

## Land, Water and Development

Sustainable and adaptive management of rivers

3rd Edition

Malcolm Newson

## Contents

	List	of piates	1X
		of figures	xi xvi xx
	List	of tables	
		of boxes	
	Prefe	xxii xxvi	
	Acknowledgements		
	Prol	ogue: 'catchment consciousness'	xxviii
1	A 'w	orld water crisis? The history and current trajectory	
	of wa	ater management	1
	1.1	Hydraulic cultures and religious codes: management in advance of science 2	
	1.2	Engineering and science: the rise of hydraulics and hydrology 4	
	1.3	Monks, mills and mines: coordination but abuse of rivers in England 9	
	1.4	Urbanisation and industrialisation: a steep deterioration 12	
	1.5	Sustainability, the current 'crisis' and the challenges of the future 14	
2	The river basin (eco)system: biophysical dynamics, 'natural' and 'compromised'		20
	2.1	Flow of water and transport of sediment 23	
	2.2	Channel morphology: indicating process and state? 33	
	2.3	Towards the 'fluvial hydrosystem': floodplains 41	
	2.4	Sediment 'delivery' at the basin scale: sources, pathways and targets 46	

2	Contents
Vί	Contents

	2.5	Incorporating the basin-scale sediment system in ecosystem management 48	
3		-water interactions: the evidence base for catchment ing and management	52
	3.1	Vegetation, soils and hydrology: a humid climate perspective 55	
	3.2	Groundwater exploitation and protection 71	
	3.3	The devil of the detail: runoff modifications in developed river basins 75	
	3.4	Land and water: off-site impacts on water quality and biota	79
	3.5	Conclusions: towards water body 'pressures' 92	
4		aging land, water and rivers in the developed world: ternational survey	94
	4.1	Development and the river basin 94	
	4.2	River basin management in the USA 96	
	4.3	Canadian river basin management 117	
	4.4	Australia: lessons learned late on a settler legacy 124	
	4.5	New Zealand: resource management conditioned by hazard	135
	4.6	Reflections: national priorities in the developed world 141	
5	River basins and development: sample trajectories		143
	5.1	New millennium, new tensions: incorporating poverty and health in the water agenda 143	
	5.2	Characteristics of water development projects in the twentieth century: 'gigantism' 150	
	5.3	A development focus: food, power and trade in drylands 153	
	5.4	River basin management in Iran: the Zayandeh Rud 159	
	5.5	The Nile: a definitive case of hydropolitics 163	
	5.6	River basin development authorities: experience elsewhere in sub-Saharan Africa 170	
	5.7	South Africa: a unique water management experiment 177	
	5.8	Land use writ large? Himalayan headwaters and the GBM 185	
	5.9	Is the dam-based development mega-project a thing of the past? 194	
	5.10	Development and rivers: broad trends 199	

—- 6	Techi	nical issues in river basin management	201
	6.1	Soil erosion 202	
	6.2	A stressed global food supply – 'Water for Food, Water for Life' 211	
	6.3	Dams and development – sedimentation, environmental flows, impact assessment 227	
	6.4	Conservation and restoration of river channels and wetlands 24	<b>1</b> 3
	6.5 6.6	Climate change and river basin management 253 Conclusions 266	
7		tutional issues in river basin management: stasis and ge in England and Wales	268
	7.1	Delivering IWRM/IRBM within contexts of rights and governance 269	
	7.2	Can basin authorities work? From the TVA to CMAs and RBDs 272	
	7.3	Case study: the evolution of basin management institutions in England and Wales 276	
	7.4	A flood-prone nation: land drainage leads the way 277	
	7.5	Basin-scale regulation: water resources and pollution 279	
	7.6	Private or public? Economics and environment 281	
	7.7	An Environment Agency – for sustainable development and the WFD 283	
	7.8 7.9	Integration with land-use planning: flooding leads again 290 The spotlight of sustainable development 294	
	7.10	River basin institutions and developing nations 297	
	7.11	Institutions for international river basin management 299	
	7.12	Sustainability and subsidiarity – scale-sensitive institutionsl organisations which can plan basin development 303	
8	Susta	ninable river basin management with uncertain knowledge	306
	8.1	A 'watery form of sustainability' 307	
	8.2	Science in the 'New Environmental Age' and the 'Risk Society' 310	
	8.3	Uncertain 'science speaks to power' 313	
	8.4	Uncertain science and land—water management: the early evidence and the 'catchment era' 315	
	8.5	Uncertain science and land–water management: where now? 318	

	8.6	Implementation: land-use controls in river basins – the case of UK forestry and farming 323	
	8.7	Broadening horizons: new knowledge – people speak to science 326	
	8.8	'Walk your watershed': catchment health – a case for acupuncture? 327	
)	-	otive land and water management: through participation social learning to hydropolitical decisions	332
	9.1	'Big themes' for future land and water development 332	
	9.2	Scale-sensitive governance, information flows and social learning 336	
	9.3	Experiences of participation: stakeholders and 'Joe Public' 341	
	9.4	The cauldron of hydropolitics and the spell of economics 344	
	9.5	Formalities of adaptive management 351	
		script: globalised water – will poverty, trade and energy s override basin-scale management?	355
		_	555
		rty, water poverty and trading out water stress 356 'virtual water' work? 357	
	Water and energy: fuelling desalination, hydro-electricity and irrigating biofuels! 358		
	The	ultimate challenge: ecosystem management under uncertainty, norance and surprises 361	
	•	Aral Sea – righting the wrongs? 363	
	Refe	rences	365
	Inde		424

424