Index

accountability 9, 138
adaptive co-management 29–30, 33, 45, 148
adaptive governance see adaptive co-management
adaptiveness or adaptability 29, 61, 82, 125, 130–32, 137
Adger, Neil 12, 21, 33, 35, 114
agent-based modeling 25–6, 60, 132
Aichi Biodiversity Targets 140
algorithmic trade
and commodity markets 111–12
and complexity 119–20, 128
controversies 110–11, 119–120
definition 150
scenarios 115–16
technologies 105–6
and volatility 112–13, 150
Anthropocene
cognitive dimensions viii, 40, 122–5
controversies 5–7, 10–11
definition 2
institutional dimensions 42–5, 60–62, 135–7, 141–3
political dimensions 7–11, 135–41
‘Anthropocene Gap’
definition viii, 121–2
elaboration 94–98, 102, 121–5, 135–41, 144–6
artificial photosynthesis 101–2, 133
assisted migration 100–101
avian influenza see emerging infectious diseases
Baltic Sea 144–5
Biermann, Frank vii, xiii, 7, 11, 22, 48–9, 125
biodiversity 55, 84, 97, 99–101, 114, 129, 131, 140
see also planetary boundaries
biosphere
definition 147
Bodin, Örjan xii, 26
Branson, Richard 14, 92–3
Breakthrough Institute 8, 10, 23
Brundtland commission see Rio Declaration
carbon dioxide removal 86–7, 89–91
see also geoengineering
Castells, Manuel 13, 69, 82
causal beliefs 122–5
climate change 3–5, 11, 17
see also planetary boundaries

cognitive dimension see mental models
collective intelligence
definition and examples 73–5, 129, 134
limitations 76–7
commodity derivatives 106–7
commodity trade (world map) 113
common but differentiated responsibility (principle) 48
complex adaptive systems
and the ‘butterfly’ effect 16
and cascading dynamics 19–20, 127–8
and ecosystems 18–19
and financial markets 20, 104
and surprise 20, 127–8
and thresholds 18–9, 127–8
complexity theory see complex adaptive systems
connectedness viii, ix, 19–20
see also teleconnections and telecoupling
Convention on Biological Diversity (CBD) 89, 91, 95, 100, 129, 131, 149
and expert group on geoengineering 84–5, 149
coral reef ecosystems 11, 13, 18, 20, 25, 39, 43, 50, 57, 100, 124, 141
crisis management 20, 43
Crona, Beatrice xiii, 148
cross-scale interactions 17, 19, 59–60
de-extinction 99, 101–2, 124
Dimitrov, Radoslav S. 43, 148
Duit, Andreas xiii, 18, 40, 50
Dynamic Drivers of Disease in Africa (DDDAC) 148
Earth system complexity 17, 38–42
definition 147
science 2
Earth system governance xiii, 39, 45, 50, 125, 136
and adaptiveness 125 see also adaptability
and architecture 42, 45–50, 61
ecological anxiety disorder 123
Ellis, Erle 6, 13–4
emerging infectious diseases and complex adaptive systems 21, 127
and controversies 76–8
and early warnings 65–7, 127
and ecological change 63–5
epidemics see emerging infectious disease
exploitation-exploration trade-off 50
fail-safe experimentation xii, 98, 128, 143
feedbacks 12–13, 17, 20, 25, 124, 137
in complex adaptive systems 17
financial markets and algorithmic trade see algorithmic trade
and commodity derivatives 106–7
and complexity 111, 120
and institutional fragmentation 119
and volatility 109–10
flexibility xi, 11, 29, 50, 126, 131, 141 see also adaptability
Folke, Carl viii, xiii, xiv, 19, 29, 50, 61
Food and Agriculture Organization (FAO) and epidemics 66, 69, 73, 82
and ‘food crisis’ 110, 118
and marine systems 55–7
‘food crisis’ 44–5, 110, 118
Gates, Bill 14, 92–3
geoengineering definition 85
governance challenges 90–94
Haida Gwaii ocean fertilization experiment 88–90
regulatory gap 84, 93
SPICE-project 87–8
Global Early Warning and Response System for Major Animal Diseases including zoonoses (GLEWS) 76, 149
global environmental governance 7, 22, 45, 49, 103, 125–6, 136, 142 see also governance (definition)
‘good governance’ 138–9, 141
governance and complexity 18, 40, 50, 126
definition 51, 147
Global Outbreak Alert and Response Network (GOARN) 72, 74
GPHIN 63, 68, 75
‘gridlock’ 22, 43
and institutions 45
‘puzzles’ 34–5
Haida Gwaii 88–90, 96
high-frequency trade see algorithmic trade
Holling, CS ‘Buzz’ viii, 18, 20, 29, 98
Homer-Dixon, Thomas 21, 97, 147
Hughes, Terry 7
human-environmental interactions 19, 42, 60, 110, 125 see also social-ecological systems
hyperlink analysis 70–71
information and communication technologies and epidemic early warnings 67–9, 71–2, 75
Index

and human-computer interactions 75–6, 105
and networks see supernetworks
and scientific collaborations 12, 46
innovation
emerging technologies 98–103
governance 93–4, 102
trade-offs x, 84, 95–8, 102
institutions
definition 147
and institutional architecture 45–50
interactions 49
institutional fragmentation 49, 55, 57–8, 61, 91–4, 116–19, 142
Intergovernmental Panel on Climate Change (IPCC) 46, 85, 92
International Commission on Stratigraphy (ICS) 5
International Health Regulation x, 65, 81, 129, 131
international law
and overarching principles 48
and peremptory norms 48
International organizations 48–50, 118, 129, 134–5, 142
International Red Cross 69–70
Kooiman, Jan xi
Kyoto Protocol 48
Lambin, Eric 40, 109, 112, 114
Leach, Melissa xiii, 9, 13, 77, 81
legitimacy 9, 46–7, 59–60, 73, 102, 127, 134, 142
Lenton, Timothy M. vi, 11, 17, 19, 147
lock-in 30, 32, 144
London Convention and Protocol 89, 91, 94–5
Lynas, Mark 10, 13, 96, 135
macro-culture 80, 123, 142
marine biodiversity 39, 54–5
see also biodiversity
Médecins Sans Frontières xiii, 66, 69, 73
mental models 121–5
see also causal beliefs
Millennium Ecosystem Assessment 12, 46–7, 139–40
Montreal Protocol 40, 45, 48
multilevel governance see governance
narratives 22, 80–81, 132
neglected diseases 77–9, 83
network theory see social networks
nonlinear change see thresholds
non-regimes see Dimitrov
ocean acidification 20, 38–9, 41–2, 50, 55
ocean fertilization geoengineering 88–91, 96, 100, 134
Olsson, Per xiii, 13, 30, 53
Ostrom, Elinor vii, xi, xiii, 28, 38, 51–2, 61, 139, 147
PaCFA 55–60
panaceas 29, 139
path-dependence 30, 32, 43, 61
see also lock-in
pathology of natural resource management 29, 139
see also panaceas
Pielke, Roger Jr. 9, 147
Pierre, Jon xi, 97, 134
planetary boundaries
controversy 6–10, 13
definition ix, 4
and emerging technologies 12–14, 99–103
and governance challenges 42–5, 142
and institutional implications 45–50, 135
interactions 39–42
and polycentricity 51–4, 57–62, 142
planetary thresholds, ‘tipping elements’ or ‘tipping points’ 4, 6, 8–9, 11, 17, 19, 126–7, 133, 135, 138
Planet under Pressure conference vi, 144
polycentricity see polycentric order
polycentric order
aggregated impacts 60, 142
definition 51, 148
empirical applications 54–7, 79
processes 52–4
strengths and weaknesses 57–60
precautionary principle 95–8, 124, 143
ProMed 67–8, 76, 80
regime shifts 18, 120, 140
Resilience Alliance xiii
resilience thinking 97–8
Rio Declaration or conference 10, 96, 124
Rio+20 8–9, 43, 47, 136, 138
Rockström, Johan xiii, 4, 6, 8, 10–11, 22, 33, 39
Royal Society 12, 85–6, 92–3
Scheffer, Marten 19, 21, 27, 32, 44, 144
scientific assessments 8, 33, 46, 50, 61, 91, 102, 142
scientific debate and controversies 5, 7–9, 14, 22–3, 99–100, 119, 134, 138
scientific uncertainty 43, 119, 128, 145
sense-making 30, 43–4, 54, 80, 119, 129
shadow networks 53
social-ecological systems ix, 11, 13, 21, 33
definition 19
social media 119
see also Twitter
social network 29, 31, 53, 69, 134
see also supernetwork
solar radiation management see stratospheric aerosols
Steffen, Will xiii, 2–3, 5–6, 10, 33, 38
STEPS Centre 77
Stockholm Resilience Centre xiii
stratospheric aerosols 40, 86–8, 101, 134
see also geoengineering
supernetwork
definition 69
and international institutions 81–2, 129, 131
illustration 70
interplay with institutions and Earth complexity 130
operation 71–6
and polycentricty 129
surprise xii, 18, 20–21, 120
and financial markets 111–12
and governance challenges 127–30, 133, 139, 141–2
Sustainable Development Goals (SDGs) 137–41
'swine flu' or 'new flu' see emerging infectious diseases
Synthetic biology 99–100
technology
and converging technologies 102–3, 133
definition 147–8
and global environmental change 12–13
and its distributional impacts 134
and planetary boundaries 12–14, 99–103
and 'quick-fixes' 13
and 'the Great Acceleration' 12, 133
and thresholds 13–14, 133
teleconnected vulnerability 133, 137
teleconnections 12, 61
telecoupling 19–20, 61, 112
application on case studies 127–8
thresholds
controversies 22–3, 130
definition 18–9, 147
early warnings 27–8, 127–8
interplay with institutions and Earth complexity 130
social responses 23–33
tipping point see thresholds
Twitter 105, 111, 136, 144
United Nations Environment Programme (UNEP) 8–9, 55–6, 58, 92, 136
United Nations Framework Convention on Climate Change (UNFCCC) 40, 45, 49, 56–7, 59, 92, 94, 131
US Center for Disease Control (CDC) 69–72
Venter, Craig 76, 99
vulnerability 13, 26
<table>
<thead>
<tr>
<th>Name</th>
<th>Pages</th>
<th>Index</th>
</tr>
</thead>
</table>
| Westley, Frances                          | xiii, 13, 97, 103, 130, 144 | and SARS 67, 74  
| World Health Organization (WHO)           | 72      | and supernetworks 69–73, 131  
| and Global Influenza Programme            |         | and the Surat crisis 66–7  
| and information processing                |         | World Organization for Animal Health (OIE) 69–70, 79  
| capacities 66–9, 75, 82                   |         | Young, Oran vii, 21, 30, 42–3, 82, 125, 129–30  
| and legitimacy 76–8, 134, 142              |         |                                                                     |