Cambridge University Press 978-0-521-51446-0 — Ecology of Industrial Pollution Edited by Lesley C. Batty, Kevin B. Hallberg Index More Information

Index

Acarospora spp., 59 Acarospora sinopica, 57 Acid Water Indicator Community (AWIC) index, 137 additive effects between pollutants in rivers, 75 Agropyron repens, 11 Agrostis spp., 7 Agrostis capillaris, 11 Agrostis stolonifera, 11 ametryn, 207, 214 antagonistic effects between pollutants in rivers, 75 Arabidopsis halleri, 11 arbuscular myocorrhizal fungi symbiosis with heavy-metal plant communities, 15-16 Armeria maritima subsp. halleri, 11 Armerietum halleri plant association, 9 Arthrobacter aurescens strain TC1 atrazine degradation, 214-215 atrazine, 207 atrazine-degrading micro-organisms, 207-209 conservation of microbial genes for degradation, 211-213 distibution of microbial genes for degradation, 213-214 enhanced microbial degradation capacity, 217 - 218evolution of atrazine degradation genes, 218 - 219gram-positive atrazine-degrading bacteria, 214-215 microbial evolution of the degradation pathway, 215-217 Australia. see bauxite mine site restoration, South Australia bauxite mine site restoration bauxite mines in Australia, 309 characteristics of developing forest communities, 316-317 criteria for successful restoration, 315 economic importance of bauxite in Australia, 309

long-term monitoring of sites, 315-316 minimising negative effects of mining, 309-310 natural vegetation around Australian mines. 309 plant litter accumulation and quality, 317-320 reference sites, 315 soil development, 320-323 soil fertility and management, 320-323 soil handling and the restoration process, 311-316 soils associated with bauxite ore, 310-311 biodiversity in polluted environments, 3 biological integrity of ecosystems, 332 Biological Monitoring Working Party (BMWP) system, 74, 128 biomonitoring of rivers Acid Water Indicator Community Index, 137 **Biological Monitoring Working Party** (BMWP) system, 128-129 definition of biomonitoring, 126 early biomonitoring techniques, 127-129 environmental quality ratio (EQR), 137 measuring responses to specific stressors, 137 Quality Rating System (Q-Value system), 129 quantifying uncertainty in assessments, 137-142 range of target organisms, 129 reference condition approach, 129-133, 134-136 RIVPACS assessment method, 129-133 saprobic system, 127–128 Trent Biotic Index, 128 Water Framework Directive, 133-136 Water Framework Directive requirements, 126 - 127biosensors use in remediation of contaminated land, 242-243 Buellia pulverea, 54 calaminarian grasslands of the order Violetalia calaminariae, 20 Caloplaca flavovirescens, 47

Cambridge University Press 978-0-521-51446-0 — Ecology of Industrial Pollution Edited by Lesley C. Batty, Kevin B. Hallberg Index More Information

346 INDEX

Cheumatopsyche brevilineata, 81 chironomid larvae as bioindicators of pollution, 76-77 Chironomus riparius, 77 Chironomus tentans, 76, 77 Cladonia spp., 41, 46 Cladonia coccifera, 46 Cladonia gracilis, 46 Cladonia peziziformis, 46 Clean Air Act (1956), 2 contaminated land bacterial biosensors, 242-243 bioremediation case study (hydrocarbon contamination), 249-252 bioremediation case study (petrochemical plant site), 244–249 degradation assessment methods, 243-244 microbial catabolic genes for contaminant degradation, 243-244 mineralisation of ¹⁴C-labelled contaminants, 243-244 potential for microbial bioremediation, 242 sustainable remediation strategies, 252-253 Corbicula manitensis, 77 cyanazine, 214 Cyphelium notarisii, 46

```
Daphnia magna, 84
```

ecological effects of pollutants case study (polluted estuaries of SW England), 152-155 definition of pollution, 147 detecting subtle changes in community composition, 149-150 detection in heterogeneous environments, 158 direct toxicity testing of samples, 156-158 evidence for actual effects, 149-150 expected effects, 148-149 implications of change in community composition, 150-151 limits to detection in the field, 155-156 prospective risk assessment, 147 Scope for Growth measurement, 157-158 sediment toxicity testing, 157 site classification by contamination effects, 149 species sensitivity distributions, 156 ecological quality assessment ecosystem health and resilience, 333-335 framework based on ecosystem services, 336-338 reference conditions, 331-333 ecological risk assessment approaches to developing frameworks, 189 definition, 189 USEPA ERA scheme, 189-190 ecological risk assessment framework (Environment Agency), 190-191 bioassays, 197-198

contaminant-pathway-receptor relationship, 190 creation of a conceptual site model (CSM), 192-194 definition of contaminated land, 190 desk study, 192-194 ecological surveys, 198-201 Environmental Protection Act (1990), 190 soil screening values (SSVs), 194-196 Tier 1, 194-196 Tier 3, 201–202 Tier 2, 196-201 economic development and pollution, 339-341 global impacts on ecosystem services, 339-341 ecosystem health concept, 333-335 ecosystem resilience concept, 333-334 Ecosystem Service Profile, 336-338 contruction, 338-339 use in environmental management, 338-339 ecosystem services biological integrity of ecosystems, 332 criteria for restoration, 331-333 ecological quality assessment framework, 336-338 ecosystem health concept, 333-335 global impacts of economic development, 339-341 impacts of economic development, 335 impacts of imported ecosystem services, 342-343 industrial decline and environmental improvement, 329-331 industrial impacts on the River Don, 327 - 329interdependence and potential trade-offs, 335 potential impacts of industrialisation, 327 reference conditions for comparison, 331-333 resilience of ecosystems, 333-334 types of services, 335 emerging contaminants engineered nanoparticles, 102-107 identifying future problem contaminants, 114 identifying high risk emerging contaminants, 115–116 identifying inputs into the environment, 114-115 monitoring the environment, 119 potential effects, 101 previous horizon-scanning studies, 116-119 range of potential contaminants, 101 research needs, 119-120 transformation products, 111-114 engineered nanoparticles ecotoxicity studies, 103-107 effects in the environment, 103-107

Cambridge University Press 978-0-521-51446-0 — Ecology of Industrial Pollution Edited by Lesley C. Batty, Kevin B. Hallberg Index More Information

INDEX 347

emerging contaminants, 102-107 fate and behaviour in the environment, 102 - 103inputs to the environment, 102 range of applications, 102 sources of nanoparticles, 102 transport in the environment, 102-103 uptake by organisms, 103–107 Environmental Protection Act (1990) UK, 190 environmental quality ratio (EQR), 137 Festuca ovina, 7 Flavoparmelia soredians, 48 freshwater macroinvertebrates. see metalliferous drainage into rivers Habitats Directive Annex I (Fauna-Flora-Habitat) (EU), 20 heavy-metal vegetation. see metallophytes herbicides s-triazines, 207 human and veterinary medicines emerging contaminants, 107-111 impacts on the environment and human health, 108-111 inputs to the environment, 107-108 Hydropsyche exocellata, 76, 84 Hydropsyche orientalis, 81 Hypogymnia physodes, 43, 48 industrial pollutants range of impacts, 1-2 industry definition, 1 range of impacts, 2-3 iron hydroxides toxic effects in rivers, 79-82 Lecanora cascadensis (Lecanora sierrae), 59 Lecanora conizaeoides ('pollution' lichen), 48, 49-54 Lecanora muralis, 44 Lecanora vinetorum, 54 Lecidea inops ('copper lichen'), 58 Lecidea theiodes, 58 Lepraria eburnea, 46 lichens abundance related to human activity, 42-45 biodiversity in metal-enriched environments, 57-59 chemicals produced by, 42 colonisation, growth and succession, 41-42 distribution and abundance, 41 ecological functions, 41 effects of air pollution, 42-45, 45-49 effects of nitrogen pollution, 54-57 effects of NO_X concentrations in London, 48 - 49effects of sulphur dioxide levels, 42-45, 45-49 evolution, 41 London's lichens, 45-49 mutualistic symbiosis, 41

mycobionts, 41 nutrient uptake, 42 photobionts, 41 pollution' lichen (Lecanora conizaeoides), 48.49-54 responses to environmental change, 42-45 Liquid Chromatography Tandem Mass Spectrometry (LC-MS-MS), 108 London's lichens, 45-49 Manchester Ship Canal agricultural pollutants, 282 background to water quality problems, 278-283 constraints on algal growth, 281–282 decline in industrial use of waterways and docks, 278 deterioration of the River Irwell, 277-278 dredging activities, 281 ecological legacy of industrial pollution, 283 - 284effects of canalisation, 280 establishing an inland port at Manchester, 276-277 future challenges, 301-304 Mersey Basin Campaign, 292–299, 303–304 metal accumulation in biota, 284 metal contamination levels, 282 non-metal industrial pollutants, 282 noxious gas generation, 282 organic pollution, 278-280 revitalising the MSC Turning Basin, 292-301 Salford Quays regeneration, 284-292, 301-302.304 sediment oxygen demand, 280-281 sediment rafting, 282 sedimentation rates, 280 sewage effluent pollution, 278-280 water column anoxia, 280 water quality legacy of industrial pollution, 283-284 medicines. see human and veterinary medicines Mersey Basin Campaign, 292-299, 303-304 metal-enriched environments biodiversity of lichens, 57-59 metalliferous drainage into rivers biological monitoring techniques, 74 characteristics, 72 contamination of biofilms, 83 direct toxicity of metals, 74-77 effects of human activities, 70-71 effects on community structure, 84-85 effects on ecosystem function, 84-85 effects on leaf litter processing, 85 functions of freshwater macroinvertebrates, 71 general responses of macroinvertebrates, 73 - 74influence of pH on toxicity, 77-79 interactions between pollutants, 75 metal adaptation in macroinvertebrates, 77 metals in river sediments, 85-87

Cambridge University Press 978-0-521-51446-0 — Ecology of Industrial Pollution Edited by Lesley C. Batty, Kevin B. Hallberg Index More Information

348 INDEX

metalliferous drainage into rivers (cont.) monitoring techniques, 74 net-acidic discharges, 72 net-alkaline discharges, 72 recovery of macroinvertebrate communities, 87-89 sources of metal inputs, 72 toxic effects of iron hydroxides, 79-82 uptake and bioaccumulation of metals, 82-84 uptake by different types of feeders, 82-84 metallophyte classification associated metal-tolerant species, 14 associated non-metal-tolerant species, 14 facultative metallophytes, 14 obligate metallophytes, 13 metallophyte vegetation in central Africa conservation and management at Katanga, 24–26 copper-cobalt metallophytes of Katanga, 22 - 26nature of the soils, 22 metallophyte vegetation in Europe classification of metallophyte vegetation, 12 classification of metallophytes, 12-14 conservation and management, 16-22 decline, 16-20 ecophysiology of metallophytes, 14-16 effects of rehabilitation and remediation, 16 - 20.21environmental legal protection, 20-22 evolution and distribution, 9 genetic adaptations, 14-15 historical interest, 21-22 local endemism, 12, 16 metal hyperaccumulation, 14-15 metal tolerance mechanisms, 14-16 nutritional challenges and adaptations, 15 plant associations specific to metalenriched soils, 9 primary sites, 10 secondary sites, 10 sensitivity to shade, 15 site management, 20 symbiosis with arbuscular mycorrhizal fungi, 15-16 tertiary alluvial habitats, 11-12 tertiary atmospheric habitats, 10-11 threats, 16 types of heavy-metal sites, 9–12 metallophyte vegetation in Latin America environmental threats from metal mining, 29-30 information from artesanal small-scale miners, 29 information from geobotanical surveys, 28 - 29information from scientific research, 27-29 status, 26-27 metallophytes definition, 7 research initiatives, 30-32

microbial ecology of contaminated land bacterial biosensors, 242-243 bioremediation case study (hydrocarbon contamination), 249-252 bioremediation case study (petrochemical plant site), 244-249 bioremediation potential, 242 catabolic genes for contaminant degradation, 243-244 degradation assessment methods, 243-244 mineralisation of 14 C-labelled contaminants. 243-244 sustainable remediation strategies, 252–253 microbial interactions with radioactive waste bioremediation potential, 226-227 sources of radioactive waste, 226 microbial interactions with radionuclides bioaccumulation, 228 biogeochemistry of Tc reduction in sediments, 230-232 biomethylation, 228-229 biomineralisation, 230 bioreduction, 228-230 bioremediative stimulation of native reducing bacteria, 232-234 biosorption, 227-228 effects on solubility, 227-230 fate and transport of uranium, 232-234 influences of nitrates and nitrate-reducing bacteria on solubility, 234-236 transformation, 228-230 microbial metabolic potential atrazine and the s-triazine herbicides, 207 atrazine-degrading micro-organisms, 207–209 catabolic expansion, , 206-207 catabolic radiation, 206-207 conservation of genes for atrazine degradation, 211-213 enhanced atrazine degradation capacity, 217-218 evolution of atrazine degradation genes, 218 - 219evolution of microbial genes, 205-206 evolution of the atrazine degradation pathway, 215-217 gene diversity and distribution driven by plasmids, 213-214 gram positive atrazine-degrading bacteria, 214-215 selection pressures in natural environments, 205 Minuartia verna, 9, 11 Mississippi River basin. see wetland systems studies monitoring ecological response to pollution range of approaches, 4 reference condition concept, 4 Murray Darling Basin wetland restoration strategy, 163-164 see also wetland systems studies. Murray River wetlands

baseline study, 165–166

Cambridge University Press 978-0-521-51446-0 — Ecology of Industrial Pollution Edited by Lesley C. Batty, Kevin B. Hallberg Index More Information

INDEX 349

nanoparticles. see engineered nanoparticles nitrogen oxides (NO_x) effects on lichens, 48-49 nitrogen pollution effects on lichens, 54-57 palaeoecological records in wetland sediments, 166-167 Parmelia saxatilis, 47 Parmelia sulcata, 49 Peltigera neckeri, 48 pН influence on metal toxicity in rivers, 77-79 pharmaceuticals. see human and veterinary medicines Pollution Haven Hypothesis, 341 'pollution' lichen (Lecanora conizaeoides), 48, 49-54 pollution of wetlands diffuse pollution sources, 162-163 Procladius spp., 77 prometryn, 207, 214 propazine, 214 Pseudomonas sp. strain ADP atrazine degradation, 209 evolution of the atrazine degradation pathway, 215-217 genes for atrazine degradation, 211-213 role of plasmids in gene diversity and distribution, 213-214 Psilolechia leprosa, 58 Quality Rating System (Q-Value system), 129 radioactive waste

bioaccumulation, 228 biogeochemistry of Tc reduction in sediments, 230-232 biomethylation, 228-229 biomineralisation, 230 bioreduction, 228-230 biosorption, 227-228 impact of bioreduction strategies on Tc solubility, 230-232 influences of nitrate and nitrate-reducing bacteria on solubility, 234-236 microbial effects on solubility, 227-230 potential for microbial bioremediation, 226-227 sources of, 226 transformation by micro-organisms, 228-230 reference conditions as remediation targets, 4-5 biomonitoring of rivers, 129-133, 134-136 ecological quality assessment, 331-333 use in ecological monitoring, 4 wetland systems, 165 remediation and ecological recovery, 4-5 River Don defining reference conditions, 331-333

impacts of Sheffield's metal industries, 327-329 industrial decline and environmental improvement, 329-331 **River** Irwell waterway neglect and deterioration, 277-278 river pollution factors affecting ecological recovery, 255-256 see also biomonitoring of rivers, metalliferous drainage into rivers. River Tame and tributaries industrial heritage, 257-260 landscape and drainage, 257-260 pollution and degradation of the river, 260 - 262River Tame study biological monitoring of water quality, 272 chemistry and taxon richness, 263 chronological changes, 263-269 data sources, 256 events and trends affecting ecological recovery, 269-270 factors in water quality improvement, 270-271 fish and the fishery, 268-269 geomorphology and ecological recovery, 271 - 272long-term biological recovery, 272 recolonisation by obligate clean water fauna, 271 results. 263-269 sites and methodology, 262-263 taxon recolonisation and successions, 265-268 **RIVPACS** (River InVertebrate Prediction and Classification System), 129-133 s-triazine herbicides, 207-208 Salford Quays regeneration, 284-292, 301-302, 304 saprobic system of biomonitoring, 127-128 Scope for Growth measurement, 157-158 Scopelophila cataractae, 11 Sheffield metal industries impact on the River Don, 327-329 industrial decline and environmental improvement, 329-331 Silene dioica, 7 Silene vulgaris, 7 simazine, 207, 214 South Australia baseline study for the River Murray wetlands, 165-166 wetland strategy, 163-164 sulphur dioxide levels effects on lichens, 42-45, 45-49 sustainable ecosystems and sustainable societies, 335 synergistic effects between pollutants in rivers, 75

Cambridge University Press 978-0-521-51446-0 — Ecology of Industrial Pollution Edited by Lesley C. Batty, Kevin B. Hallberg Index More Information

350 INDEX

technetium biogeochemistry of Tc reduction in sediments, 230-232 impact of bioreduction strategies on solubility, 230-232 influences of nitrate and nitrate-reducing bacteria on solubility, 234-236 terbuthylazine, 214 terbutryn, 214 Thlaspi caerulescens, 11 threatened species in polluted environments, 3 transformation products degradation products (degradates), 111 ecotoxicity of degradates, 112-114 emerging contaminants, 111-114 environmental fate of degradates, 111-112 environmental occurrence of degradates, 111 pesticide risk assessment, 111 Trent Biotic Index, 128, 256 uranium waste bioremediative stimulation of native U(VI)-reducing bacteria, 232-234 fate and transport in the environment, 232-234 influences of nitrate and nitrate-reducing bacteria on solubility, 234–236

US Environmental Protection Agency (USEPA) ecological risk assessment (ERA) scheme, 189–190 Usnea spp., 49

Vezdaea leprosa, 46 Violetalia calaminariae vegetation order, 12, 20 Violetum calaminariae, 9, 12 Water Framework Directive (EU), 2, 86, 87, 126-127, 136, 156 restoration of wetland systems, 164-165 wetland systems commitments to restore wetlands, 163-165 diffuse pollution sources, 162-163 establishing baseline conditions, 165-166 identifying targets for restoration, 165-166 palaeoecological records in sediments, 166-167 reference conditions, 165 restoration under the Water Framework Directive, 164-165 sediment records, 166-167 South Australia's wetland strategy, 163-164 wetland systems studies acidity/alkalinity, 179-180 appropriate baseline for restoration, 182-183 eutrophication, 173-175 metal pollution in sediments, 172-173 methods, 169-170 multiple drivers and symptoms, 180–182 Murray Darling Basin study area, 167-168 regional integration of site studies information, 182 results and discussion, 170-183 salinity, 175-179 sediment pollution, 170-173 sedimentation rates, 170-172 study areas, 167-168 turbidity and its biological impacts, 173 upper Mississippi River Basin study area, 167, 168

Xanthoria parietina, 44