Index

abatement facilities
   cost recovery through subsidized 64
   economic incentives for operation of 138
   reduced revenue generation 90
acceptability, in charge methodology 113, 114
agricultural users
   France 138
       beneficiaries of WA transfers 54
       contribution to water charge revenue 53–4
       information for 66
       ratio, subsidies/charges 55
   socio-economic impacts, water charges 49
agriculture
   Brazil 119–20
       water charges
           economic impact of 120–21
           favourable levels 137
   France
       non-point source pollution 53
       pattern changes 48
       pollution programme (PMPOA) 43
       water charges, application 19
       water contamination 45, 47
air pollution control
   market creation approach 23–4
   output tax 17
Alsace, nitrate concentration 46
ambient standards 1
   water quality, Brazil 98
ANA, see National Water Agency
ANEEL, see National Power Agency
animal breeders, pollution and revenue contribution, France 45, 53
aquaculture, water charges
   Ceará 107
   Mexico 77
aquifers, overexploitation, Mexico 72
autonomy, see institutional autonomy
availability zones, Mexico 76, 80
basic unit price (PUB) 108
behaviour prices, revenues from 15
BOD discharges
   Mexico 83
   Paraíba do Sul 111
   water charge reductions 117
Brazil, water management
   final comments 131–2
   implementation phase 6, 104–30, 137–8
   instrument design phase 36, 101–4
   policy analysis phase 97–101, 135
   reform 5–6
bulk water pricing structure, Ceará 106, 107
CACs, see command-and-control mechanisms
carbon tax, Scandinavia 19, 22
Caribbean, EI experiences 3, 25
cattle raising, Brazil 120
   economic impact of charges 121–2, 123
Ceará
   water charges, implementation 6, 106–7
   water resource policy 99
CEEIBH, see Special Committee of Integrated Studies of River Basins
charge exemptions
France
agricultural use 19
public services 40
instrumental role 136
Mexico
1986 Federal Law of Charges 81
elimination 94
wastewater 91
OECD region 19
chemical discharges 85
CNA, see National Water Commission
CNRH, see National Council of Water Resources
COD concentration, Lerma river 88
coefficients, computation, effluent charges France 62–3
COGERH 106, 107
Colombia, revenue and incentive 20–22
command-and-control mechanisms (CACs) 1
France 35–6, 47, 59
identifying problems, EI formulation 27
information symmetry 17
institutional capacity 16
regulatory capture 19
water charges as complement to 6, 135
Commissariat Général du Plan 43, 53, 58
compensatory measures 30
France 59–61
compliance, industrial discharges 90–91
CONAMA Resolution No. 20 (1986) 98
Conseil d’Etat 44, 57
consumer behaviour, lack of knowledge, France 43–4
consumption, France
computation of effluent charges 62
computation of user charges 41–2
consumption rights, Paraíba do Sul 116
control cost estimation 27–8
control cost savings 2
control level standards 1–2
control-oriented policy instruments 12–13
cost estimation, water management and planning, Paraíba do Sul 129
cost functions
price levels 15
uncertainty about 18
cost–benefit analytical tools 8
recommendation 139
cost-effectiveness 11–14
information symmetry 17
market creation approach 23
pricing criteria 14
uniform pollution charges 1, 2
cost-saving potential 2, 15–16
Cour des Comptes 53
credit subsidies 18–19
CRH, see State Water Resource Council
cross-subsidies
equity versus efficiency 19
Mexico 87, 94
damage functions, uncertainty about 18
decentralization 6–7, 135
Brazil 101, 131
France 4, 36, 37, 52
Decentralization Act (1982) 38
Decree No. 66-700 (1996) 55
demand-oriented schemes 9–10
demographic growth, see population growth
deposit-return schemes 9–10
devaluation, revenue generation, Mexico 89
direct subsidies, Mexico 87
distortionary fiscal instruments France 59–61
removal, EI formulation 27
DNAEE, see National Department of Water and Electric Energy
domestic users, see residential users
double dividend 22
economic incentives 20–22
abatement facilities 138
environmental improvement 2
environmental regulation 10
France, pollution-reducing investments 37
policy instruments 10–11, 12–13
subsidies 18
to treat water, Mexico 90
economic instruments
choice and effectiveness 1
common applications 24–5
conceptual framework 10–11
cost-saving potential 2, 15–16
country cases 3–6
main findings 134–8
summary of recommendations 138–9
see also Brazil; France; Mexico
double dividend 22
environmental targeting 16–17
guidelines for application 26
instrument analysis phase 28–9
instrument development phase 29–31
policy analysis phase 26–8
main conclusions 6–7
market creation 22–4
pricing criteria 14–15
pricing instruments 11–14
recommendations 7–8
revenues and incentives 20–22
subsidies 18–19
survey, Latin America and Caribbean 3
uncertainty about cost and damage functions 17–18
use analysis 9
economic objectives, charge criteria, Brazil 105
economic profile, Paraiba do Sul 110–13
economic and social impacts
assessment, EI formulation 30
Colombia, analysis 21
France 45, 49–51
Paraiba do Sul, minimization 113, 114
effluent charges
Colombia 20
economic incentives 12
examples of applications 13
France 40–41
lack of transparency and equity in 63–4
need for detailed design guidelines 66–7
residential users’ criticism of 61–3
revenue from 54
six WAs, (1992) 42
implementation 44–6
see also pollution charges; wastewater charges
effluent collection, computation of emission charge, France 63
effluent concentrations, measurement, France 64–5
EI, see economic instruments
eligibility criteria, financial transfers, France 58–9
Emission Trading Programme (EPA, 1974) 23
energy sector, water policy opposition, Brazil 101
environmental consequences, charge applications 139
environmental damage, estimation, EI formulation 27–8
environmental outcomes, France 46–9
environmental policy, clarification, EI formulation 26–7
environmental problems, identification, EI formulation 27
environmental profile, Paraiba do Sul 110–13
Environmental Program (1994–2000) 71
environmental quality, charge criteria, Brazil 105
environmental regulation economic incentives 10
France 52
environmental regulators conflict with water authorities,
Mexico 75
need for collaboration with water management framework 138
standards 1
environmental targeting 16–17
environmental taxes 22
equity issues 1–2
erosion control, resource allocation,
Paraíba do Sul 129
Europe
crater charge levels 19
see also France; Holland
European directives
French compliance with 39
urban wastewater 48
evaluation process, recommendations for continuous 7–8
exemptions, see charge exemptions
expected total consumption, effluent charges based on 62
expenditure-driven principle 55
external costs, lack of research 43
externality prices, revenues from 15
extractive industries, see mining activities
farmers, see agricultural users
federal investment, Mexico 93
1991 wastewater charge 80–81
water bodies 81
process in 84
Federal Law of Irrigation Waters (1926) 74
Federal Law of Waters (1972) 74
Federal Water Law No. 9433 (1997)
Federal water management system,
Mexico 4–5, 73–4
federal waters, Brazil 5, 97
financial assistance, for polluters, France 37, 48
financing facilities, subsidies as 19
fiscal subsidies 18–19
fish farming, impact of charges,
Paraíba do Sul 125–6
flexibility, EI use 10
Fox, President 91, 93
France, water management
design phase 39–42
implementation phase 44–65, 136–7, 138
institutional barriers 43–4
legal barriers 44
new approach 4
paradigm for Latin America experiences 3, 25
policy analysis phase 35–9, 134
recommendations 65–8
Water Act (1964) 3
water charges 19
funds, destination of, France 56–7
greenhouse gases, markets for 24
groundwater, France pollution levels 45, 46, 48
use charge 41
Guandu river basin 124, 125
heterogeneous pollution, pricing structure 17
Holland, revenue and incentive 20
homogenous pollution, pricing structure 17
horizontal equity impacts 11
hydroelectric sector
Brazil favourable charge levels 137
power generation plants 122–4
water policy opposition 101, 130
Mexico, water charges 77
IBAMA 98, 99
implementation costs versus cost-saving benefits 2, 16
planning, EI formulation 31
see also instrument implementation phase
income, impact of charges, France 50
individual standards 1
industrial discharges
Mexico 83–5, 89
compliance 90–91
industrial users
Brazil
water charges
Ceará 106, 107
Paraíba do Sul 115–17, 130
France 63–6
information for 66
likelihood of collusion with WAs 52
ratio, subsidies/charges 55
water charges
economic and social impacts 49
revenues from 54
Mexico
water charges
(1993) 76
(2002) 77
revenue generation 79
industry mapping 40
information, effluent charge design 40–41
information symmetry, cost-effectiveness 17
infrastructure investment
Ceará 106–7
Mexico 73, 74, 87, 91–4
revenue distribution 7, 136
Infrastructure Investment Fund (FINFRA) 93
institutional arrangements
Brazil 97, 98, 101–3, 106, 112
EI formulation 30–31
France 37, 38, 51–2, 68
introduction of EIs 16
Mexico 73–4
recommendations 139
institutional autonomy 7
Brazil 6
France 37
Mexico 5
institutional barriers 28
France 43–4
Mexico 5
Paraíba do Sul 126–7
institutional capacity
assessment, EI formulation 28
CAC instruments 16
EI experiences 25
institutional power, CNA 5
institutional reform, France 68
instrument analysis phase 28–9
instrument design phase
Brazil 101–4
France 39–42
recommendations 66–7
main findings 136
Mexico 75–87
instrument development phase 29–31
instrument implementation phase
Brazil 6, 104–30
France 44–65
recommendations 67–8
main findings 136–8
Mexico 87–94
inter-basin transfer water charges, Brazil 124–5
investment decisions, local municipalities, France 48
irrigation
infrastructure investment, Mexico 74
water charges, Ceará 107
joint working, need for 138
knowledge acquisition, French Water Agencies 43–4
Kyoto Protocol 24
Lajes Hydroelectric Complex 124
Latin America
credit and fiscal subsidies 18–19
EI experiences 3, 25
revenue-raising aims, EIs 20
non-compliance costs 11
non-governmental organizations, Brazil 130
non-point source pollution, France 45, 53

OECD region
application of EIs 24–5
exemptions and tax differentiation 19
output tax, air pollution control 17
revenue-raising aims, EIs 20
subsidies 18
opportunity cost assessments 27–8
optimal use level 14
output tax, air pollution control 17

Paraíba do Sul river basin, water charges 6, 103, 109–30
Paraíba do Sul River Basin Committee (CEIVAP) 110, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 128
Paraíba do Sul Water Resources Plan 110
participatory process, need for 7, 138
past experiences, reviews, EI formulation 28
penalty level, non-compliance 11
performance indicators, design, EI formulation 31
performance standards 1
performance-rating programmes 12
examples of applications 13
pesticide contamination, France 47
‘Pigouvian tax’ approach 9, 14
planning, French water management 4, 36
policy analysis phase 26–8
country cases
Brazil 97–101
France 35–9
main findings 134–5
Mexico 72–5
policy goals, compatibility with pricing criteria 15
policy instruments, with economic incentives 10–11, 12–13
pollutant concentration, charge levels, Mexico 81, 82
‘polluter/user pays’ principle 10, 38, 39, 45, 78
pollution abatement
France
investment 38
subsidies 61
see also abatement facilities
pollution charges
Colombia, pricing criteria 20–21
cost-effectiveness 1
desired ambient environmental conditions 14
economic incentives 2
equity issues 1–2
see also effluent charges;
wastewater charges; water pollution charges
pollution control
Brazilian legislation 97–8
France 35–6
market creation approach 23–4
wastewater 78–80
see also air pollution control
pollution indicators, Mexico 83
population growth
water availability, Mexico 72
water pollution, Paraíba do Sul 110
population size, effluent charges, France 62
pricing criteria 14–15
pollution charges, Colombia 20–21
recommendations 139
water charges
Brazil 6, 106
Mexico 5
pricing instruments 2, 11–14
pricing structure
France, effluent charges 41
Mexico, water charges 75–6
São Paulo 108
private participation, Mexico 93–4
profit maximization, equalization and minimization of costs 11, 14
Index

PROMAGUA 93
PUB value 108
public awareness and debate 8, 31, 139
France 52–4
public investment, water sector, Mexico 92
public perception
analysis, EI formulation 29
water charges, Paraíba do Sul 129–30
public unit price (PUP), determination of, Paraíba do Sul 117–18
PUM value 108, 109
quantitative rights, market creation approach 22–3
recreation, water charges, Mexico 77
reduction mechanisms, water charges, Paraíba do Sul 118–19
regional environmental authorities (AARs) 21
regulatory capture 19
residential users
Brazil
water charges
Ceará 106, 107
Paraíba do Sul 115–16
France
effluent charges 40
criticism of 61–3
ratio, subsidies/charges 55
water charges 39–40
concern and organized protest 53
economic and social impacts 49–51
revenues from 54
improvement of information to 66
revenue distribution
France 38, 57–9
infrastructure investment 7
Paraíba do Sul 128–9
simulation, EI formulation 29–30
water charges 136
revenue generation
Brazil 105, 131
Ceará 106
Paraíba do Sul 117–18, 128–9
São Paulo 108–9
France 4, 54–7
and incentive 20–22
Mexico 5, 79, 88–90
pricing criteria 14–15
recommendations 7
simulation, EI formulation 29–30
water charges design 136
rice industry 120
Rio de Janeiro 110, 114, 124, 127, 128
River Basin Agencies (ABH) 102
river basin authorities, autonomy 5, 6, 7, 53, 139
River Basin Committees 7
Brazil 6, 99, 101, 102, 103, 110, 112, 137–8
France 4, 36–7, 43
River Basin Councils, Mexico 4–5, 73–4, 95
River Basin Management Plans 5–6, 103
river basins
continuous environmental evaluation 7–8
France 37
management, Brazil 98
River Basins Cleanup Program 117
sanction values 11
sanitation agencies, Colombia 21–2
sanitation sector, charges, Paraíba do Sul 115–17
Santiago, industrial air pollution control 24
São Paulo 128
institutional arrangements 127
possibility of revenue transfers 127
simulation study, cost savings 16
water charges, implementation 6, 104–6, 108–9, 114
water resource policy 99–100
Scandinavia, carbon tax 19, 22
secondary treatment, industrial discharges 85
Secretariat of Water Resources, Brazil 100
sectoral conflicts 136
self-reporting, Mexico 80
SEMA 98
sewerage, public investment, Mexico 92
signalling, in charge methodology 113, 114
simplicity, in charge methodology 113
Sistema LIGHT 124–5
slash-and-burn agriculture 120
social impacts, see economic and social impacts
socio-economic conditions, charge criteria, Brazil 105
Special Committee of Integrated Studies of River Basins (CEEIBH) 98
Special Conditions of Discharge 83
standards, environmental regulation 1
economic incentives 12
examples of applications 13
see also Mexican Official Standards
State Water Council, Ceará 106
State Water Resource Council (CRH) 108
state waters, Brazil 5, 97
legislation 101
strict liability legislation 12
examples of applications 13
strong EI 10
Sub-basin Committees, Paraíba do Sul 127
subsidies 18–19
France
agricultural users 138
VI Working Plan (1992–96) 55, 60
Mexico 87
reduction 94–5
sugar industry 120
discharges 85
Sulphur Dioxide Allowance Trading 24
surface water, France
nitrate contamination 45
reduction in pollution levels 48
use charge 41
sustainable policy implementation path, France 67–8
tax burden, reducing through environmental taxes 22
tax differentiation, among payees 19
tax rebates 18
tax recycling 22
technological standards, see command-and-control mechanisms
theoretical analysis
EI formulation 28
EI use 9
theoretical basis, water charges, France 39
tradable permits 12
examples of applications 13
transaction costs 2
uncertainty, about cost and damage functions 17–18
uniform pollution charges 1
unit water use charges, France 48
United States, market creation approach 23–4
urban water charges
Mexico
(1993) 76
(2002) 77
revenue generation (1993–2001) 79
use level charges 1–2
user charges
Colombia 20
economic incentives 12
examples of applications 13
France 41–2
implementation 46
revenue from 54
six WAs, (1992) 42
Index

Mexico 71
(1993) 76
(2002) 77
users, see agricultural users; industrial users; residential users

VI Working Plan 54, 55
VII Working Plan 53, 54, 55–6

WAs, see Water Agencies
wastewater charges
Mexico 4, 71
design phase 80–81
implementation phase 88–91
wastewater discharges
Mexico
main industries 85
pollution control 78–80
wastewater treatment
Brazil 110, 116–17
France 36, 48–9
Mexico 78
private participation 93–4
water
France
increased demand 35
lack of incentives to change use patterns 4
Mexico
availability and distribution 72
excessive misuse 75
Water Act (1964) 3, 35–6, 57, 63, 134
Water Act (1992) 38, 53, 63, 64
Water Act project (2002) 45, 51
Water Agencies (WAs) 36
Brazil 5
see also National Water Agency
France 4
autonomy 37, 53
destination of funds 56–7
industry mapping 40
likelihood of collusion with industrialists 52
major drawbacks in system 61–5
move towards efficient environmental policy 45
poor knowledge acquisition 43–4
recommendations 65–6
revenue distribution 57–9
specific charge for extractive industries 44
water authorities, conflict with environment authorities, Mexico 75
Water Basin Committees, Brazil 5
water charges
Brazil
criteria 105
design phase 101–4
final comments 131–2
implementation phase 6, 114–30
Ceará 6, 106–7
Paraíba do Sul 6, 109–30
São Paulo 6, 107–9
policy analysis phase 97–101
Colombia 20
decentralization 6–7
design, as financing mechanism 136
environmental consequences of application 139
exemptions, see charge exemptions
France
design phase 39–42
implementation phase 4, 44–65
institutional barriers 43–4
legal barriers 44
policy analysis phase 35–9
recommendations 65–8
goal of 6
introduction
as complement to CAC 135
within a policy framework 134–5
lack of evaluation process 7
Latin America and Caribbean 3
levels, incentives for abatement facilities 138
Mexico 4
instrument design phase 75–87
implementation phase 5, 87–94
policy analysis phase 72–5
recommendations 94–5
<table>
<thead>
<tr>
<th>Term</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>pricing criteria</td>
<td>151</td>
</tr>
<tr>
<td>revenue, see revenue distribution</td>
<td></td>
</tr>
<tr>
<td>revenue generation</td>
<td></td>
</tr>
<tr>
<td>Water Code (1934)</td>
<td>97</td>
</tr>
<tr>
<td>Water Law (1910)</td>
<td>74</td>
</tr>
<tr>
<td>water management framework</td>
<td></td>
</tr>
<tr>
<td>need for collaboration</td>
<td></td>
</tr>
<tr>
<td>with environmental framework</td>
<td>138</td>
</tr>
<tr>
<td>with other policy frameworks</td>
<td>139</td>
</tr>
<tr>
<td>Water Parliaments</td>
<td>36</td>
</tr>
<tr>
<td>water pollution</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>35–6</td>
</tr>
<tr>
<td>Mexico</td>
<td>72–3</td>
</tr>
<tr>
<td>Paraíba do Sul river basin</td>
<td>110</td>
</tr>
<tr>
<td>water pollution charges, Mexico</td>
<td>5</td>
</tr>
<tr>
<td>water pollution licences, France</td>
<td>36</td>
</tr>
<tr>
<td>water pollution rights</td>
<td>36</td>
</tr>
<tr>
<td>Water Program (2001–2006)</td>
<td>91, 93, 94</td>
</tr>
<tr>
<td>Water quality</td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td></td>
</tr>
<tr>
<td>ambient standards</td>
<td>98</td>
</tr>
<tr>
<td>degradation, Paraíba do Sul</td>
<td>111</td>
</tr>
<tr>
<td>France</td>
<td></td>
</tr>
<tr>
<td>deterioration, post-war period</td>
<td>35</td>
</tr>
<tr>
<td>observed trends</td>
<td>47-8</td>
</tr>
<tr>
<td>poor standards</td>
<td>53</td>
</tr>
<tr>
<td>revenue allocation, Paraíba do Sul</td>
<td>128</td>
</tr>
<tr>
<td>water resource policy, Brazil</td>
<td>98–101</td>
</tr>
<tr>
<td>water supply, Ceará</td>
<td>106, 107</td>
</tr>
<tr>
<td>water user associations, Ceará</td>
<td>106</td>
</tr>
<tr>
<td>weak EI</td>
<td>10</td>
</tr>
<tr>
<td>welfare changes, France</td>
<td>50–51</td>
</tr>
<tr>
<td>withdrawal rights, Paraíba do Sul</td>
<td>116</td>
</tr>
<tr>
<td>withdrawal user price multiplier (KO)</td>
<td>117–18</td>
</tr>
</tbody>
</table>