

Index

- abscisic acid 12–13
- accuracy of measurements 149
- ablation zones of glaciers 341
- alien infestations 329
- alpine river hydroecology 339–41
 - future directions 353–6
 - integrated understanding 351–3
 - physicochemical properties 342
 - classification 352
 - hydrochemistry 346
 - stream discharge 342–3
 - stream temperature 343–4
 - suspended sediment concentration 344–6
 - river biota 346
 - glacier-fed rivers 346–8
 - nonglacier-fed rivers 348–9
 - temporal variability 349–50
 - water sources 341–2
- anisohydric plant species 16–17
- aquatic–terrestrial subsidies 57–8, 68
 - flow control 58–9
 - from land to water 59, 60
 - from water to land 59–61
 - future research 68
 - human impact 67
 - riparian deforestation 67
 - river channelization and regulation 67–8
 - river corridors 61
 - braided river reach 63–6
 - forrested headwater streams 61–2
 - temperate lowland rivers 66–7
- average daily flow (ADF) 236
- avulsion 376–7
- bars 362, 377–80
 - evolution 363–6
 - avulsion 376–7
 - ecological implications 373–4
 - migration 374–6
 - facies composition 371
 - initiation 363
 - sedimentology
 - ecological implications 362–3
 - grain size sorting 363–71
 - surface structure and hydraulics 371–3
 - cross-sections 372
- Behavioral Guidance Structure (BGS) 215
- biodiversity in floodplains 41–6
- black-water rivers 302
- braid bars 363, 364–5
 - sedimentology 366–87
- canopy conductance 14
- carbon dioxide (CO₂), atmospheric 114, 116
 - plant response to 117–21
- Catchment Abstraction Management Strategies (CAMS) 232
- cavitation 15
- chemical signaling in transpiration 12–13
- chironomids 133–4
- Cladocera 134
- climate change 113–14, 123–4

- differing perspectives of hydrologists and ecologists 121–2
- experimental studies 117–21
- future research 122–3
- simulation studies 116–17
- streamflow 114–15
- Clivina collaris* 45
- cluster analysis (CA) 172
- cohesion–tension (CT) theory of water movement 8, 14
- Colorado River basin 100–2
- computational fluid dynamics (CFD) 216–17
- cross-bar channels 370–1

- Danube River 406–7, 409–10
 - biota 412–13
- Darcy's Law 154–5
- decoupling coefficient 13
- dendrohydrology 132–3
- diatoms 134–5
- discrete grain identification
 - applications 197
 - principles 196–7
- dissolved organic carbon (DOC) 103, 106
 - in-stream biogeochemical function 106–7
- dissolved organic matter (DOM) 82, 412
- disturbance, flow-generated 75–80
- downstream response to imposed flow transformation (DRIFT) 243, 244
- drag coefficients of vegetation 277–8
- droughts 76, 79–80, 86–7
 - impacts 82–4
 - recovery 85–6
- Dry Weather Flow (DWF) 236
- dyes and tracers 153, 159–60
- dynamic global vegetation models (DGVM) 113

- eco hydraulics 205–7, 221
 - challenges and limits 220–1
 - concepts 211–12
 - dimensionality 281–3
 - drag coefficients of vegetation 277–8
 - examples
 - drift feeding salmonids 212–15
 - fish swim path selection 215–19
 - flow–vegetation interactions 269–71
 - basic principles 271–2
 - nonlinearities 276–7
 - roughness properties of vegetation 272–6
 - opportunity for engineers and ecologists 219–20
 - origin of concepts 207–8
 - reference frameworks 208
 - agent 209–11
 - Eulerian 209
 - Lagrangian 209
 - velocity 278–81
- ecohydrology
 - focus 3–4
 - historical perspective 2–3
- ecologically acceptable flow regime (EAFR) 233
- El Nino–Southern Oscillation (ENSO) 300–1
- electrofishing 391–2
- embolisms 15–16
- Endrick River 365
- ensemble grain size parameter determination
 - applications 198–200
 - principles 197–8
- environmental flows, determining 234–5
 - biological response models 235, 238–9
 - habitat assessment 235, 237–8
 - habitat suitability criteria 240–1
 - habitat-inclusive biological models 235, 241
 - hydrological indices 235, 236–7
- estuarine–coastal floods 78
- Eulerian–Lagrangian–Agent method (ELAM) 211, 218–20
- European Union Water Framework Directive 228, 237
- evapotranspiration
 - forests
 - evaporation and transpiration 21
 - understory transpiration 22
 - key concepts and processes
 - liquid water transport through trees 14–19
 - SPAC 8
 - transpiration 9–14
 - water uptake in roots 19–21
- exposed riverine sediments (ERS) 37–8, 52
 - flow disturbance 39–41
 - flow disturbance, importance to invertebrates 41
 - lateral and longitudinal connectivity 47–8
 - life history patterns and function ecology 46–7
 - physical variability 41–6
 - habitats 38
 - invertebrate conservation 38–9
 - threats to invertebrate biodiversity 50–2
- exposure strain rates, vertical and lateral 213–14

- flood pulse concept 131, 361
- floodplains 253–4
 - see also* exposed riverine sediments (ERS) adjustment values for vegetation roughness 274

- floods 76, 78–9, 86–7
 - constrained streams 80–1
 - floodplain rivers 82
- flow action, plant response to 320–1
- flow regime variability 165–6, 230
 - bibliographic analysis 167, 168
 - data collection and analysis 172–5
 - data integration for hydroecological analysis 175–6, 177, 179
 - future directions and challenges 176–8
 - hydroecological data requirement 166
 - scale 167–70
- flow-generated disturbances 75
 - definitions 75–6
 - droughts 79–80
 - impacts 82–4
 - recovery 85–7
 - floods 78–9
 - constrained streams 80–1
 - floodplain rivers 82
 - future challenges 87–8
 - refugia 77–8
 - responses 76–7
- flow–vegetation interactions 291–2
 - dimensionality 281–3
 - drag coefficients 277–8
 - ecohydraulics
 - basic principles 271–2
 - need for 269–71
 - nonlinearities 276–7
 - roughness properties of vegetation 272–6
 - empirical illustrations 282
 - complex velocity patterns in staggered arrays 286–7
 - field measurement of velocity 289–90
 - modelling Wienfluss flows 290–1
 - velocity profiles in emergent rigid vegetation 284
 - velocity profiles in mixture of submerged and emergent rigid vegetation 284–6
 - velocity profiles in submerged flexible vegetation 286
 - velocity profiles in submerged rigid vegetation 283–4
 - velocity variation across partially vegetated channel 287–8
 - water surface slope 289
 - velocity 278–81
- fluvial ecosystems 94
 - biogeochemical dynamics 94–5
 - biotic communities 95
 - material delivery to and within 103–5
 - in-stream biogeochemical function 106–7
 - riparian interface zone 105–6
 - forests *see* trees and forests
- frustules 134
- future research themes 423–4
 - applied hydroecology 425–6
 - aquatic–terrestrial linkages 424–5
 - disturbance 424
 - ecosystem sensitivity to hydrological change 424
 - modern and palaeo-analogue studies 425
- general circulation models (GCMs) 116
- glaciers 341–2
- grain size
 - determination
 - discrete 196–7
 - ensemble 197–200
 - sorting
 - barforms 363–71
- groundwater dependent ecosystems (GDEs) 147
- groyne fields, flow patterns 408
- heterotrophic flagellates (HNF) 413
- high resolution remote sensing 185
 - depth and morphology 188
 - image processing 188–90, 191
 - laser scanning 194–6
 - photogrammetry 190–4
 - future developments 200
 - requirements of scale 185–8
 - substrate 196
 - discrete grain identification 196–7
 - ensemble grain size parameter determination 197–200
- human impacts on hydroecological patterns 327–9
- hydraulic capacitance 18
- hydraulic gradient (HG) 96
- hydraulic redistribution (HR) 20–1
- hydraulic resistance 14, 17
- hydraulic retention zones 405–6
 - geomorphology and patch dynamics 406–7
 - habitat conditions for characteristic biota 409–11
 - implications for river management 416–17
 - retention and water column processes 411–14
 - retention, hydraulics and physiographic conditions 407–8
 - significance for river networks 414–16
- hydroecology 225–7
 - application to water resource problems 242–4, 245–6
 - communication and policy development 244–5
- focus 3–4

- historical perspective 2–3
- water resource management 231–2
 - determining environmental flows 234–41
 - ecologically acceptable flow regimes 232–4
 - riverine system protection 232
- hydrogeomorphic template 94
- hydrogeomorphical–ecological interactions 295–6, 311–13
- hydrogeomorphical dynamics 296–303
- longitudinal gradients at confluence zones 305
 - biological 306–11
 - sediment 305–6
 - riparian ecosystem 303–5
- hyporheic flow 323–5
- image processing
 - applications 190, 191
 - principles 188–9
- Indicators of Hydrologic Alteration (IHA) 166, 236
- innundation, plant response to 320
- interdisciplinary approach 422–3
- Intermediate Disturbance Hypothesis (IDH) 48
- invertebrates in exposed riverine sediments 37–8, 52
 - conservation 38–9
 - flow disturbance 41
 - life history patterns and function ecology 46–7
 - physical variability 41–6
 - population variability 47–8
 - sustainability 48–50
 - threats to biodiversity 50–2
- isohydric plant species 16–17
- laser scanning
 - applications 195–6
 - principles 194–5
- lateral exposure strain rate 213–14
- leaf area index (LAI) 13–14, 22, 23, 25
- light sensitivity of stomatal conductance 11–12
- Loire River basin 100–2
- long-term (palaeo) records 129, 141–2
 - key concepts 130–2
 - palaeoecohydrology, restoration and enhancement 136–7
 - case study I – River Culm in SW England 137–8, 139, 140
 - case study II – Danish Lakes 138–41
 - proxies and transfer functions 132
 - chironomids 133–4
 - Cladocera 134
 - Coleoptera 133
 - dendrohydrology 132–3
 - diatoms 134–5
 - pollen and spores 135–6
 - river–floodplain–lake systems 129–30
- Lotic-invertebrate Index for Flow Evaluation (LIFE) 175–6, 179
- Manning's *n* 272
- meanders 366–7
- Meso-HABSIM 240
- meso-scale surveys 238
- minimum acceptable flows (MAFS) 231
- mini-piezometers and groundwater mapping 151–6
- models, mathematical 208
- momentum absorbing area (MAA) 272, 275
- Murray River 387–9
 - velocity profile 393
 - fish capture 396–7
 - large wood characteristics 394–6
- NICOLAS Project 255, 256
- nitrate pollution 253–4
 - future perspectives 264–5
 - landscape perspectives 261
 - catchment-scale considerations 263
 - nitrogen loading 263–4
 - upslope–riparian-zone–channel linkage 262–3
 - riparian buffers 254–5
 - climatic and hydrological controls 255–8
 - effect of vegetation 258–9
 - N₂O emissions 260–1
 - nitrogen saturation effect 259–60
- Numerical Fish Surrogate (NFS) 212, 216–17, 218
- Orinoco Basin 295–6, 311–13
 - catchment area 297
 - characteristics of Orinoco River and tributaries 298
 - hydrogeomorphical dynamics 296–303
 - riparian ecosystem 303–5
 - longitudinal gradients at confluence zones 305
 - biological 306–11
 - sediment 305–6
- palaeo records *see* long-term records
- Palmer Drought Severity Index (PDSI) 300–2
- particle imaging velocimetry (PIV) 373

- particulate organic matter (POM) 412
- perirheic zone 300
- permeability of wood 17
- PHABSIM (physical habitat simulation) 186, 239
- photogrammetry
 - applications 193–4
 - principles 190–3
- photon flux density (PFD) 10
- photo-sieving 196
- physical–ecological interactions 387–9, 397–400
- Murray River
 - fish abundance analysis 397
 - fish capture 396–7
 - physical and hydraulic characteristics of large wood 394–6
 - study area 389–91
 - study methods 391–3
- planform bend positions 392
- plants, response to atmospheric CO₂ 117–21
- plant communities, hydroecological patterns of change 317–18
 - see also* vegetation
 - future directions 330–1
 - human impacts 327–9
 - hydrological–ecological interactions
 - ecological drivers 321
 - hydrological drivers 319–21
 - natural influences 321–2
 - lateral dimension 322–3
 - longitudinal dimension 325–6
 - temporal dimension 326–7
 - vertical dimension 323–5
 - riverine habitats 318–19
- point bars 363
- pollen and spores 135–6
- pool–riffle sequences 96–8
- pools 84
- precision of measurements 149
- press disturbances 76, 77
- principal components analysis (PCA) 172
- pulse disturbances 76, 77
- ramp disturbances 76, 77
- refugia 77–8, 87
- rheophytic vegetation 303
- riffle–pool sequences 96–8
- river continuum concept 130–1, 361
- river corridors 57–8, 68
 - aquatic–terrestrial subsidies 61
 - braided river reach 63–6
 - forested headwater streams 61–2
 - temperate lowland rivers 66–7
 - flow control 58–9
 - future research 68
 - human impact 67
 - riparian deforestation 67
 - river channelization and regulation 67–8
 - subsidies from land to water 59, 60
 - subsidies from water to land 59–61
- river floods 78, 82
- river flow 169–70
- river productivity model 414
- river regulation, sustainable 230–1
- riverine ecosystems
 - barform sedimentology
 - ecological implications 362–3
 - grain size and sorting 363–71
 - roots, water uptake 19–21
 - roughness coefficients for vegetation 273
 - run-off, plant control of 321
- sands and gravel, permeability values 367
- sap velocity 18
- seasonal droughts 79, 83
- sedimentology 361–2, 377–80
 - barforms
 - ecological implications 362–3
 - grain size sorting 363–71
 - surface structure and hydraulics 371–3
 - barforms, evolution of
 - avulsion 376–7
 - ecological implications 373–4
 - migration 374–6
 - permeability values 367
- seepage meters 151, 152
- slackwater zones 407
- Soil–Plant–Atmosphere Continuum (SPAC) 8
- South Saskatchewan River 364
- specific conductivity 17
- specific median discharge (SMED) 176, 177
- Squamish River 371
- stomatal conductance 10–12
- streamflow 114–15
- streams
 - aquatic–terrestrial subsidies 61–2
 - droughts 82–4
 - recovery from 85–6
 - floods 80–1
 - suberization 19
 - supra-seasonal droughts 79, 83
 - Surface Bypass Collector (SBC) 215
 - surface water–groundwater (SGW) exchange processes 93–4, 107–8
 - flow variability and water movements 96
 - analysis in basin area 99–102
 - flow dynamics 103
 - spacial 96–8
 - temporal 99

- flow variability, implications of
 - in-stream biogeochemical function 106–7
 - material delivery to and within fluvial ecosystems 103–5
 - riparian interface zone 105–6
- fluvial ecosystems 94
 - function 94–5
 - structure 95
- surface water–groundwater (SGW), field monitoring 147–8
 - direct hydrological methods 150–1
 - mini-piezometers and groundwater mapping 151–6
 - seepage meters 151, 152
 - synoptic surveys 152, 157
 - future technical challenges 160–1
 - indirect hydrological methods
 - dyes and tracers 153, 159–60
 - water chemistry and chemical signatures 153, 158–9
 - water temperature and thermal patterns 153, 157–8
 - terminology 148–50
 - synoptic surveys 152, 157
- Tagliamento River 63–6, 363
- Terrestrial Ecosystem Model (TEM) 116
- total hydraulic strain 217
- traffic rule 217
- Trannon River 375
- transpiration 9–14
- trees and forests 7–8
 - see also* wood
 - evapotranspiration in forests
 - evaporation and transpiration 21
 - understorey transpiration 22
 - evapotranspiration of trees
 - liquid water transport 14–19
 - SPAC 8
 - transpiration 9–14
 - water uptake in roots 19–21
 - life cycle hydrolic changes 22–3
 - age-related changes in forest composition 23
 - age-related changes in forest stand level 25–7
 - implications for predictive models 27–8
 - species composition in aging forests 27
 - tree size and stomatal conductance 23–5
 - structural complexity classes for fragments 391
- UK Biodiversity Action Plan (BAP) 232
- unsuberized roots 19
- Vegetation Ecosystem Modeling and Assessment Program (VEMAP) 116
- vegetation *see also* plants responses to
 - hydrological drivers 320–1
 - roughness and water surface slope 289
- vertical exposure strain rate 213–14
- vertical hydraulic gradient (VHG) 96, 99
- vortex structures 281–2
- water, role on Earth 1–2
- water chemistry and chemical signatures 153, 158–9
- water column processes 411–14
- water processing, plant control of 321
- water resource management 226, 245–6
 - hydroecology, application of 242–4
 - communication and policy development 244–5
 - hydroecology, role of 231–2
 - determining environmental flows 234–41
 - ecologically acceptable flow regimes 232–4
 - water allocation 232
 - rivers 416–17
 - scientific basis 227–30
 - principles 230–1
- water storage in trees 18
- water temperature and thermal patterns 153, 157–8
- wave action, plant response to 320
- Weighted Usable Area (WUA) 239
- white-water rivers 302
- Wienflüss flows 289–90
 - modelling 290–1
- wood *see also* trees and forests
 - fish habitats 389
 - fish numbers 395
 - structural complexity classes 391
- xylem water transport 15