae</i>	<i>Cu. pe</i>
<i>Cyclospermum leptophyllum</i>	Annual	Herb	<i>Umbelliferae</i>	<i>Ap. le</i>
<i>Cynodon dactylon</i>	Perennial	Herb	<i>Gramineae</i>	<i>Cy. da</i>
<i>Cyperaceae</i> sp.	Perennial	Herb	<i>Cyperaceae</i>	<i>Cy. sp</i>
<i>Cyperus difformis</i>	Annual	Herb	<i>Cyperaceae</i>	<i>Cy. di</i>
<i>Cyperus rotundus</i>	Perennial	Herb	<i>Cyperaceae</i>	<i>Cy. ro</i>
<i>Cyrtomium fortunei</i>	Perennial	Herb	<i>Dryopteridaceae</i>	<i>Cy. fo</i>
<i>Dalbergia hupeana</i>	Perennial	Vine	<i>Leguminosae</i>	<i>Da. hu</i>
<i>Dalbergia yunnanensis</i>	Perennial	Vine	<i>Leguminosae</i>	<i>Da. yu</i>
<i>Daucus carota</i>	Biennial	Herb	<i>Umbelliferae</i>	<i>Da. ca</i>
<i>Davidia involucrata</i>	Perennial	Tree	<i>Nyssaceae</i>	<i>Da. in</i>
<i>Debregeasia orientalis</i>	Perennial	Shrub	<i>Urticaceae</i>	<i>De. or</i>
<i>Descurainia sophia</i>	Annual	Herb	<i>Gramineae</i>	<i>De. so</i>
<i>Dichrocephala integrifolia</i>	Annual	Herb	<i>Compositae</i>	<i>Di. in</i>
<i>Digitaria ciliaris</i>	Annual	Herb	<i>Gramineae</i>	<i>Di. ci</i>
<i>Digitaria violascens</i>	Perennial	Herb	<i>Gramineae</i>	<i>Di. vi</i>
<i>Dioscoreaceae</i> sp.	Perennial	Vine	<i>Dioscoreaceae</i>	<i>Di. sp</i>

<i>Discocleidion rufescens</i>	Perennial	Shrub	<i>Euphorbiaceae</i>	<i>Di. ru</i>
<i>Distylium chinense</i>	Perennial	Shrub	<i>Hamamelidaceae</i>	<i>Di. ch</i>
<i>Drynaria roosii</i>	Perennial	Herb	<i>Drynariaceae</i>	<i>Dr. ro</i>
<i>Dysphania ambrosioides</i>	Annual	Herb	<i>Chenopodiaceae</i>	<i>Dy. am</i>
<i>Elaeagnus pungens</i>	Perennial	Shrub	<i>Elaeagnaceae</i>	<i>El. pu</i>
<i>Elymus tsukushiensis</i>	Perennial	Herb	<i>Gramineae</i>	<i>El. ts</i>
<i>Equisetum giganteum</i>	Perennial	Herb	<i>Equisetaceae</i>	<i>Eq. gi</i>
<i>Erigeron annuus</i>	Annual	Herb	<i>Compositae</i>	<i>Er. an</i>
<i>Erigeron canadensis</i>	Annual	Herb	<i>Compositae</i>	<i>El. ca</i>
<i>Eriobotrya japonica</i>	Perennial	Tree	<i>Rosaceae</i>	<i>Er. ja</i>
<i>Eriocapitella vitifolia</i>	Perennial	Herb	<i>Ranunculaceae</i>	<i>An. vi</i>
<i>Erythranthe nepalensis</i>	Perennial	Herb	<i>Scrophulariaceae</i>	<i>Er. ne</i>
<i>Eupatorium japonicum</i>	Perennial	Herb	<i>Compositae</i>	<i>Eu. ja</i>
<i>Eupatorium lindleyanum</i>	Perennial	Herb	<i>Compositae</i>	<i>Eu. li</i>
<i>Euphorbia helioscopia</i>	Annual	Herb	<i>Euphorbiaceae</i>	<i>Eu. he</i>
<i>Excoecaria acerifolia</i>	Perennial	Shrub	<i>Euphorbiaceae</i>	<i>Ex. ac</i>
<i>Fagaceae</i> sp.	Perennial	Tree	<i>Fagaceae</i>	<i>Fa. sp.</i>
<i>Ficus tikoua</i>	Perennial	Vine	<i>Moraceae</i>	<i>Fi. ti</i>
<i>Firmiana simplex</i>	Perennial	Tree	<i>Sterculiaceae</i>	<i>Fi. si</i>
<i>Galium aparine</i>	Annual	Herb	<i>Rubiaceae</i>	<i>Ga. ap</i>
<i>Gamochaeta pensylvanica</i>	Annual	Herb	<i>Compositae</i>	<i>Ga. pe</i>
<i>Gardenia jasminoides</i>	Perennial	Shrub	<i>Rubiaceae</i>	<i>Ga. ja</i>
<i>Geranium wilfordii</i>	Perennial	Herb	<i>Geraniaceae</i>	<i>Ge. wi</i>
<i>Gramineae</i> sp.	Annual	Herb	<i>Gramineae</i>	<i>Gr. sp.</i>
<i>Helianthus tuberosus</i>	Perennial	Herb	<i>Compositae</i>	<i>He. tu</i>
<i>Hemarthria altissima</i>	Perennial	Herb	<i>Gramineae</i>	<i>He. al</i>
<i>Hemisteptia lyrata</i>	Annual	Herb	<i>Compositae</i>	<i>He. ly</i>
<i>Houttuynia cordata</i>	Perennial	Herb	<i>Saururaceae</i>	<i>Ho. co</i>
<i>Humulus scandens</i>	Annual	Herb	<i>Moraceae</i>	<i>Hu. sc</i>
<i>Hydrocotyle moschata</i>	Perennial	Herb	<i>Umbelliferae</i>	<i>Hy. mo</i>
<i>Hylodesmum podocarpum</i>	Annual	Herb	<i>Leguminosae</i>	<i>Hy. po</i>
<i>Hypericum monogynum</i>	Perennial	Shrub	<i>Guttiferae</i>	<i>Hy. mo</i>
<i>Hypericum perforatum</i>	Perennial	Herb	<i>Guttiferae</i>	<i>Hy. pe</i>
<i>Hypericum sampsonii</i>	Perennial	Herb	<i>Guttiferae</i>	<i>Hy. sa</i>
<i>Imperata cylindrica</i>	Perennial	Herb	<i>Gramineae</i>	<i>Im. cy</i>
<i>Indigofera amblyantha</i>	Perennial	Shrub	<i>Leguminosae</i>	<i>In. am</i>
<i>Ipomoea nil</i>	Annual	Herb	<i>Convolvulaceae</i>	<i>Ip. ni</i>
<i>Iris wilsonii</i>	Perennial	Herb	<i>Iridaceae</i>	<i>Ir. wi</i>
<i>Ixeris polycephala</i>	Annual	Herb	<i>Compositae</i>	<i>Ix. po</i>
<i>Juncus effusus</i>	Perennial	Herb	<i>Juncaceae</i>	<i>Ju. ef</i>
<i>Juniperus chinensis</i>	Perennial	Tree	<i>Cupressaceae</i>	<i>Ju. ch</i>
<i>Koelreuteria paniculata</i>	Perennial	Tree	<i>Sapindaceae</i>	<i>Ko. pa</i>
<i>Lactuca sibirica</i>	Perennial	Tree	<i>Taxodiaceae</i>	<i>La. si</i>
<i>Lapsanastrum apogonoides</i>	Annual	Herb	<i>Compositae</i>	<i>La. ap</i>
<i>Leguminosae</i> sp.	Annual	Herb	<i>Leguminosae</i>	<i>Le. sp.</i>
<i>Leonurus macranthus</i>	Annual	Herb	<i>Labiatae</i>	<i>Le. ma</i>
<i>Lespedeza bicolor</i>	Perennial	Shrub	<i>Leguminosae</i>	<i>Le. bi</i>

<i>Ligustrum lucidum</i>	Perennial	Shrub	<i>Oleaceae</i>	<i>Li. lu</i>
<i>Ligustrum sinense</i>	Perennial	Shrub	<i>Oleaceae</i>	<i>Li. si</i>
<i>Lindera glauca</i>	Perennial	Shrub	<i>Lauraceae</i>	<i>Li. gl</i>
<i>Lobelia chinensis</i>	Perennial	Herb	<i>Campanulaceae</i>	<i>Lo. ch</i>
<i>Lolium perenne</i>	Perennial	Herb	<i>Gramineae</i>	<i>Lo. pe</i>
<i>Lonicera japonica</i>	Perennial	Vine	<i>Caprifoliaceae</i>	<i>Lo. ja</i>
<i>Loropetalum chinense</i>	Perennial	Shrub	<i>Hamamelidaceae</i>	<i>Lo. ch</i>
<i>Lygodium japonicum</i>	Perennial	Herb	<i>Lygodiaceae</i>	<i>Ly. ja</i>
<i>Lysimachia christinae</i>	Perennial	Herb	<i>Primulaceae</i>	<i>Ly. ch</i>
<i>Machura tricuspidata</i>	Perennial	Tree	<i>Moraceae</i>	<i>Ma. tr</i>
<i>Mallotus barbatus</i>	Perennial	Tree	<i>Euphorbiaceae</i>	<i>Ma. ba</i>
<i>Mallotus philippensis</i>	Perennial	Shrub	<i>Euphorbiaceae</i>	<i>Ma. ph</i>
<i>Mallotus repandus</i>	Perennial	Shrub	<i>Euphorbiaceae</i>	<i>Ma. re</i>
<i>Mazus pumilus</i>	Perennial	Herb	<i>Scrophulariaceae</i>	<i>Ma. pu</i>
<i>Medicago lupulina</i>	Perennial	Herb	<i>Leguminosae</i>	<i>Me. lu</i>
<i>Medicago sativa</i>	Perennial	Herb	<i>Leguminosae</i>	<i>Me. sa</i>
<i>Melia azedarach</i>	Perennial	Tree	<i>Meliaceae</i>	<i>Me. az</i>
<i>Melilotus officinalis</i>	Biennial	Herb	<i>Leguminosae</i>	<i>Me. of</i>
<i>Mentha canadensis</i>	Perennial	Herb	<i>Labiatae</i>	<i>Me. ca</i>
<i>Microstegium fasciculatum</i>	Perennial	Herb	<i>Gramineae</i>	<i>Mi. fa</i>
<i>Millettia aboensis</i>	Perennial	Vine	<i>Leguminosae</i>	<i>Mi. ab</i>
<i>Miscanthus floridulus</i>	Perennial	Herb	<i>Gramineae</i>	<i>Mi. fl</i>
<i>Miscanthus sinensis</i>	Perennial	Herb	<i>Gramineae</i>	<i>Mi. si</i>
<i>Morus alba</i>	Perennial	Tree	<i>Moraceae</i>	<i>Mo. al</i>
<i>Mosla scabra</i>	Annual	Herb	<i>Labiatae</i>	<i>Mo. sc</i>
<i>Musa basjoo</i>	Perennial	Herb	<i>Musaceae</i>	<i>Mu. ba</i>
<i>Myrsine africana</i>	Perennial	Shrub	<i>Myrsinaceae</i>	<i>My. af</i>
<i>Nandina domestica</i>	Perennial	Shrub	<i>Berberidaceae</i>	<i>Na. do</i>
<i>Odontosoria chinensis</i>	Perennial	Herb	<i>Lindsaeaceae</i>	<i>Od. ch</i>
<i>Oenanthe javanica</i>	Perennial	Herb	<i>Umbelliferae</i>	<i>Oe. ja</i>
<i>Oenothera biennis</i>	Biennial	Herb	<i>Onagraceae</i>	<i>Oe. bi</i>
<i>Ophiopogon japonicus</i>	Perennial	Herb	<i>Liliaceae</i>	<i>Op. ja</i>
<i>Oplismenus undulatifolius</i>	Annual	Herb	<i>Gramineae</i>	<i>Op. un</i>
<i>Oreocnide frutescens</i>	Perennial	Shrub	<i>Urticaceae</i>	<i>Or. fr</i>
<i>Oxalis corniculata</i>	Perennial	Herb	<i>Oxalidaceae</i>	<i>Ox. co</i>
<i>Paulownia tomentosa</i>	Perennial	Tree	<i>Scrophulariaceae</i>	<i>Pa. to</i>
<i>Periploca sepium</i>	Perennial	Shrub	<i>Asclepiadaceae</i>	<i>Pe. se</i>
<i>Persicaria hydropiper</i>	Perennial	Herb	<i>Polygonaceae</i>	<i>Pe. hy</i>
<i>Persicaria lapathifolia</i>	Annual	Herb	<i>Polygonaceae</i>	<i>Pe. la</i>
<i>Phanera championii</i>	Perennial	Vine	<i>Leguminosae</i>	<i>Ph. ch</i>
<i>Phragmites australis</i>	Perennial	Herb	<i>Gramineae</i>	<i>Ph. au</i>
<i>Phyllanthus puber</i>	Perennial	Shrub	<i>Euphorbiaceae</i>	<i>Ph. pu</i>
<i>Phyllostachys edulis</i>	Perennial	Herb	<i>Gramineae</i>	<i>Ph. ed</i>
<i>Phytolacca acinosa</i>	Perennial	Herb	<i>Phytolaccaceae</i>	<i>Ph. ac</i>
<i>Pilea plataniiflora</i>	Perennial	Herb	<i>Urticaceae</i>	<i>Pi. pl</i>
<i>Pinus thunbergii</i>	Perennial	Tree	<i>Pinaceae</i>	<i>Pi. th</i>
<i>Piper hancei</i>	Perennial	Vine	<i>Piperaceae</i>	<i>Pi. ha</i>

<i>Pittosporum daphniphyloides</i>	Perennial	Tree	<i>Pittosporaceae</i>	<i>Pi. da</i>
<i>Pittosporum glabratum</i>	Perennial	Tree	<i>Pittosporaceae</i>	<i>Pi. gl</i>
<i>Plantago asiatica</i>	Perennial	Herb	<i>Plantaginaceae</i>	<i>Pl. as</i>
<i>Platycladus orientalis</i>	Perennial	Tree	<i>Cupressaceae</i>	<i>Pl. or</i>
<i>Poa infirma</i>	Perennial	Herb	<i>Gramineae</i>	<i>Po. in</i>
<i>Pogonatherum crinitum</i>	Annual	Herb	<i>Gramineae</i>	<i>Po. cr</i>
<i>Polygala japonica</i>	Perennial	Herb	<i>Polygalaceae</i>	<i>Po. ja</i>
<i>Polygonaceae</i> sp.	Perennial	Herb	<i>Polygonaceae</i>	<i>Po. sp.</i>
<i>Polygonum aviculare</i>	Annual	Herb	<i>Salicaceae</i>	<i>Po. av</i>
<i>Polygonum plebeium</i>	Annual	Herb	<i>Polygonaceae</i>	<i>Po. pl</i>
<i>Polypogon fugax</i>	Annual	Herb	<i>Gramineae</i>	<i>Po. fu</i>
<i>Polypogon monspeliensis</i>	Annual	Herb	<i>Gramineae</i>	<i>Po. mo</i>
<i>Populus × canadensis</i>	Perennial	Tree	<i>Salicaceae</i>	<i>Po. ca</i>
<i>Populus adenopoda</i>	Perennial	Tree	<i>Salicaceae</i>	<i>Po. ad</i>
<i>Populus lasiocarpa</i>	Perennial	Tree	<i>Salicaceae</i>	<i>Po. la</i>
<i>Portulaca oleracea</i>	Annual	Herb	<i>Portulacaceae</i>	<i>Po. ol</i>
<i>Potentilla chinensis</i>	Perennial	Herb	<i>Rosaceae</i>	<i>Po. ch</i>
<i>Potentilla indica</i>	Perennial	Herb	<i>Rosaceae</i>	<i>Po. in</i>
<i>Prunella vulgaris</i>	Perennial	Herb	<i>Labiatae</i>	<i>Pr. vu</i>
<i>Prunus cerasus</i>	Perennial	Tree	<i>Rosaceae</i>	<i>Pr. ce</i>
<i>Prunus persica</i>	Perennial	Tree	<i>Rosaceae</i>	<i>Am. pe</i>
<i>Pseudognaphalium affine</i>	Annual	Herb	<i>Compositae</i>	<i>Ps. af</i>
<i>Pteridium latiusculum</i>	Perennial	Herb	<i>Pteridiaceae</i>	<i>Pt. la</i>
<i>Pteris cretica</i>	Perennial	Herb	<i>Pteridaceae</i>	<i>Pt. cr</i>
<i>Pteris vittata</i>	Perennial	Herb	<i>Pteridaceae</i>	<i>Pt. vi</i>
<i>Pterocarya stenoptera</i>	Perennial	Tree	<i>Juglandaceae</i>	<i>Pt. st</i>
<i>Pteroceltis tatarinowii</i>	Perennial	Tree	<i>Ulmaceae</i>	<i>Pt. ta</i>
<i>Puccinellia tenuiflora</i>	Perennial	Herb	<i>Gramineae</i>	<i>Pu. te</i>
<i>Pueraria montana</i> var. <i>lobata</i>	Perennial	Vine	<i>Elaeagnaceae</i>	<i>Pu. mo</i>
<i>Pyracantha fortuneana</i>	Perennial	Shrub	<i>Rosaceae</i>	<i>Py. fo</i>
<i>Pyrus betulifolia</i>	Perennial	Tree	<i>Rosaceae</i>	<i>Py. be</i>
<i>Quercus acutissima</i>	Perennial	Tree	<i>Fagaceae</i>	<i>Qu. ac</i>
<i>Quercus aliena</i>	Perennial	Tree	<i>Fagaceae</i>	<i>Qu. al</i>
<i>Quercus mongolica</i>	Perennial	Tree	<i>Flacourtiaceae</i>	<i>Qu. mo</i>
<i>Ranunculus cantoniensis</i>	Annual	Herb	<i>Ranunculaceae</i>	<i>Ra. ca</i>
<i>Ranunculus sieboldii</i>	Perennial	Herb	<i>Ranunculaceae</i>	<i>Ra. si</i>
<i>Reynoutria japonica</i>	Perennial	Herb	<i>Polygonaceae</i>	<i>Re. ja</i>
<i>Reynoutria multiflora</i>	Perennial	Herb	<i>Polygonaceae</i>	<i>Re. mu</i>
<i>Rhamnella franguloides</i>	Perennial	Shrub	<i>Rhamnaceae</i>	<i>Rh. fr</i>
<i>Rhododendron microphyton</i>	Perennial	Shrub	? <i>Ericaceae</i>	<i>Rh. mi</i>
<i>Rhododendron simsii</i>	Perennial	Shrub	<i>Ericaceae</i>	<i>Rh. si</i>
<i>Rhus chinensis</i>	Perennial	Shrub	<i>Anacardiaceae</i>	<i>Rh. ch</i>
<i>Ricinus communis</i>	Annual	Herb	<i>Euphorbiaceae</i>	<i>Ri. co</i>
<i>Robinia pseudoacacia</i>	Perennial	Tree	<i>Leguminosae</i>	<i>Ro. ps</i>
<i>Rorippa indica</i>	Perennial	Herb	<i>Cruciferae</i>	<i>Ro. in</i>
<i>Rosa × hibernica</i>	Perennial	Shrub	<i>Rosaceae</i>	<i>Ro. hi</i>
<i>Rosa chinensis</i>	Perennial	Herb	<i>Rosaceae</i>	<i>Ro. ch</i>

<i>Rosa multiflora</i>	Perennial	Shrub	<i>Rosaceae</i>	<i>Ro. mu</i>
<i>Rosa multiflora</i> var. <i>cathayensis</i>	Perennial	Shrub	<i>Rosaceae</i>	<i>Ro. mu</i>
<i>Rosa roxburghii</i>	Perennial	Shrub	<i>Rosaceae</i>	<i>Ro. ro</i>
<i>Rosa rugosa</i>	Perennial	Shrub	<i>Rosaceae</i>	<i>Ro. ru</i>
<i>Rosaceae</i> sp.	Perennial	Herb	<i>Rosaceae</i>	<i>Po. sp.</i>
<i>Rubia cordifolia</i>	Perennial	Herb	<i>Rubiaceae</i>	<i>Ru. co</i>
<i>Rubus amphidasys</i>	Perennial	Shrub	<i>Rosaceae</i>	<i>Ru. am</i>
<i>Rubus corchorifolius</i>	Perennial	Shrub	<i>Rosaceae</i>	<i>Ru. co</i>
<i>Rubus ellipticus</i>	Perennial	Shrub	<i>Rosaceae</i>	<i>Ru. el</i>
<i>Rubus parvifolius</i>	Perennial	Shrub	<i>Rosaceae</i>	<i>Ru. pa</i>
<i>Rubus swinhoi</i>	Perennial	Shrub	<i>Rosaceae</i>	<i>Ru. sw</i>
<i>Rumex acetosa</i>	Perennial	Herb	<i>Polygonaceae</i>	<i>Ru. ac</i>
<i>Rumex trisetifer</i>	Annual	Herb	<i>Polygonaceae</i>	<i>Ru. tr</i>
<i>Sabia swinhoi</i>	Perennial	Shrub	<i>Sabiaceae</i>	<i>Sa. sw</i>
<i>Sagina japonica</i>	Annual	Herb	<i>Caryophyllaceae</i>	<i>Sa. ja</i>
<i>Salix babylonica</i>	Perennial	Tree	<i>Salicaceae</i>	<i>Sa. ba</i>
<i>Salvia aurea</i>	Annual	Herb	<i>Labiatae</i>	<i>Sa. au</i>
<i>Salvia miltiorrhiza</i>	Perennial	Herb	<i>Labiatae</i>	<i>Sa. mi</i>
<i>Salvia plebeia</i>	Annual	Herb	<i>Labiatae</i>	<i>Sa. pl</i>
<i>Sambucus williamsii</i>	Perennial	Shrub	<i>Caprifoliaceae</i>	<i>Sa. wi</i>
<i>Selaginella sinensis</i>	Perennial	Herb	<i>Selaginellaceae</i>	<i>Se. si</i>
<i>Selaginella tamariscina</i>	Perennial	Herb	<i>Selaginellaceae</i>	<i>Se. ta</i>
<i>Selaginella uncinata</i>	Perennial	Herb	<i>Selaginellaceae</i>	<i>Se. un</i>
<i>Senecio scandens</i>	Perennial	Herb	<i>Compositae</i>	<i>Se. sc</i>
<i>Setaria viridis</i>	Annual	Herb	<i>Gramineae</i>	<i>Se. vi</i>
<i>Smilax glabra</i>	Perennial	Shrub	<i>Liliaceae</i>	<i>Sm. gl</i>
<i>Smilax walteri</i>	Perennial	Shrub	<i>Liliaceae</i>	<i>Sm. wa</i>
<i>Solanaceae</i> sp.	Annual	Herb	<i>Solanaceae</i>	<i>So. sp.</i>
<i>Solanum nigrum</i>	Annual	Herb	<i>Solanaceae</i>	<i>So. ni</i>
<i>Solanum virginianum</i>	Annual	Herb	<i>Solanaceae</i>	<i>So. vi</i>
<i>Soliva anthemifolia</i>	Annual	Herb	<i>Compositae</i>	<i>So. an</i>
<i>Sophora davidi</i>	Perennial	Shrub	<i>Leguminosae</i>	<i>So. da</i>
<i>Spiraea chinensis</i>	Perennial	Shrub	<i>Rosaceae</i>	<i>Sp. ch</i>
<i>Spiraea salicifolia</i>	Perennial	Shrub	<i>Rosaceae</i>	<i>Sp. sa</i>
<i>Spiranthes sinensis</i>	Perennial	Herb	<i>Orchidaceae</i>	<i>Sp. si</i>
<i>Staphylea forrestii</i>	Perennial	Tree	<i>Staphyleaceae</i>	<i>St. fo</i>
<i>Stellaria media</i>	Annual	Herb	<i>Caryophyllaceae</i>	<i>St. me</i>
<i>Styphnolobium japonicum</i>	Perennial	Tree	<i>Leguminosae</i>	<i>St. ja</i>
<i>Tetradium glabrifolium</i>	Perennial	Tree	<i>Rutaceae</i>	<i>Te. gl</i>
<i>Theaceae</i> sp.	Perennial	Shrub	<i>Theaceae</i>	<i>Th. sp.</i>
<i>Thelypteris acuminata</i>	Perennial	Herb	<i>Thelypteridaceae</i>	<i>Th. ac</i>
<i>Thelypteris glanduligera</i>	Perennial	Herb	<i>Thelypteridaceae</i>	<i>Th. gl</i>
<i>Thelypteris parasitica</i>	Perennial	Herb	<i>Thelypteridaceae</i>	<i>Th. pa</i>
<i>Toona sinensis</i>	Perennial	Tree	<i>Meliaceae</i>	<i>To. si</i>
<i>Torilis scabra</i>	Annual	Herb	<i>Umbelliferae</i>	<i>To. sc</i>
<i>Trachycarpus fortunei</i>	Perennial	Tree	<i>Palmae</i>	<i>Tr. fo</i>
<i>Triadica sebifera</i>	Perennial	Tree	<i>Euphorbiaceae</i>	<i>Tr. se</i>

<i>Trifolium repens</i>	Perennial	Herb	<i>Leguminosae</i>	<i>Tr. re</i>
<i>Trigonotis peduncularis</i>	Annual	Herb	<i>Boraginaceae</i>	<i>Tr. pe</i>
<i>Typha orientalis</i>	Perennial	Herb	<i>Typhaceae</i>	<i>Ty. or</i>
<i>Ulmaceae</i> sp.	Perennial	Tree	<i>Ulmaceae</i>	<i>Ul. sp</i>
<i>Ulmus pumila</i>	Perennial	Tree	<i>Ulmaceae</i>	<i>Ul. pu</i>
<i>Umbelliferae</i> sp.	Annual	Herb	<i>Umbelliferae</i>	<i>Um. sp.</i>
<i>Urena lobata</i>	Perennial	Shrub	<i>Malvaceae</i>	<i>Ur. lo</i>
<i>Urticaceae</i> sp.	Perennial	Herb	<i>Urticaceae</i>	<i>Ur. sp.</i>
<i>Verbena officinalis</i>	Perennial	Herb	<i>Verbenaceae</i>	<i>Ve. of</i>
<i>Vernicia fordii</i>	Perennial	Tree	<i>Euphorbiaceae</i>	<i>Ve. fo</i>
<i>Veronica anagallis-aquatica</i>	Perennial	Herb	<i>Scrophulariaceae</i>	<i>Ve. an</i>
<i>Veronica peregrina</i>	Annual	Herb	<i>Scrophulariaceae</i>	<i>Ve. pe</i>
<i>Veronica persica</i>	Annual	Herb	<i>Scrophulariaceae</i>	<i>Ve. pe</i>
<i>Veronica polita</i>	Annual	Herb	<i>Scrophulariaceae</i>	<i>Ve. po</i>
<i>Viburnum chinshanense</i>	Perennial	Shrub	<i>Caprifoliaceae</i>	<i>Vi. ch</i>
<i>Viburnum utile</i>	Perennial	Shrub	<i>Caprifoliaceae</i>	<i>Vi. ut</i>
<i>Vicia cracca</i>	Perennial	Herb	<i>Leguminosae</i>	<i>Vi. cr</i>
<i>Vicia sepium</i>	Perennial	Herb	<i>Leguminosae</i>	<i>Vi. se</i>
<i>Vincetoxicum atratum</i>	Perennial	Herb	<i>Asclepiadaceae</i>	<i>Vi. at</i>
<i>Viola philippica</i>	Perennial	Herb	<i>Violaceae</i>	<i>Vi. ph</i>
<i>Vitex negundo</i>	Perennial	Shrub	<i>Verbenaceae</i>	<i>Vi. ne</i>
<i>Vitis heyneana</i>	Perennial	Vine	<i>Vitaceae</i>	<i>Vi. he</i>
<i>Woodwardia japonica</i>	Perennial	Herb	<i>Blechnaceae</i>	<i>Wo. ja</i>
<i>Xanthium strumarium</i>	Annual	Herb	<i>Compositae</i>	<i>Xa. st</i>
<i>Youngia heterophylla</i>	Annual	Herb	<i>Compositae</i>	<i>Yo. he</i>
<i>Youngia japonica</i>	Annual	Herb	<i>Compositae</i>	<i>Yo. ja</i>
<i>Zanthoxylum bungeanum</i>	Perennial	Tree	<i>Rutaceae</i>	<i>Za. bu</i>
<i>Zanthoxylum capense</i>	Perennial	Shrub	<i>Rutaceae</i>	<i>Za. ca</i>

Table S4. The introduction of the important concepts appears in the manuscript.

Important Concepts	Definition of the Key Concepts
Cascade reservoirs	A series of reservoirs are constructed across one river, which produce cumulative effects stage by stage.
Reservoir Storage capacity	The water storage capacity below flooding level. Which is a representative index for dividing reservoir grade and determining engineering safety standard.
Water level fluctuation magnitude	The magnitude of the water level fluctuation refers to the water level fluctuation between the high-water table and low-water table due to the management action in reservoirs.
Water level fluctuation frequency	The water level fluctuation frequency depends mainly on the storage capacity and the water release control of each reservoir with time, which refers to the recurrence interval.
Water level fluctuation zone	A special habitat with alternating flood and dry cycles caused by periodic submergence and exposure due to water level changes in rivers and reservoirs (Zhang et al., 2012)
Reservoir regulation	The regulation of reservoir uses the water usage criteria release, operating policies to control runoff and redistribute runoff according to the economic and social needs (power generation, irrigation, water supply, <i>etc.</i>) to reduce flood peak and prevent flood disaster. It could be divided into the daily, weekly, seasonally, and yearly reservoirs. The altering WLF magnitude and frequency are the consequence of reservoir regulation.
Daily regulated reservoirs	The water table in the daily regulated reservoirs alter during day and night according to the water load for power generation. The retention time of the natural runoff is generally 24 h.
Weekly regulated reservoirs	The river runoff in the weekly regulated reservoirs does not change much within a week during the dry season. The retention time of the natural runoff in weekly regulated reservoir is generally 1–3 weeks.
Seasonally regulated reservoirs	The reservoir could complete the water retention from empty to full reservoir in 1–3 months period.
Yearly regulated reservoirs	The retention time of the natural runoff in yearly regulated reservoir is generally one year. The yearly regulated reservoir could carry out the daily regulation and weekly regulation as well.

Table S5. The relative inundation probability (RIP) from the relative height of the plot against the width of each zonation.

Label	Regulation Operation	RIP in Inundation Zone	Width of the Inundation Zone (m)	RIP in Inundation Zone per meter	Rip in Transitional Zone	Width of the Transitional Zone (m)	RIP in Transitional Zone
HJD	yearly	97.8648	53.88467	1.8161901	2.1352	40.821	0.0523064
DF	seasonally	96.4413	14.82925	6.5034509	3.5587	3	1.1862333
SFY	Daily	77.4021	10.432	7.4196798	22.5979	2.165	10.437829
WJD	seasonally	96.4413	22.79609	4.2306069	3.5587	7.023182	0.5067077
GPT	seasonally	96.4413	38.756	2.4884224	3.5587	20.43	0.1741899
SL	Weekly	85.1234	11.81056	7.2074002	14.8766	5.810556	2.5602715
ST	Weekly	85.1234	7.001857	12.15726	14.8766	4.406429	3.3761128
PS	Weekly	85.1234	13.008	6.5439268	14.8766	3.208	4.6373441
YP	Daily	77.4021	12.90714	5.9968423	22.5979	3.907143	5.7837404

Table S6. The introduction of the research questions as well as the relevant predictor and explanatory variables.

Research Questions	Response Variables (Which Scale)	Definition	Predictors (Which Scale)	Statistical Analyses
(1) How do species richness, alpha diversity, beta diversity the proportion of non-native species of riparian vegetation in cascade reservoirs varying between different regulation types and zonation? Which species are indicative of different regulation type by zonation?	Species richness (per sampling site)	The number of all species per sampling site	Flow regulation type Zonation Local environmental components	The two-factor of covariates (ANCOVA) Indval
	Species Shannon diversity	Shannon's diversity index of the species per sampling site		
	Proportion of non-native species	The proportion of the non-native species per sampling site		
	Beta diversity	beta diversity of the species per sampling site		
	Nestedness	Nestedness of the species per sampling site		
	Species turnover	Species turnover of the species per sampling site		
(2) How much variation in species composition at a quadrat scale do factor such as regulation explain? And which is the best predictor?	Species composition (per sampling quadrat)	In each quadrat, the abundance of all recoded plant species was transformed to 5 levels according to Van Der Meijden (2005).	Dam properties (Retention time, Reservoir age, Storage capacity)	RDA/Variation Partitioning
			Hydrological alteration (WLF frequency, WLF duration of flooding, WLF magnitude, Reservoir size, Relative inundation probability) Local environment (TN, TP, Temperature, DO, pH, Slope, Width_WLF, River width, Soil texture, Width_Inundation, Distance to dam)	

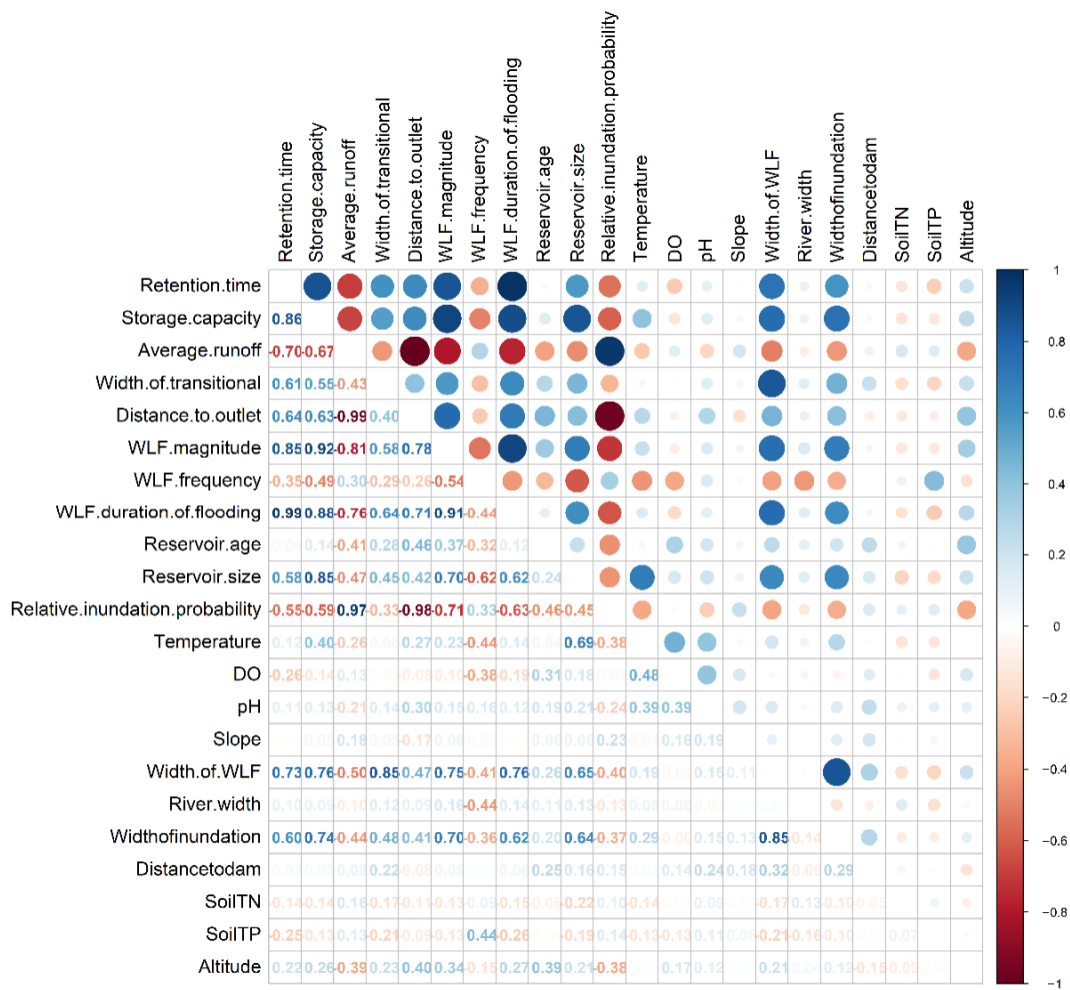


Figure S3. The pairwise correlation between the indicators in the analyses.

Table S7. The independent explanatory variables in the study were the remaining variables in the final model. The VIF value was calculated for the predictors. The value of the remaining indicators was less than 3, which could be considered as the independent variables. Abbreviation was shown as follows, RIZ—Reservoir Inundation Zone, RTZ—Reservoir Transitional Zone, WLF—Water Level Fluctuation.

Indicators	Full Model	Model1 (M1)	Model2 (M2)	Model3 (M3)	Model4 (M4)	Final Model
	Full model	FM-WLF duration of flooding	M1-Distance to outlet	M2-Width of WLF	M3-WLF magnitude	M4-WLF frequency
Retention time	40,782	16.55	15.5	14.4	5.11	2.98
Storage capacity	8474	315.97				
WLF magnitude	76.17	48.83	21.49	21.45		
WLF frequency	571.4	13.36	7.58	7.56	6.4	
WLF duration of flooding	52,561					
Reservoir age	349	5.25	4.88	4.88	3.12	2.87
Reservoir size	20.96	7.22	3.24	3.24	3.21	2.52
Relative inundation probability	4981	213.64	3.86	3.78	3.59	2.87
DO	4.59	3.93	3.85	3.83	3.61	1.85
pH	15.31	3.57	3.03	3.03	2.98	1.64
Slope	1.37	1.36	1.36	1.36	1.29	1.29
Width of WLF	64.57	63.84	63.71			
River width	2.141	1.9	1.86	1.85	1.85	1.26
Width of RIZ	22.32	22.31	21.94	3.17	2.73	2.58
Distance to dam	2.21	2.18	1.95	1.82	1.72	1.68
Soil TN	1.43	1.38	1.16	1.16	1.16	1.15
Soil TP	1.85	1.84	1.8	1.79	1.36	1.23
Altitude	1.6	1.58	1.58	1.55	1.54	1.45
Width of RTZ	19.54	19.29	19.2	2.25	2.19	2.11

Table S8. Forward model selection of generalized linear mixed-effect model (GLMMs.NB) for species richness.

Model	Step Forward Process	Formular	AIC	BIC	logLik	Deviance
Full model	ALL	Species richness ~ Regulation type + Zonation + Reservoir age + Slope + Relative inundation probability + DO + pH + Reservoir size + Retention time + Altitude + Distance to dam + River width + Soil TN + (1 reservoir)	1083.4	1144.2	-522.7	1045.4
Model1	Full model-Distance to dam	Species richness ~ Regulation type + Zonation + Reservoir age + Slope + Relative inundation probability + DO + pH + Reservoir size + Retention time + Altitude + River width + Soil TN + (1 reservoir)	1081.4	1139	-522.7	1045.4
Model2	Model1-Altitude	Species richness ~ Regulation type + Zonation + Reservoir age + Slope + Relative inundation probability + DO + pH + Reservoir size + Retention time + River width + Soil TN + (1 reservoir)	1079.4	1133.8	-522.7	1045.4
Model3	Model2-Soil TN	Species richness ~ Regulation type + Zonation + Reservoir age + Slope + Relative inundation probability + DO + pH + Reservoir size + Retention time + River width + (1 reservoir)	1077.4	1128.6	-522.7	1045.4
Model4	Model3-Relative inundation probability	Species richness ~ Regulation type + Zonation + Reservoir age + Slope + DO + pH + Reservoir size + Retention time + River width + (1 reservoir)	1075.6	1123.6	-522.7	1045.6
Model5	Model4-Rentention time	Species richness ~ Regulation type + Zonation + Reservoir age + Slope + DO + pH + Reservoir size + River width + (1 reservoir)	1073.9	1118.7	-522.9	1045.9
Model6	Model5-Slope	Species richness ~ Regulation type + Zonation + Reservoir age + DO + pH + Reservoir size + River width + (1 reservoir)	1073.4	1115	-523.7	1047.4
Model7	Model6-River width	Species richness ~ Regulation type + Zonation + Reservoir age + DO + pH + Reservoir size + (1 reservoir)	1073.9	1112.3	-524.9	1049.9
Model8	Model7-DO	Species richness ~ Regulation type + Zonation + Reservoir age + pH + Reservoir size + (1 reservoir)	1074.5	1109.7	-526.2	1052.5

Table S9. Forward model selection of generalized linear mixed-effect model (GLMMs) for Shannon index.

Model	Step Forward Process	Formular	AIC	BIC	logLik	Deviance
Full model	ALL	Shannon index ~ Regulation type + Zonation + Reservoir age + Slope + Relative inundation probability + DO + pH + Reservoir size + Retention time + Altitude + Distance to dam + River width + Soil TN + (1 reservoir)	607.8	668.6	-284.9	569.8
Model1	Full model-Altitude	Shannon index ~ Regulation type + Zonation + Reservoir age + Slope + Relative inundation probability + DO + pH + Reservoir size + Retention time + Distance to dam + River width + Soil TN + (1 reservoir)	605.9	663.4	-284.9	569.9
Model2	Model1-Soil TN	Shannon index ~ Regulation type + Zonation + Reservoir age + Slope + Relative inundation probability + DO + pH + Reservoir size + Retention time + Distance to dam + River width + (1 reservoir)	603.9	658.3	-284.9	569.9
Model3	Model2-Relative inundation probability	Shannon index ~ Regulation type + Zonation + Reservoir age + Slope + DO + pH + Reservoir size + Retention time + Distance to dam + River width + (1 reservoir)	601.9	653.1	-284.9	569.9
Model4	Model3-Retention time	Shannon index ~ Regulation type + Zonation + Reservoir age + Slope + DO + pH + Reservoir size + Altitude + Distance to dam + River width + (1 reservoir)	600.0	647.9	-285.0	570.0
Model5	Model4-Distance to dam	Shannon index ~ Regulation type + Zonation + Reservoir age + Slope + DO + pH + Reservoir size + River width + (1 reservoir)	598.1	642.9	-285.0	570.1
Model6	Model5-Slope	Shannon index ~ Regulation type + Zonation + Reservoir age + DO + pH + Reservoir size + River width + (1 reservoir)	596.5	638.1	-285.2	570.5
Model7	Model6-Reservoir age	Shannon index ~ Regulation type + Zonation + DO + pH + Reservoir size + River width + (1 reservoir)	595.0	633.3	-285.5	571.0
Model8	Model7-DO	Shannon index ~ Regulation type + Zonation + pH + Reservoir size + River width + (1 reservoir)	593.4	628.6	-285.7	571.4
Model9	Model8-Reservoir size	Shannon index ~ Regulation type + Zonation + pH + River width + (1 reservoir)	594.5	626.5	-287.2	574.5

Table S10. Forward model selection of generalized linear mixed-effect model (GLMMs) for invasive species proportion.

Model	Step Forward Process	Formular	AIC	BIC	logLik	Deviance
Full model	ALL	Invasive species proportion ~ Regulation type + Zonation + Reservoir age + Slope + Relative inundation probability + DO + pH + Reservoir size + Retention time + Altitude + Distance to dam + River width + Soil TN + (1 reservoir)	115.7	176.5	-38.8	77.74
Model1	Full model- Reservoir size	Invasive species proportion ~ Regulation type + Zonation + Reservoir age + Slope + Relative inundation probability + DO + pH + Retention time + Altitude + Distance to dam + River width + Soil TN + (1 reservoir)	113.7	171.3	-38.8	77.74
Model2	Model1- Distance to dam	Invasive species proportion ~ Regulation type + Zonation + Reservoir age + Slope + Relative inundation probability + DO + pH + Retention time + Altitude + River width + Soil TN + (1 reservoir)	111.7	166.1	-38.8	77.75
Model3	Model2- Altitude	Invasive species proportion ~ Regulation type + Zonation + Reservoir age + Slope + Relative inundation probability + DO + pH + Retention time + River width + Soil TN + (1 reservoir)	109.7	160.9	-38.8	77.78
Model4	Model3- Slope	Invasive species proportion ~ Regulation type + Zonation + Reservoir age + Relative inundation probability + DO + pH + Retention time + River width + Soil TN + (1 reservoir)	107.8	155.7	-38.9	77.81
Model5	Model4-Soil TN	Invasive species proportion ~ Regulation type + Zonation + Reservoir age + Relative inundation probability + DO + pH + Retention time + River width + (1 reservoir)	105.9	150.6	-38.9	77.90
Model6	Model5-Retention time	Invasive species proportion ~ Regulation type + Zonation + Reservoir age + Relative inundation probability + DO + pH + River width + (1 reservoir)	103.9	145.5	-38.9	77.97
Model7	Model6-River width	Invasive species proportion ~ Regulation type + Zonation + Reservoir age + Relative inundation probability + DO + pH + (1 reservoir)	102.2	140.6	-39.1	78.27
Model8	Model7-DO	Invasive species proportion ~ Regulation type + Zonation + Reservoir age + Relative inundation probability + pH + (1 reservoir)	100.4	135.6	-39.2	78.44
Model9	Model8-pH	Invasive species proportion ~ Regulation type + Zonation + Reservoir age + Relative inundation probability + (1 reservoir)	103.2	135.2	-41.6	83.26

Table S11. Forward model selection of generalized linear mixed-effect model (GLMMs) for Beta diversity.

Model	Step Forward Process	Formular	AIC	BIC	logLik	Deviance
Full model	ALL	Beta diversity ~ Regulation type + Zonation + Reservoir age + Slope + Relative inundation probability + DO + pH + Reservoir size + Retention time + Altitude +Distance to dam + River width + Soil TN + (1 reservoir)	-874.59	-813.82	456.3	-912.59
Model1	Full model-Retention time	Beta diversity ~ Regulation type + Zonation + Reservoir age + Slope + Relative inundation probability + DO + pH + Reservoir size + Altitude +Distance to dam + Soil TN + (1 reservoir)	-876.56	-818.99	456.28	-912.56
Model2	Model1-River width	Beta diversity ~ Regulation type + Zonation + Reservoir age + Slope + Relative inundation probability + DO + pH + Reservoir size + Altitude +Distance to dam + Soil TN + (1 reservoir)	-878.54	-824.17	456.27	-912.54
Model3	Model2-Reservoir age	Beta diversity ~ Regulation type + Zonation + Slope + Relative inundation probability + DO + pH + Reservoir size + Altitude +Distance to dam + Soil TN + (1 reservoir)	-880.46	-829.28	456.23	-912.46
Model4	Model3-Slope	Beta diversity ~ Regulation type + Zonation + Relative inundation probability + DO + pH + Reservoir size + Altitude +Distance to dam + Soil TN + (1 reservoir)	-882.07	-834.1	456.04	-912.07
Model5	Model4-pH	Beta diversity ~ Regulation type + Zonation + Relative inundation probability + DO +Reservoir size + Altitude +Distance to dam + Soil TN + (1 reservoir)	-884.07	-839.29	456.04	-912.07
Model6	Model5-Reservoir size	Beta diversity ~ Regulation type + Zonation + Relative inundation probability + DO + Altitude +Distance to dam + Soil TN + (1 reservoir)	-885.48	-843.9	455.74	-911.48
Model7	Model6-Soil TN	Beta diversity ~ Regulation type + Zonation + Relative inundation probability + DO + Altitude +Distance to dam + (1 reservoir)	-887.47	-849.09	455.74	-911.47
Model8	Model7-Distance to dam	Beta diversity ~ Regulation type + Zonation + Relative inundation probability + DO + Altitude + (1 reservoir)	-889.38	-854.19	455.69	-911.38
Model9	Model8-Altitude	Beta diversity ~ Regulation type + Zonation + Relative inundation probability + DO + (1 reservoir)	-889.35	-857.37	454.68	-909.35
Model10	Model9-DO	Beta diversity ~ Regulation type + Zonation + Relative inundation probability + (1 reservoir)	-885.68	-856.9	451.84	-903.68

Table S12. Forward model selection of generalized linear mixed-effect model (GLMMs) for Nestedness.

Model	Step Forward Process	Formular	AIC	BIC	logLik	Deviance
Full model	ALL	Nestedness ~ Regulation type + Zonation + Reservoir age + Slope + Relative inundation probability + DO + pH + Reservoir size + Retention time + Altitude +Distance to dam + River width + Soil TN + (1 reservoir)	-793.28	-732.51	415.64	-831.28
Model1	Full model-River width	Nestedness ~ Regulation type + Zonation + Reservoir age + Slope + Relative inundation probability + DO + pH + Reservoir size + Retention time + Altitude +Distance to dam + Soil TN + (1 reservoir)	-795.2	-737.62	415.6	-831.2
Model2	Model1-Altitude	Nestedness ~ Regulation type + Zonation + Reservoir age + Slope + Relative inundation probability + DO + pH + Reservoir size + Retention time +Distance to dam + Soil TN + (1 reservoir)	-796.76	-742.38	415.38	-830.76
Model3	Model2-Relative inundation probability	Nestedness ~ Regulation type + Zonation + Reservoir age + Slope + DO + pH + Reservoir size + Retention time +Distance to dam + Soil TN + (1 reservoir)	-798.25	-747.07	415.12	-830.25
Model4	Model3-Slope	Nestedness ~ Regulation type + Zonation + Reservoir age + DO + pH + Reservoir size + Retention time +Distance to dam + Soil TN + (1 reservoir)	-799.53	-751.55	414.76	-829.53
Model5	Model4-pH	Nestedness ~ Regulation type + Zonation + Reservoir age + DO + Reservoir size + Retention time +Distance to dam + Soil TN + (1 reservoir)	-800.59	-755.81	414.3	-828.59
Model6	Model5-DO	Nestedness ~ Regulation type + Zonation + Reservoir age + Reservoir size + Retention time +Distance to dam + Soil TN + (1 reservoir)	-800.09	-758.51	413.04	-826.09
Model7	Model6-Reservoir size	Nestedness ~ Regulation type + Zonation + Reservoir age + Retention time +Distance to dam + Soil TN + (1 reservoir)	-802.06	-763.67	413.03	-826.06
Model8	Model7-Retention time	Nestedness ~ Regulation type + Zonation + Reservoir age + Distance to dam + Soil TN + (1 reservoir)	-803.37	-768.19	412.69	-825.37
Model9	Model8-Soil TN	Nestedness ~ Regulation type + Zonation + Reservoir age + Distance to dam + (1 reservoir)	-804.82	-772.84	412.41	-824.82
Model10	Model9-Reservoir age	Nestedness ~ Regulation type + Zonation + Reservoir age + Distance to dam + (1 reservoir)	-801.51	-772.72	409.75	-819.51

Table S13. Forward model selection of generalized linear mixed-effect model (GLMMs) for Species turnover.

Model	Step Forward Process	Formular	AIC	BIC	logLik	Deviance
Full model	ALL	Species turnover ~ Regulation type + Zonation + Reservoir age + Slope + Relative inundation probability + DO + pH + Reservoir size + Retention time + Altitude +Distance to dam + River width + Soil TN + (1 reservoir)	-642.97	-582.2	340.49	-680.97
Model1	Full model-River width	Species turnover ~ Regulation type + Zonation + Reservoir age + Slope + Relative inundation probability + DO + pH + Reservoir size + Retention time + Altitude +Distance to dam + Soil TN + (1 reservoir)	-644.96	-587.39	340.48	-680.96
Model2	Model1-Slope	Species turnover ~ Regulation type + Zonation + Reservoir age + Relative inundation probability + DO + pH + Reservoir size + Retention time + Altitude +Distance to dam + Soil TN + (1 reservoir)	-646.9	-592.53	340.45	-680.9
Model3	Model2-Reservoir size	Species turnover ~ Regulation type + Zonation + Reservoir age + Relative inundation probability + DO + pH + Retention time + Altitude +Distance to dam + Soil TN + (1 reservoir)	-648.56	-597.39	340.28	-680.56
Model4	Model3-pH	Species turnover ~ Regulation type + Zonation + Reservoir age + Relative inundation probability + DO + Retention time + Altitude +Distance to dam + Soil TN + (1 reservoir)	-650.38	-602.4	340.19	-680.38
Model5	Model4-Retention time	Species turnover ~ Regulation type + Zonation + Reservoir age + Relative inundation probability + DO + Altitude +Distance to dam + Soil TN + (1 reservoir)	-651.75	-606.97	339.87	-679.75
Model6	Model5-Soil TN	Species turnover ~ Regulation type + Zonation + Reservoir age + Relative inundation probability + DO + Altitude +Distance to dam + (1 reservoir)	-653.17	-611.59	339.58	-679.17
Model7	Model6-Reservoir age	Species turnover ~ Regulation type + Zonation + Relative inundation probability + DO + Altitude +Distance to dam + (1 reservoir)	-654.19	-615.8	339.09	-678.19
Model8	Model7-Altitude	Species turnover ~ Regulation type + Zonation + Relative inundation probability + DO + Distance to dam + (1 reservoir)	-654.03	-615.65	339.02	-678.03
Model9	Model8-Relative inundation probability	Species turnover ~ Regulation type + Zonation + DO + Distance to dam + (1 reservoir)	-653.01	-624.03	338.01	-676.01

Table S14. Environmental PCA axes used as covariates in ANCOVA models and their ecological interpretation. The correlation value for each selected variable in the environmental PCA1 and environmental PCA2. The most parsimonious GLMMs.NB model to predict species richness considered reservoir age, DO, pH and reservoir size as fixed effects (model6: AIC = 1073.4, in Table S8, https://www.scielo.cl/scielo.php?script=sci_arttext&pid=S0718-19572020000300238#t2, accessed on date) The selected environmental variables for Shannon diversity were pH, reservoir size and reservoir width (model7: AIC = 593.4, in Table S9). Interaction terms between fixed effects were not considered due to too many fixed effects.

Species Index	Variables Included in PCA	Retained PCA Axis	Main Variable Loadings	Ecological Interpretation of the Retained PCA Axis
Species richness	Reservoir age, DO, pH, reservoir size	PCA1	Reservoir age = 0.645; DO = 0.745; pH = 0.692; reservoir size = 0.562	Reservoir age–size–water chemistry gradient. Higher PCA1 values represent older and larger reservoirs with higher DO and pH.
Shannon diversity	pH, reservoir size, reservoir width	PCA1	pH = 0.734; reservoir size = 0.434; reservoir width = 0.123	Water chemistry gradient, mainly associated with pH.
Shannon diversity	pH, reservoir size, reservoir width	PCA2	pH = 0.231; reservoir size = 0.583; reservoir width = 0.721	Reservoir morphological size gradient, mainly associated with reservoir width and reservoir size.
Non-native species proportion	Reservoir age, relative inundation probability, pH	PCA1	Reservoir age = 0.787; relative inundation probability = -0.817; pH = 0.564	Reservoir age/pH versus inundation gradient. Higher PCA1 values represent older reservoirs with higher pH but lower relative inundation probability.
Beta diversity	Relative inundation probability, DO	PCA1	Relative inundation probability = 0.744; DO = 0.625	Hydrological–water-quality gradient. Higher PCA1 values represent reservoirs with higher relative inundation probability and higher DO.
Nestedness	Reservoir age, distance to dam	PCA1	Reservoir age = 0.791; distance to dam = 0.791	Reservoir development–spatial position gradient. Higher PCA1 values represent older reservoirs and sites farther from the dam.
Species turnover	DO, relative inundation probability, distance to dam	PCA1	DO = -0.289; relative inundation probability = -0.793; distance to dam = 0.222	Inundation gradient, mainly negatively associated with relative inundation probability.
Species turnover	DO, relative inundation probability, distance to dam	PCA2	DO = 0.182; relative inundation probability = 0.466; distance to dam = 0.935	Spatial-position gradient, mainly associated with distance to dam.