Index

Across Trophic Level System Simulation (ATLSS) 175–6
Adamowicz, W.L. 110
adaptive management 44, 264–5, 281
Advisory Committee on Water Data 171
Advisory Council on Executive Organization (Ash Council) 32
Alabama-Coosa-Tallapoosa (ACT) Rivers 248
All American Canal 232, 236, 237
Allison, G.T. 225
allocation of water
effects of federal law on 256–8
groundwater law 255–6
prior appropriation 253, 255
riparian law 253, 254
alternative dispute management (ADR) 65–6, 68, 69
amenity benefits and costs 106–8, 131
hedonic techniques 107–8
American Institute for Research (AIR) 272
American Society of Civil Engineers (ASCE) 43, 165, 274
American Water Resources Association (AWRA) 276
analysis, evolution of 2
analytical initiatives 58
analytical techniques, and environmental values 5
Andreu, J.J. 159
anti-degradation policy 152
Apalachicola-Chattahoochee-Flint (ACF) River Basin 11, 248, 264
aquatic ecosystem models 174–9, 191
aquatic life, protection of 141–5, 150
AQUATOOL model 169
AQUATOX model 176–7
Arctic National Wildlife Refuge 108
Argyle, M. 214
Arizona vs California 233, 234, 237
Arkansas, Red, White River Basin Study 130
Arnold, J.G. 172
Arrow, K.J. 110, 128, 250
Arrow’s Impossibility Theorem 247
Aspen Institute 43
Association of State Floodplain Managers (ASFPM) 272
Bachmat, Y. 170
Baedecker, M.J. 278
Barber, B. 66
Barbier, E.B. 205
Barnthouse, L.W. 215
BASINS, modelling tool 172
Batabyal, A.A. 215
Beck, R.E. 258
Bedient, P.B. 172
benefit quantification techniques 92
benefit-cost analysis 3, 12, 22, 25, 29, 82–135
amenity benefits and costs 106–8
benefit-cost inference and incomplete economic analysis 113
broadening 265–6
decision criterion 121–2
demand curves: changes in output 100–102
discount rate 118–21, 128
ecosystem restoration 129–30
estimation of costs 114–15
hydroelectric benefits 100
intangibles 85
integrated benefits and costs 115–26
intergenerational equity 121, 129
land use changes 100
measuring project benefits and costs 97–114
The evolution of water resource planning and decision making

changes affecting producers and workers 99–100
price changes and consumers 97–9
non-market benefits and costs 102–111
inferring using benefits transfer 111–13
non-monetarized and non-quantified effects 129
non-use benefits 108–111
price inflation 116–17
principle of present value 117–18
project evaluation 116–17
published standards for 127
recreation benefits 102–6
role of willingness-to-accept 127–8
secondary benefits 88–9, 89–90
special issues in estimation of costs 114–15
standards 29
temporal issues 115–16
uncertainty in 122–3, 129
scenario methods 123
sensitivity analysis 123
simulation techniques 123–4
benefits and costs, environmental 85
benefits transfer method 111–12
activity data 112
unit value transfer 112
value function transfer 112
birds 140
Bishop, R.C. 210, 215
Black, R. 131
Blamey, R. 205
Bohm, P. 131, 205
Boland, J.J. 275
Bonnor, R.E. 222
Bornstein, D. 226
Borton, T.E. 67
Boulder Canyon Project Act (1928) 18, 232, 233
Bower, B.T. 91
Boyle, K.J. 204
Brickman, P.D. 214
Bromley, D. 93–4
Brown, F.L. 250
Brown, G.M. Jr. 106
Browner, C. 269
Buchanan, J. 226
Bureau of Census 158
bureaucratic politics and process model 225
Cabinet Council on Natural Resources and the Environment 38
California State Water Project 93
Carey Act (1894) 221
Carson, R.T. 109, 110, 131, 148, 260
Carter, Jimmy 37
Caulfield, H.P. Jr. 49, 88, 89, 130
Center for Disease Control 156
Central Arizona Project 233
Central and South Florida Project 160
Central and Southern Florida Project
Century Magazine 138
Chadwick, E. 142
Chapra, S.C. 179
Chesapeake Bay 173
Chesapeake and Ohio Canal 15
choice based conjoint 110–11
Cicchetti, C.J. 106
Ciriacy-Wantrup, S. 209
civic culture, and water management 64
Civil Works Strategic Plan 269
Clark, Galen 138
Clawson, M. 91, 131
Clean Air Act (CAA), amendments (1990) 195, 196
Clean Rivers Restoration Act (1966) 30
Clean Water Act (1977) 2, 31, 33, 148, 167, 192
amendments (1987) 151–2
implementation 152–5
planning framework 162
provisions 150–52
revision (1977) 36
Clean Water Action Plan 269
Clean Water Restoration Act 150
climate change 58, 267–8
Climate Change 2007 267
Climate Change Impacts on the United States 267
collaborative approach 70
collective action 224
Colorado River 8–9, 11, 18
Index

Colorado River Basin 223
  1929 to 1968  232–4
  1968 to present  234–8
  comparison of Rational and Polis
  Models 239–46
  existing governance system 238–9
  interest groups 234, 241–2, 247
  irrigation 231–2, 236
  pre-1929  230–32
  salinity 235–6
  and USBR 234
  water governance case study 230–46
  water scarcity 236–7
  water transfer 237–8
Colorado River Commission 231, 232
Colorado River Storage Project Act
(1956) 233
common pool property 224
community and cultural values,
  measurement 92
compensating variation 84–5, 97–9,
  131
  ‘compensation principle’ 84
  ‘compensation test’ 84
Comprehensive Environmental
  Response, Compensation and
  Liability Act (1980) 36, 109, 159
Comprehensive Everglades Restoration
  Plan (CERP) 42, 160
conflict management
  and participation 65–6
  tools 73
Congressional Behavior Model 225–6
conservation 22, 27, 30
conservation movement 138
construction agencies 27, 51
  see also USACE, USBR, NRCS
Consumer Price Index (CPI) 116
  ‘consumer surplus’ 130
  consumers, and price changes 97–9
  consumption 199, 200
Consumptive Uses and Losses Report
  238
contaminants 280
  regulation 42
contingent choice method 203
contingent valuation 92, 95
  advantages of 203
  embedding effect 204
  non-use benefits 108–110
technical problems for studies 204–6
  yea saying 204
coordinated water management 31
Cortner, H.J. 268
Cost of Living Adjustments (COLAs)
  116
cost pricing 93
cost sharing 39, 40, 45, 68, 92, 125, 262
Costanza, R. 195, 196
Council of Economic Advisors 91
Council on Environmental Quality
  (CEQ) 32, 69, 159
Crawford, N.H. 172
Creighton, J. 67, 69
Crenson, M.A. 227
Criteria for the Federal Evaluation of
  Resource Investments 97
Cummings, R. 130
Czech, B. 139, 148, 149
da Costa, J.R. 180
Dahl, R.A. 8, 76, 226
Dahl, T.E. 137, 148
Daly, H.E. 198, 199
dam building 147, 181, 223, 232, 233,
  274
  1800 to 1900 15
  1920s 140–41
Dam Removal Clearing House 43
Danish Hydraulic Institute 169
database initiatives 58
Davies, J.C. III 144
Davis, R.K. 91, 106, 131
decision analysis 213
decision making
  benefit–cost analysis 121–2
  and ethical dimensions 63
  political 220–52
  tensions between the political and
  technical 64–5
decision support systems 180
deforestation 18
Degrees of Belief 65
Delaware River Basin Commission
  (DRBC) 53
Delaware River Estuary 190–91
Delft Hydraulics 169
Delli Priscoli, J. 64, 73, 75
demands 1, 35, 75
democracy 75
Desert Land Act (1877) 16

*Design of Water-Resource Systems* 26, 93

Desvousges, W. 204

Diamond, P.A. 131

Diener, E. 214

Dietz, T. 206
diminishing marginal utility 87
discount rate 118–21, 128
discount rate formula 89, 91
distribution analysis 31

Dombeck, M.P. 138

Donigian 172

Downs, A. 227

drainage basins, national study 21
dredged material 151
drought games 31

Drury, W. 207

Dupuit, J. 87

Dzurik, A.A. 41, 45, 46

Eckstein, O. 17, 26, 85, 92, 95, 130
ecological assessment 174–9
ecological restoration 129–30, 167, 266
and environmental quality 279–80
ecologists, and economists 5–6, 188–21

economic analysis 82, 83–5, 113–14
historic contributions on water resources 94–6
of water projects 21, 26
early foundations 85–8
economic development 15, 25, 86, 90
economic efficiency 23, 92

*Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (P&G)* (1983) 10, 38, 58, 91, 122, 127, 161, 162, 228, 262

economic evaluation of water projects 22, 23

Economic Theory of Politics 8, 227

economics
role of 3
of water quality management 91

*The Economics of Welfare* 87

economists
and ecologists 5–6, 188–221
defining what is to be valued 206–9
disciplinary arrogance 200–209
divisions between 198

Environmental Monitoring and Assessment Program (EMAP) 192–5
interdisciplinary collaboration 188–90

Quality of the Environment program, at Resources for the Future (RFF) 190–92

and the Science Advisory Board 195–7
valuing changes in ecosystem service flows 201–4, 208

ecosystems
protection of 159–61
and uncertainty 209
value of 196–7
valuing changes in ecosystem service flows 201–4

‘efficiency’ accounting stance 34

Eisner, T. 210

Ekelund, R.B. Jr. 86

El Sarafy, S. 214

Elgin, D.S. 46, 49

endangered species 148–50, 210

Endangered Species Act (ESA) (1973) 35, 148, 235

Endangered Species Committee 148–9

Endangered Species Preservation Act (1966) 148

Enhanced Stream Water Quality Model (QUAL2E) 174

environment 27–8, 31–7, 260–61

environmental assets, safe minimum standards (SMS) for 209

environmental benefits and costs 85

environmental conflict resolution (ECR) 69–71

Environmental Defense 55

environmental effects
prediction techniques 165–81
demand for 165–8
groundwater models 170–71
hydrologic/hydraulic models 169–70
Index

modelling process 179–81
state of development 168–9
water quality models 173–4
watershed models 172–3
environmental impact statements 32
environmental legislation 35
environmental mediation 66
Environmental Monitoring and Assessment Program (EMAP) 192–5
environmental movements 31, 36, 41
environmental policies 137–45, 146–65
environmental protection 3, 4, 12, 56
environmental quality 10–11, 24, 34, 161
and ecological restoration 279–80
and travel cost 104–6
‘Environmental Quality Account’ 31
Environmental quality (EQ)
accounting stance 34
environmental restoration 37, 178
environmental systems models 168
environmental values 4, 136–45, 146
and analytical techniques 5
incorporation in water resources project planning 161–4
and water allocation 59–60
in water resources planning programs 145–6
equivalence 117
Erie Canal 15
Erskine, H. 203, 214
Espelande, W.N. 223
ethical dimensions, water management 62–3
Everglades National Park Protection and Expansion Act (1989) 41
Everglades Restoration 37, 39, 41, 42, 44, 160, 175, 268
existence value 91
extinction 211
Exxon Valdez 110
Fair, G.M. 143
Farmer, M.C. 209
Feather, T.D. 44, 175
federal agencies, and planning processes 51
Federal Emergency Management Agency (FEMA) 39–40

Federal Energy Regulatory Commission (FERC) 18
federal government 15–16, 17–18
role of 7, 11, 221, 223, 249
Federal Interagency Flood Management Task Force 39–40
Federal Interagency River Basin Committee (FIARBC) 53, 88, 145
federal law, effects on water allocation and use 256–8
Federal Natural Resource Development 96
Federal Power Act, amendment (1986) 38, 39
Federal Power Commission 18, 19, 92
Federal Register 110
federal water policy 273–4
federal water policy coordinating institution (proposed) 57–8
Federal Water Policy Initiatives 37
Federal Water Pollution Control Act (1956) 144
Amendments 236
Federal Water Pollution Control Administration 144–5
Federal Water Power Act (1920) 19
Federal Water Quality Administration 150
Fedra, K. 180
financial analysis and policies 124–6
Fischer, L.K. 80
Fischhoff, B. 215
Fish and Wildlife Coordination Act (1934) 140
Fish and Wildlife Coordination Act (1946) 27
fish/fishing 104, 131, 175, 177–8, 235
flood control 16, 25, 28–9, 259–60, 271–3
cost sharing 18
Mississippi River 19
Flood Control Act (1917) 18
Flood Control Act (1936) 20, 22, 87–8, 260
and economic analysis 85, 87, 94
Flood Control Act (1944) 25
Flood Control Act (1960) 29
Flood Control Act (1965) 29
flood insurance 29
The evolution of water resource planning and decision making

Flood Insurance Act (1968) 29
Flores, N.E. 110, 131
Florida, Pelican Island 140
flow targets 177–8
food webs 178
Foreman, J. 210, 215
Foster, C.H.W. 276
Fox, I. 130
Frakin, P.L. 250
A Framework for the Economic Assessment of Ecological Benefits 196
France, Ecole National de Ponts et Chaussees (ENPC) 86–7, 94
Freeman, A.M. 196, 214
Friedkin, J.F. 236
Friedman, L.C. 278
Gallatin, A. 86, 94
Gallatin Report (1808) 15
Galloway, G.E. 268
Gardner, B.D. 49
Georgakakos, A.P. 180
Geospatial Information Systems (GIS) 263
Getches, D.H. 230, 250, 254, 258
Gilbert, F.S. 207
Ginsberg, B. 227
Glickman, D. 269
Global Water Partnership (GWP) 65
governance 6–7
concept of 220
evolution of 1–2
models of 225–6
and politics 7–8
see also water governance
Government Performance and Results Act (1993) 269
Granneman, N.G. 271
‘Green Book’ 25, 44, 88–9, 94, 145
Griffin, J. 214
Grigg, N.S. 29, 40, 45
Gross Domestic Product Implicit Price Deflator series 116
groundwater and planning and management 270–71
protection of 150
groundwater law 255–6
groundwater models 170–71
guidelines 25–6, 32, 87–91
Guring, G. 214
Habermas, J. 65
habitat equivalency 131
Habitat Evaluation Procedures 175, 178, 212
Habitat evaluation system (HES) 212
Habitat Suitability Index (HSI) 174
Haefele, E. 220
Hammack, J. 106
Hanchey, J.R. 67
Hanemann, W.M. 131, 205
Hanke, S.H. 46
Hargrove, E.C. 53
Harris, C.C. 204, 215
Harrison, R.W. 137
Harvard Resources for the Future (RFF) 91
Harvard Water Program 93, 96, 169, 262
Hausman, J.A. 130, 131
Hayes 139
Hays, S.P. 138, 146, 209
hedonics 92, 95, 107–8
Heilbroner, R.L. 198
Hells Canyon 92
Herbert, R.F. 86
Hicks, J.R. 99, 130
high quality waters (HQU) 152
Hirschleifer, J. 92, 95
history of water resource planning and development
1800 to 1900 15–16
1900 to 1933 16–20
1933 to 1943 20–23
1943 to 1969 23–31
1969 to 1980 31–7
1980 to present 37–44
Holmes, B.H. 14, 15, 19, 26, 27, 29, 31
Homestead Act (1862) 222
Hoover Dam 232, 240
Hotelling, H. 91, 130, 131
House Document 308 (US House of Representatives) (1926) 19
House Document 465 (US House of Representatives) 29
Huber, W.C. 172
Hufschmidt, M.M. 49, 89, 95
Hundley, N. Jr. 250
Index

hurricanes 271, 272
hydro electric power generation 256–7
hydroelectric benefits 100, 275
hydrologic/hydraulic models 31, 169–70
hydrological Simulation Program
FORTRAN (HSPF) 172–3
hydrology 93
Hynning, C.J. 142

Idaho, demand curve for potatoes 101
Idaho Power Commission 92
ignorance 210, 211
In-stream Flow Incremental Method 175
Ince, S. 169
independent water project review process 37
Index of Biological Integrity (IBI) 179
individual species, protection of 139–41, 148–50
‘informed consent’ 63
infrastructure, replacement 274–5
Inland Waterways Commission (IWC) 139
institutional analysis model 227
institutional model 8
intangibles 85, 88, 145
integrated water resources management (IWRM) 57, 65, 69, 70, 74
Interagency Council on Public Participation (ICCP) 68
interdisciplinary working 277–8
interest group model 226
interest groups 222, 223
Colorado River Basin 234, 241–2, 247
intergenerational equity 121, 129, 268
Intergovernmental Panel on Climate Change (IPCC) 267
International Joint Commission 261
International non-governmental organizations (INGOs) 55
International Union for Conservation and Natural Resources (IUCN) 164
interstate rivers 257–8
iron triangles 226, 232
irrigation 16, 17, 19, 115, 125, 222, 234, 236, 237
James, L.D. 46
Jefferson, Thomas 76
Johansson-Stenman, O. 206
Journal of Economic Perspectives 131
jurisdictional boundaries 65
Kahneman, D. 128
Kaldor, N. 130
Kalter, R.J. 97
Karr, J.R. 178
Kates, R.W. 28
Kempton, W. 136, 146
Kingcaid Act (1920) 18
Kirby, J. 164
Kissimmee River Restoration Project 160
Kneese, A.V. 91
Knetsch, J.L. 91, 93, 128, 205
Krausman, P.R. 139, 148, 149
Krutilla, J.V. 17, 26, 85, 89, 91, 92, 95, 108, 125, 130, 215
Lake Ontario 176
Lancaster, K.J. 107
land reclamation 137
land use changes 100
land use control and zoning 28–9
Lane, R.E. 214
Lasswell, H.D. 8, 64, 227
Law of the River 236, 237, 239, 250
Lee, R.R. 46
legislation 17
American law on allocation of water 253–8
drivers of 55
drivers of 55
levees 18, 19, 28
Lindblom, C.E. 8
Linsley, R.K. 172
local governments 22–3, 52, 158
local interests 223
local organizations 28
Lochhead, J.S. 237, 250
Locke, J. 198
Loucks, D.P. 49, 180, 269
Lower Colorado River Multi-species Conservation Program 235
Maass, A. 8, 26, 93, 169, 227, 262
McCool, D. 226
The evolution of water resource planning and decision making

McCutcheon, S.C. 179
MacDonnell, L.J. 238, 250
Macilwain, C. 210
McKee, J.E. 144
McMichael, A.J. 196
MacRae, D. 202, 214
Mäler, K.G. 104, 119
Malthusian Principle 196
market benefits 100, 131
market goods, evaluation 3
market prices 114
Marshall, A. 199, 214
Martin, L.R. 165
Martin, Q.W. 180
Martin, R. 230, 250
Marx, K. 198
Massachusetts, water quality legislation 143
Massachusetts State Board of Health legislation 142
maximum contaminant level goals (MCLG) 42
Mehan, G.T. III 154
Merck 215
Metcalf and Eddy, Inc. 172
Metropolitan Water District (MWD) 236, 237
Meyers, C.J. 250
Migratory Bird Hunting and Conservation Stamp Act (1934) 140
Migratory Birds Conservation Act (1929) 140
MIKE-BASIN model 169
Millenium Ecosystem Assessment 206–7
Miller, T.O. 235
Minard, J. 87
Mini Historical Statistics 155
Mississippi River Basin 16, 164 flood control 19
Mississippi River Commission 16
Missouri River Basin Development plan (Pick-Sloan plan) 25
Mitchell, R.C. 131, 214 models
Across Trophic Level System Simulation (ATLSS) 175–6
AQUATOOL 169
AQUATOX 176–7
bureaucratic politics and process model 225
for environmental systems 168
governance 225–6
groundwater 170–71
hydrologic/hydraulic 169–70
institutional analysis model 227
institutional model 8
interest group 226
modelling process 179–81
PHABSIM 175
predictive 166–8
QUAL2E 174
Rational 228, 229, 239–46, 248–9, 333
RIBASIM 169
simulation 75, 123–4
Soil and Water Assessment tool (SWAT) 172
SPARROW 173
stakeholder involvement 180
Stanford Watershed 172
Storm Water Management 172
Streeter-Phelps 173, 191
SWAT 172
terrestrial and aquatic ecosystem 174–9
WASP6 174
water quality 167, 173–4
watershed 172–3
Moore 73
Morey, E.R. 104, 105, 131
Mueller, J.A. 179
Muir, John 138
Multiple Purpose River Development 92, 95
multiple-objective analysis (1943 to 1969) 24
multiple-objectives 89
multiple-purpose planning 18, 19 projects 1900 to 1933 20
for river basins 21
Municipal Wastewater Treatment Construction Grant amendments (1981) 38
Nadeau, R.L. 210
Naiman, R.J. 278
National Academy of Public Administration (NAPA) 266, 273
<table>
<thead>
<tr>
<th>Index</th>
<th>293</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Assessment Synthesis Team (NAST) 267</td>
<td>Native American and federal reserved water rights 257</td>
</tr>
<tr>
<td>National Board of Engineers for Rivers and Harbors 17</td>
<td>national areas, preservation 137–9, 147–8</td>
</tr>
<tr>
<td>National Commission on Water Quality 35</td>
<td>Natural Resource Conservation Service (NRCS) 22</td>
</tr>
<tr>
<td>National Conservation Commission 17</td>
<td>natural resource damage assessment 109–10</td>
</tr>
<tr>
<td>National Drinking Water Standards (NDWS) 156</td>
<td>Natural Resource Districts (NRD) 55</td>
</tr>
<tr>
<td>national economic development (NED) 34, 46, 91, 145, 161</td>
<td>Natural Resources Conservation Service (NRCS) 51</td>
</tr>
<tr>
<td>National Flood Insurance Program (NFIP) 262</td>
<td>nature, value of 198–9</td>
</tr>
<tr>
<td>National Forestry Commission 139</td>
<td>Naver, Henri 87</td>
</tr>
<tr>
<td>National Oceanic and Atmospheric Administration (NOAA) 110, 128, 204</td>
<td>navigation 15, 18, 25, 256, 275</td>
</tr>
<tr>
<td>National Park Service (NPS) 18, 28, 147</td>
<td>Nebraska, Natural Resource Districts (NRDs) 80–81</td>
</tr>
<tr>
<td>National Planning Board (NPB) 21, 145</td>
<td>negative externalities 93</td>
</tr>
<tr>
<td>National Pollution Discharge Elimination System (NPDES) 36, 163</td>
<td>New Directions in U.S. Water Policy 34–5, 50, 56</td>
</tr>
<tr>
<td>National Priorities List 159</td>
<td>new technology 263–4</td>
</tr>
<tr>
<td>National Research Council (NRC) 171, 264, 278, 279</td>
<td>Nominal Group Technique 67</td>
</tr>
<tr>
<td>National Resources Board (NRB) 21, 145</td>
<td>non-governmental organizations (NGOs) 50–51</td>
</tr>
<tr>
<td>National Resources Committee 21, 142, 144</td>
<td>and planning processes 55</td>
</tr>
<tr>
<td>National Resources Planning Board (NRPB) 21, 24</td>
<td>non-market benefits and costs 102–111</td>
</tr>
<tr>
<td>National Sciences and Technology Council 277</td>
<td>non-monetarized and non-quantified effects 129</td>
</tr>
<tr>
<td>national water policy 56</td>
<td>choice based conjoint 110–11</td>
</tr>
<tr>
<td>National Water Quality Assessment Program 154</td>
<td>contingent valuation 108–110</td>
</tr>
<tr>
<td>National Waterways Commission 17</td>
<td>normative theory 88</td>
</tr>
<tr>
<td>National Weather Service River Forecast System 30</td>
<td>North Atlantic Regional study (NAR) 29</td>
</tr>
<tr>
<td>Nationwide Rivers Inventory (NRI) 147–8</td>
<td>North Carolina basin-wide water quality planning program 163–4</td>
</tr>
<tr>
<td>office of Water Policy 38</td>
<td>Northeast Water Supply Study (NEWS) 29</td>
</tr>
<tr>
<td>Ohio River 144</td>
<td>Northwest Fishbowl Planning approach 67</td>
</tr>
<tr>
<td>Ohio River Valley Water Sanitation Commission (ORSANCO) 53</td>
<td>Norton, V. 130</td>
</tr>
<tr>
<td>Ohio vs US Department of Interior 109</td>
<td>Noss, R.F. 209</td>
</tr>
<tr>
<td>Omnibus Rivers and Harbors Act (1826) 15–14</td>
<td>Office of Water Policy 38</td>
</tr>
</tbody>
</table>

Clifford S. Russell and Duane D. Baumann - 9781848449367 Downloaded from Elgar Online at 01/16/2019 02:16:46PM via free access
The evolution of water resource planning and decision making

O’Neill, R.V. 208
open access property 224
option value 91
organizational structure 276
Orlob, G.T. 179
Orme dam 223
other social effects (OSE) accounting
stance 34
Owen, J. 207

Palmer, R.N. 30, 180
Pareto improvements 84, 130
Park, R.A. 176
participation 65–6, 75
Payne, J.W. 205
PCB contamination 176–7
Pearce, D.W. 215
Peden, W. 76
Pelican Island, Florida 140
Pennsylvania, Unified Watershed
Assessment 164
permits 52, 148, 151, 152, 163, 254
Perrings, C. 215
PHABSIM model 175
Phelps, E.B. 167
Pick-Sloan plan, (Missouri River Basin
Development plan) 25
Pigou, A.C. 87, 94, 130
Pinchot, Gifford 139
planning coordination 26
planning frameworks 46
planning processes
basin and watershed planning
269–71
coordinating planning efforts 48–9
defining goals and objectives 46–7
developing implementation plans 50
elements of 45–6
establishing a database 47–8
establishing monitoring programs 50
evaluation of plans 49
evolution 44–50
and federal agencies 51
groundwater 270–71
identifying and evaluating
alternatives 49
identifying issues and problems 46
and local governments 52
making recommendations 49–50
managing conflicts 48
methodologies and goals 45
and non-governmental organizations
55
obtaining stakeholder input 48
planning objectives and measuring
results 268–9
and regional institutions 52–5
and state agencies 51–2
Platt, R.H. 142

Policies, Standards and Procedures
in the Formulation, Evaluation
and Review of Plans for Use and
Development of Water and Related
Land Resources (Senate Document
97) 26, 29, 90–91, 96, 145–6, 262
Polis Model 8–9, 228
compared with Rational Model 229
and the Colorado River Basin
239–46, 248–9
political decision making 6–9, 220–54
approaches to 227–9
inertial problems 222
institutional analysis model 227
levels of 221
local interests 223
Polis Model 228
public choice or rational choice
model 227
Rational Model 228
time dimension 221–2
Politics 227
politics
and governance 7–8
and public interest 261–2
of water governance 226–9
pollution 33–4, 37, 201–2, 261
from non-point sources 151
from urban storm water run-off 151, 152
and population 199
public water supplies 143–4
Quality of the Environment program
190–91
pollution control 30, 144
affordability 155
Pontius, D. 250
population 141, 142
and pollution 199
pork barrel projects 226
Portney, P.R. 131
Index

Postel, S. 280
Potomac River Basin study 30–31
Powell, John Wesley 138
predictive models 166–8
present value, principle of 117–18
preservation 90
  of individual species 148–50
  of natural areas 137–9, 146–7
Presidential Advisory Committee on Water Resources Policy 26
President’s Committee on Water Flow 21
President’s Council on Sustainable Development (PCSD) 165
President’s Water Resource Policy Commission 26
price changes, and consumers 97–9
price inflation 116–17
Principles and Standards for Planning Water and Related Land Resources (P&S) (1973) 34, 45, 93, 96, 161, 162
prior appropriation 230–31, 253, 255
private property 224
private sector initiatives (1800 to 1900) 15
probabilities 65
‘problem-sheds’ 3, 11
Producer Price Index (PPI) 116
producers, changes affecting 99–100
project cost-sharing rules 37
project effects 82–3
project evaluation 116–17
property regimes 224
property rights 93, 202, 224–5
Proposed Practices for Economic Analysis of River Basis Projects (The Green Book) 25, 44, 88–9, 94, 145
protection
  of aquatic life 141–5, 150
  of ecosystems 159–61
  of groundwater 150
  of individual species 139–41
  of public health 141–5, 150
public, role of 268
public choice theory 226, 227
public dialogue 65
public health 36, 141–5, 150
Public Health Act (UK) (1848) 142
Public Health Prevention and Bioterrorism Preparedness Act (2002) 42
public interest 247–8
public involvement 3
  and US Army Corps of Engineers (USACE) 62
  in water planning 62–76, 67–8
  chronology of changes 66–71
  simulation models 75
  skills 75
Public Involvement in the Corps of Engineers Planning Process 67
public sector 275–6
public water supplies, pollution 143–4
Public Works Administration 21
publicly owned treatment works (POTW) 34, 150
Putnam, R.D. 227
Quality of the Environment program, at Resources for the Future (RFF) 190–92
RAND Corporation 91
Randall, A. 209
Raskin, P. 169
Rational Model 228, 333
  compared with Polis Model 229
  and the Colorado River Basin 239–46, 248–9
Ready, R.C. 205, 210, 215
Reclamation Act (1902) 16, 17, 221, 259
Reclamation Program 19
Reclamation Project (1902) 125
Reclamation Project Act (1939) 125
Reclamation projects 241
Reclamation Service 223
recreation benefits 1, 102–6
  survey approaches to estimating 106
  travel cost method 91, 95, 102–6
  regime theory 226
Regional Economic Development (RED), accounting stance 34
  regional economic effects (REE) 161
  regional institutions, and planning processes 52–5
  regional interests 56
regions, and planning and management 58
Regulatory Right-to-Know Act (2001) 154
Reich, R. 65, 76
Reisner, M. 250
remediation 261
Report Card for America’s Infrastructure 274
Report on the Lands of the Arid Region of the West 138
Report of the Poor Law Commissioners Concerning the Labouring Population of Great Britain 142
Report of the Sanitary Commission of Massachusetts 142
research 278, 280–81
Reserved rights doctrine 233
Resource Conservation and Recovery Act (CWA) (1976) 31
and Superfund 158–9
Resources for the Future (RFF) 190–92
restoration projects 167
RIBASIM model 169
Richter, B.D. 177, 280
riparian land resources 137, 147
riparian law 253, 254
risk 189
River Analysis System 169
eriver basin commissions (RBCs) 11, 27
abolition 91
river basins 83–4, 92
planning for 26, 269–70
River of Grass Evaluation Methodology (ROGEM) 175
Rivers and Harbors Act (1927) 19, 29
Rogers, P. 26, 45, 240
Roosevelt, Theodore 17, 259
Rorty, R. 190
Rosen, S. 107
Rouse, H. 169
Russell, C.S. 85, 189, 214
Safe Drinking Water Act (SDWA) (1974) 31, 35–6, 38
reauthorized (1996) 42
standards 156–8
safe minimum standards (SMS), for environmental assets 209, 211
Sagoff, M. 114, 131, 222
Sax, D.F. 215
scenario methods 123
Schad, T.D. 46, 58
Schiller, A. 214
Schilling, K.E. 49
Schkade, D.A. 205, 268
Schnoor, J.L. 179
Science Advisory Board 195
secondary treatment 153
security, and water sources 43, 262
Sen, A. 205
Senate Select Committee on Water Resources 26–7
sensitivity analysis 123
sewers 142–3, 144
local government expenditures 155
shared vision planning 74
Shattuck, Lemuel 142
Sheer, D.P. 31
Sierra Club 55, 146, 147
Silent Spring 148, 260
simulation models 75, 123–4
Sinden, J.A. 205
Slovic, P. 215
small watershed program 28
Smith, A. 198
Smith, R.A. 173
Smith, V.K. 106
society, nature of 8
Soil Conservation Service (SCS) 22, 25, 28, 172
Soil and Water Assessment Tool (SWAT) models 172
Solid Waste Disposal Act 150
South Florida Water Management District (SFWMD) 41, 160, 175
SPARROW model 173
stakeholder involvement 281
Stakhiv, E. 165, 178
Stalnaker, C. 175
standards 10
for benefit-cost analysis 127
Standards and Criteria for Formulating and Evaluating Federal Water Resources Developments 89, 95
Stanford, J.A. 178, 280
Stanford Watershed Model 172
state agencies, and planning processes 51–2
state (governmental) property 224
State Water Planning survey 44
State Water Project 93
Stern, P.C. 206
Stockfish, J.A. 120
Stone, D.A. 7, 8, 220, 227, 228–9, 244
Storm Water Management Model 172
Streeter, H.W. 167
Streeter-Phelps model for dissolved oxygen 173, 191
Subcommittee to Study Civil Works of the House Committee on Public Works 26
Superfund Act (1980) 36
Susquehanna River 67
Susquehanna River Basin Commission (SRBC) 54
sustainability (sustainable development) 5, 164–5
history of concept 164
and weighting 165
Swamp Lands Act (1849) 137–8
Takacs, D. 208, 209
Tarlock, A.D. 258
Tarr, J. 144
technical approaches 57
Tennessee Valley Authority (TVA) 20, 29, 53, 259
terrestrial and aquatic ecosystem models 174–9
terrorism, and water sources 43, 262
Thacher, J. 131
Thomann, R.V. 179
time, in project analysis 115–16
Toman, M. 214, 215
total maximum daily loads (TMDLs) 167
travel cost method 91, 95, 102–4, 131
valuing changes in environmental quality through 104–6
Tullock, G. 226
UK, law on water allocation 253
uncertainty 189
in benefit-cost analysis 122–3, 129
and ecosystems 209
United Nations Educational, Scientific and Cultural Organization (UNESCO) 165
United States vs Jay Woods (1987) 38
US Army Corps of Engineers (USACE) 8, 10, 21, 25, 29, 175, 265, 266, 269, 272
ADR program 68
Civil Works Programs 69, 71
conflict resolution tools 72
and cost sharing 68
creation of 15
early navigation work 125
ECR programs 71
and evolution and elements of planning processes 44–50
evolution of responsibilities 44
expansion of functions 16–17, 41
Hydraulic Engineering Center (HEC) 169
Institute for Water Resources (IWR) 45, 67–8, 180
select bibliography 78–9
management of watershed stakeholders 71–2
and public involvement 62
public involvement tools 72
public participation 67–8
and regional framework studies 29
restoration projects 161–2
training program 67
trends in responsibilities and approaches 47
watershed approach 70
and WRDA 160
US Bureau of the Budget (BOB) 21, 25, 88
Budget circular A-47 89, 94–5
US Bureau of Land Management 137
US Bureau of Reclamation (USBR) 16, 25, 51, 223, 233
and Colorado River Basin 233
regional multi-purpose planning functions 18
US Commission on the Organization of the Executive Branch of the Government 26
US Congress 27, 46
US Department of Agriculture (USDA) 21
Agricultural Research Service 172
US Department of Environment and Natural Resources (DENR) 163

The evolution of water resource planning and decision making

US Department of Interior (USDOI) 18, 120
Division of Forestry 139
US Environmental Protection Agency (EPA) 32–3, 42, 46, 153, 159, 163, 176, 192–5, 195, 196, 236
and planning processes 51
regulatory approach 58
Watershed/Water Quality Modeling
Technical Support Center 172
US Executive Office of the President (EOP) 21, 263
US Fish and Wildlife Service (USFWS) 22, 140, 141, 175, 235
US Forest Service (USFS) 18
US Geological Survey (USGS) 56, 138
US Government Accountability Office (GAO) 46, 125, 140, 281
US House of Representatives 19, 29, 61
US Interagency Committee on Water Resources (USIACWR) 25, 88
US Office of Management and Budget (OMB) 10, 21, 69, 88, 119, 120, 122, 154
Circular A-47 44
US Senate 61, 90, 96

value 194
community and cultural 92
concept of valuation 197
of ecosystems 196
Vaughan, W.J. 124, 206
Vick, S.G. 65
Viessman, W. Jr. 44, 49, 57
Vitousek, P.M. 215

Washington, DC, study of metropolitan area water supply problems 30–31, 56
WASP6 model 174
wastewater treatment 31, 33, 151, 167
water availability 278–9
water demand prediction 30
water governance Colorado River Basin, case study 230–46
politics of 226–9
underlying principles 224–5
water institutions 279

water management and civic culture 64
contemporary trends 56–7
discontinuity between geography and jurisdiction 65
ethical dimensions 62–3
implementing adaptive management 264–5
integrated 57
participation and conflict management 65–6
and planning changes to 262–3
tensions between the political and technical 64–5
Water Management Districts (WMD) 55
water planning, public involvement 62–76
water pollution control 33–4, 37
Water Pollution Control Act (1948) 27–8, 144
Water Pollution Control Act Amendments (1972) 31, 33–4
water power 16, 19
water property rights 224–5
water quality 33, 36, 104, 131
federal action on 144
and federal law 257
Water Quality Act (1965) 28, 150
Water Quality Act (1987) 40
water quality management, economics of 91
water quality models 167, 173–4
water resource decisions, in the past half century 1–2
Water Resource Development 92, 95
water resource planning and development (1800 to 1900) 15–16
water resources historic contributions to economic analysis 94–6
national assessment 277
research 278
Water Resources Council (WRC) 27, 34, 37, 38, 91, 122, 127, 161, 174, 228
Water Resources Development Act (1965) 45–6
Water Resources Development Act (1974) 120
Water Resources Development Act (1986) 39, 45, 125, 268
Water Resources Development Act (1990) 41, 160
Water Resources Development Act (2000) 44
water resources evaluation, US guidelines for 87–91
Water Resources Planning Act (1965) 27, 44, 54, 56, 91, 240, 262
Water Resources Planning Act (1996) 160
water resources planning programs, environmental values 145–6
water resources project planning, incorporation of environmental values 161–4
Water Resources Research 131
water rights 225
Native American and federal reserved water rights 257
Water Science and Technology Board (WSTB) 171
Water Supply 92, 95
water supply, local government expenditure on 158
water use 279
Water in the West 42
waterborne disease 156, 157, 158
Waters, F. 230, 250
watershed models 172–3
watershed protection approach 162–3
Watershed Restoration Action Strategies (WRAS) 164
watersheds 18, 44
planning 269–70
weak complementarity 104–5
Weatherford, G.D. 250
Weisbrod, B.A. 91
‘welfare economics’ 83, 84, 92, 97
well-being of people 90
wellhead protection programs 38
Werick, W.J. 180
Western Water Policy Review Advisory Commission 42
Weston Solutions, Inc. 177
wetlands 137, 140, 157, 166
Wetlands Evaluation Techniques (WET) 212
White, G.F. 23, 28
Whittington, D. 214
Widditsch, A. 67
Wild and Scenic Rivers Act (1968) 30, 147
Wilderness Society 55
wildlife reserves 140
Willig, R.D. 99, 130
willingness-to-accept 85, 127–8, 130, 205
willingness-to-pay (WTP) 85, 90, 130, 154, 193–4, 205, 206
embedding effect 204
marginal (MWTP) 202–3
Winters vs U.S. 257
Wolf, H.W. 144
workers, changes affecting 99–100
Works Progress Administration 21
World Commission on Environment and Development (WCED) 164, 268
World Conservation Strategy 164
World Meteorological Organization (WMO) 267
Yellowstone National Park 138
Yellowstone Park Protection Act 140
Yosemite Valley 138
Hetch-Hetchy watershed 139
Young, H.P. 115
Young, R.A. 49
zoning 28, 29