Index

Abel, Nick 6
aboriginal people 1
access 43, 57, 62
entitlements 82–4, 89–90
rights 100
accounting systems 86, 152, 153
ACIL Tasman 139, 143–4, 146, 149
acquisition limits 27–8
Acton v Blundell 31
Adelaide, water demand 20
agricultural
production, changes in 129–31
usage 100, 108–11, 122, 125, 154–5
alienation rights 102
allocation
effectiveness 144–5
efficiency in 9–10, 121–2
environmental flows 16–17
history of 10–12
improvements 18–19
market-based 77–8
mechanisms 122–5
property rights 15–16
state control of 76–7
approvals process 144, 162
aquifers 97, 103
Argus, The 46
assignability 67
Atherton Tableland 133, 135
Australia
entitlements in 106–14
water in 95–100
availability of water 98–9
Beardmore Dam 152–3
Bega River 168
benchmarking, registration systems 87
‘beneficial use’ 161
Bennett, Jeff 6
biodiversity 16–17
Blackstone, W. 25
Brazil, water markets 60
Bulk Shares (BS) 152
bundling of land and water 147
bureaucrats 128
Burnett River Dam 134
California 59
call options, forward trading 156
Campbell, David 6
capacity share entitlements 152–3
capping
commercial uses 20
extractions 83, 176–7
volumes 162
water harvesting 111–12
case studies, inter-sector trading 129–32
centralised allocation, Victoria 51–3
Chaffey brothers 1
Chile, water markets 60, 124
choice modelling 168–70
Coase theorem 15
Coffin v The Left Hand Ditch Co. 35–6
Coggan, Anthea 6
collective
action approach, property rights 40
in-stream uses 26
Colorado 34, 35–6, 59, 61, 156
Comet River 131–2
commercial uses, capping 20
common law
concept of property 66–7
custom 24–5, 26, 33
second-best allocations 27–30
see also English common law
common pool
problems 31
resource 102–3, 112
‘common property’ 61–2
communal property rights 57
community groups 128
‘community of the river’ 42–3
Index

compensation 32, 33
competitive pressures 128
water markets 9
complete entitlements 115
compulsory charging, Victoria 51
Condamine-Balonne Basin 152
conditional trading 143
transfers 162
congestion pricing 148
conservation initiatives 172–8
consumptive uses 170
Coronation Hill 169–70
cost-reflective pricing 163

cotton industry 129–31, 133, 135
Cotton industry 129–31, 133, 135
Council of Australian Governments (COAG)
agreement (1994) 78, 82, 119–20, 127
commitments 13, 140, 141–4, 162
property framework 62–4
statements 8–9, 11
strategies 15, 19–21
courts as policymakers 69
customary foundations of water rights 24–5
dams
construction of 32, 33–4, 99
timing of release 150–51
Deakin, Alfred 48, 77
delivery
capacity entitlements 148–50
rights 14
demand
changes in 18
and groundwater rights 30–31
volatility, management of 144–6
Department of Natural Resources and Mines (DNR&M) 86
derivatives/options
contracts 86
markets 162
disputes, water access 43
downstream entitlements 16, 151

users 42–3, 97, 103–4, 111, 114
water yields 109
‘dozer’ rights 16
drainage rights 153
drought (1877–1881) 45–6
ecologically sustainable usage 79
economic issues, water trading 121–8
usage 100
Emerald Irrigation Area 129–31, 135
demand 171–6
end-user entitlements 152
English
allocation in 27–9
common law 39, 42, 57, 62, 69, 76
groundwater rights 30
markets 24, 25, 26
natural user system 32, 34, 35

entitlements
cancellation of 89
as collateral for loans 87
defensibility of 106–14
definitions, uniformity in 159
irrigation 114
National Water Initiative 58
nature of 83–5
security and defensibility 100–105
strategies 13–16
unbundling of 85, 86
entrepreneurship, returns from 135
environmental
entitlements, active trading in 160–61
traders 155, 161
environmental flows 16–17, 167
investment in 20–21
market demands for 171–6
regulatory setting of 168–71
and titling systems 90–91
environmentalists 128
Epstein, Richard A. 5
‘equi-marginal principle’ 4, 168
equity criteria, water trading 19
‘equivalent right’ model 91
Essential Services Commission 14
European
gleast systems 62
settlers 1

evapotranspiration 108, 109, 112, 113
evolutionary nature of property rights 41
exchange rates 159–60
excludable benefits 171
exclusion rights 102
exclusive rights, land 25–6
experimental economic procedures 127
explicit rights 102, 104
external costs 9–10, 163
extractive uses 140–41
Fairbairn Dam 129, 135
farm boundaries, water within 108–12
dams 99, 111
production models 126, 133
farmers
price rises 127–8
water rights 11–12
first possession rule 35
fish habitats 161
Fitzroy Basin 131–2, 168–9
flooding 33
flows 103–4
forests 108–9, 110
forward trading 145, 148
free-rider incentives 172, 173, 176, 177, 178
Freebairn, John 4
French legal system 62
fruit growing 131
funding for conservation 175–6
futures contracts 156
Gold Fields Act (1857) 44
gold mining, Victoria 44
government
failure 125, 134
intervention 10, 41, 48–9, 166
land departments 15
ownership of water rights 52–3
policy 10–12, 19–21
reforms 56–9, 78, 92–3
Goyder line 1
grandfather arrangements 11–12, 19
groundwater
percolation 108
rights 30–31
trading in 158
volume 99
H Jones v Kingsborough Corporation 65
Harris, Edwyna 5
harvesting of water 111–12
Hawai‘i 68
Head v Amoskeog Mfg. Co. 33
holders of rights 140–41
Holmes and Sinclair Relationship (HSR) 109
horticultural regions 113
human influences on hydrological cycle 95–7
Hunter Walter Corporation 108
hydro-electric generation 150–51
hydrological cycle, human influences on 95–7
imperative necessity 34–6
implicit rights 102, 104
in-district usage rights 149–50
in-stream
flow rights 161
uses 26, 31–6
incentive structures, politicians 3–4
incomplete entitlements 115
indefeasibility, water titles 88–9
Individual Capital Shares (ICS) 152
industrial users 121–2
infrastructure failure 49
innovation, returns from 135
institutional frameworks, rigidity in 51–2
inter-jurisdictional trading 158–60
inter-sectoral trade 125, 129–32
interstate trading 158–60
intra-sectoral trade 132–3
investments
environmental flows 20
incentives for 80
infrastructure 134
water markets 19
irrigation
districts 1
efficiency 113–14
schemes 135
Victoria 41, 45–51, 52
Irrigation Act (1886) 46, 48, 50
irrigators 97, 127–8
Islamic law 62
Kaldor-Hicks
improvements 36
standard of social welfare 32
land
  ownership 43, 44–5
  rights 25–6
  separation from water 82, 147–8
  use/change 108–11
landowners
  groundwater rights 30
  trading of water 146
leases 86, 154
legal environment
  property regimes 61–2
  water rights 24–5
legislation, objectives of 57–9
licences, water use 15, 17–18
licensing systems 77
Limari water market, Chile 60
‘live and let live’ regimes 26
loans, collateral for 87
location-specific flows 103–4
Locke, John 24–5, 27, 35
long-term entitlements 103
Mackay region 134
Major’s line, Victoria 42
management
  rules, environmental allocations 91
Mareeba-Dimbula Irrigation Area (MDIA) 133, 134, 135
marginal social benefits, environmental flows 17
market
  contracting 40–41
  demands for environmental flows 171–6
  models 39–61
  valuation studies 170–71
market-based allocation 77–8
mature water economy stage 10–11
Mean Annual Run-off (MAR) 99
Meering and Leaghur Irrigation Company 41
Melbourne, demand in 12, 20
Middle Eastern legal systems 62
Mildura 1
Mill Act cases, US 33
mills, construction of 32, 33–4
Mining Act (1865) 46
Mining Boards/Committees, Victoria 44
mining industry 131–2
Mississippi River 31
mortgage arrangements, protection of 88
multiple system of water rights 35–6
Murray River 114, 151
Murray Wetlands Working Group (MWWG) 112
Murray-Darling Basin 109, 142–3, 153, 158–9
National Land and Water Resources Audit (NLWRA) 99, 169
National Parks 166
National Provincial Bank v Ainsworth 66
National Water Initiative (NWI)
  access entitlements 83
  agenda 141–4
  common principles 92–3
  drivers 79
  strategies 58–9
natural
  resource property rights 41
  user system of rights 32
  ‘navigation servitude’, US 34
negative externalities, irrigation 127
New South Wales (NSW)
  allocations 85, 86, 106
  irrigation 39, 114
  titling system 92
  trading 158, 159
  ‘vesting’ formula 65
  water harvesting 111–12
New South Wales Farmers Federation 111–12
  non-consumptive uses 170, 171–2
  non-excludable benefits 165–6, 171, 176–7
  non-extractive uses 140–41
  non-market values 168–71, 178
Northern Territory 64
  ‘old title’ system 81
  ‘onus of proof’ requirement 143–4, 162
  opportunity costs 134
  options contracts 162
  Ord River Dam 134
  Oregon Water Trust (OWT) 161
out-of-region trades 149–50
out-of-stream uses, US 35
over-use, prevention of 40
ownership rights, definition of 2–3
Pareto
  efficiency 166
  exchange 19
  improvements 26, 32, 36
partial equilibrium analysis 126
percolation losses 112
permanent trades/trading 85, 86, 141, 143
perpetuity characteristics, entitlements 13, 15–16
Pigovian tax 127
policy initiatives 10–12, 19–21
political economy issues, water trading 127–8
politicians, incentive structures 3–4
pollution
  costs 14–15
  rights 153
Port Philip District, Victoria 42, 43
Portland, Victoria 42
Pratt Walter Group 112
price rises, farmers 127–8
price sensitive demand 133
primary entitlements 146–53
prior
  appropriation 34–6
  entitlements 104
  ‘prior right model’ 91
private
  in-stream uses, allocation of 27–9
  irrigation schemes 46–8
private sector conservation enterprises (PSCEs) 167, 173–8
pro-rata allocation 28–9
product prices 18
production costs 12–13
property framework, water markets 56–7, 61–7
  background 57–9
  market models 59–61
  water as public property 67–9
property regimes 61–2
property rights
  allocation of 15–16
  nature of 39–41
  re-definition of 66–7
security/enforceability of 80
public
  accessibility, entitlement registers 89–90
  trust doctrine 67–9
public funded
  investment projects 20–21, 134
  irrigation schemes 49–50
public rights
  embodiment of public values 63–4
  protection of 61, 69
put options, futures trading 156–7
‘quality of title’ provision 86–8
Quebec 30–31
Queensland
  allocations 85
  benefits of water trading 129–35
  titling system 92
  trading 86, 159
  ‘vesting’ formula 65
  water harvesting 111
Queensland Resource Registry (QRR) 86, 90

R v Toohey: Ex parte Meneling Station P/L 66–7
rainfall variation 42, 43–4
reafforestation 110
reasonable user system of rights 32, 35
recording systems 81
recreational usage 171–2
redistribution of property rights 40–41
registered interests, protection of 86–8
registers of deeds 81
registration systems
  reforms of 92–3
  role of 80–81
registry of information, entitlements 15, 90
regulation 64–6
regulators, concerns of 140
rent-seeking behaviour 166–7, 170, 177
residual entitlements 104
resource
  management 77–8
  rents 128
return flows 97, 114
rights
  bundles of 53
Index

185

to extract 140–41
to sell, limitation of 150
levels of 100, 102
riparian
rights 42–5, 48–9, 57, 64
systems 29–30
rivers
property rights 63
topography 31–2, 34–5
Rolfe, John 6
Roman law 24–5, 62, 68
Royal Commission (1884) 48
runoff 108–10
rural users, sales to urban users 20
Rural Water Commission (RWC) 52
‘safe’ farming 1
scarcity, living with 1–2
Scottish law 62
seasonal allocations 85
second-best allocations at common law 27–30
secondary markets 154–8
sectors, trading across 158
security
of entitlements 100–105
of supply, settlers 45
sequential allocation problem 104
settlement expansion 42–5
short-term entitlements 103
single share product 13
‘sleeper’ rights 16
Smith, Adam 2–3
Snowy Mountains Hydroelectricity
Scheme 1, 150–51
Snowy River 170
social
improvements, compensation for 32, 33–4
infrastructure for common law rights 29–30
South Australia (SA)
allocations 85
irrigation 113, 114
titulo system 92
water harvesting 111
Spain
legal system 62
water markets 60, 61
spatial alienability of entitlements 103
squatters’ water rights 42–5
St George Water Supply Scheme 152, 153
state
control of allocation 76–7
guarantee of title 89
management resources 57–8
State Rivers and Water Supply
Commission (SRWSC) 39, 50–52
stated preference techniques 126–7, 134
statutory framework, gaps in 66–7
stored water 99, 122–3
stranded assets 14, 149, 150
substitutability of water sources 103–4
sugar cane industry 133, 135
SunWater 152
supply volatility, management of 144–6
surface water 99
swaps contracts/swaptions 157
Sydney Water Corporation 108
‘tagging’ of water 159–60
Tan, Poh-Ling 5
Tasmania 58
technology, investments in 19
temporary
trades/trading 85, 86, 141, 143
transfers of water 155–6
theoretical foundations of water rights 24–5
third party interests, protection of 86–8
Tinaroo Dam 135
titling regimes
background 81–2
environmental flows 90–91
indefeasibility 88–9
nature of entitlements 83–5
nature of transactions 85–6
pretection of registered interests 86–8
public accessibility 89–90
transition issues 91–2
titling systems
legal aspects of 141
role of 80–81
topography 31–2, 34–5
Torrens titling system 81, 82, 86–9, 91, 92
tradeable
entitlements, value in 151
property rights, establishment of 78–9
trading across users/sectors 158
in environmental entitlements 160–61
in groundwater 158
inter-jurisdictional 158–60
limitations of 148
rights to property 2–4
trading systems, need for improvements 79
transaction costs 104–5, 109–11, 115, 165–7
transactions nature of 85–6
range 154–61
restrictions on 20
transfers adverse impacts 162
block approvals 144
of rights 29–30, 35
of title 90
transition issues, entitlement systems 91–2
transmission losses 112
trusteeship 67–9
two entitlement model 13

UK, environmental protection 171
un-allocated transmission losses 112
unbundling of primary entitlements 146–53
uni-directional flows 103–4
upstream entitlements 16
users 97, 103–4, 109–11, 114
urban users
demand levels 121–2
purchase from rural users 20
urban water market, demand in 12
US Constitution 33–4
environmental protection 171
forward sales 162
prior appropriation and imperative necessity 34–6
state ownership of water 67–9
water access 43
water markets 24, 56, 59–60
water rights 31–2, 36–7, 62

usage patterns, modification of 145–6
rights 171
users, trading across 158
usufruct 62, 69
value information 168–71
verification of title 89–90
‘vesting’ formula 64–6
Victoria
allocation 97
availability of water 98
evapotranspiration 109
harvesting of water 111
horticulture 113
interstate trading 158
irrigation 45–51, 88, 114
move to centralised allocation 51–3
property rights 39–41
riparian rights 42–5
stiting system 92
unbundling of entitlements 85
use of ‘vesting’ formula 64
Victoria Government

water availability 98–9
characteristics 3
cost components 17–18
law, evolution of 63–4
losses 13–14
as public property 67–9
separation from land 82, 147–8
use 100
Water (Central Management Restructuring) Act (1984) 52
Water Act (1905) 49, 51
Water Act (1989) 52, 64–5
Water Allocation Register, Queensland 90
Water Conservancy Board (WCB) 46
Water Conservation Act (1881) 46
Water Conservation Act (1883) 47
water markets development of 56–7
effective operation of 17–19
future development 140–41
need for establishment of rights 38–9
setting up of 59
Water Reform Working Group (WRWG) 139
water rights 12–16
farmers 11–12
groundwater 30–32
history of 26
theoretical and customary foundations 24–5
water trading
benefits of 129–35
economic issues 121–8
evolution of 76–9
water trading instruments study
background 140–41
managing volatility 144–6
NWL/COAG 141–4
overview of possibilities 146–63
water use licences 15
Waterworks Trusts 46, 47–50
wealth generating exchanges 40–41
wells 44
Western Australia 58
Western Mining Corporation Ltd v Commonwealth 67
Wetland Care Australia (WCA) 112
Whitten, Stuart 6
Wilberforce, Lord 66
WILMA titling system 92
withdrawal rights 100, 102
Woolston, Michael 5–6
World Bank 60, 61
Yanner v Eaton 65
Yass River 111
Zimbabwe 171