

Index

Note: Locators for figures appear in italics.

- abandonment, 199
 Jenne-jeno site, 177, 181, 199
 Méma Basin, 177
- accommodation systematics, 32, 56, 112
 in an unpredictable environment, 71
 clustered settlements, 106, 108, 109, 185
 specialist groups, 106, 107, 110, 117, 119
 rules of interaction, 112–114, 117, 120, 122, 132
 self-organization as, 58, 102, 130
 serial evolution of, 71, 110 *See also* Pulse Model
- actual evapotranspiration (AET), 92
- Adams, Robert M.
 Hans Nissen and, *The Uruk Countryside*, 193, 211
Heartland of Cities, 193
- Adepts, 139
- AET (actual evapotranspiration), 92
- African Union, 4
- agrarian lifestyle, 96
- agricultural intensification, lack of, 175, 176
- agro-literate states, 21
- Aklé dune system, 71
- Akumbu site, 127, 128, 166
- Albright, W. F., 24
- Aldred, Cyril, 217
- alienation, 132
- Allen, P. M., 31, 33, 36, 40
- Allen, T. F. H., 204, 205, 206
- Alley, R. B., 79
- Amadou, Sékou, 122
- American Southwest, 75
- Ancestral Puebloans (North America), 75, 141
- Andrews, Anthony P., 15
First Cities, 13–14
- anomie, 131
- Anyang (China), 221
- Aougoundou, Lake, 69
- archaeological record
 Pulse Model supported by, 128
 recognition of specialist/
 corporate groups, 131, 148, 158
- archaeologists
 habits of mind, 29
 implicit social values, 23, 25
 interpretation of data, 107
- archaeology
 cognitive, 187
The Archaeology of City-States
 (Nichols and Charlton), 21
- architecture
 city walls, 175, 224
 monuments, 15, 25, 26
 mosques, 177
- Arma people, 120
- art
 monumental, 15
 symbolism of, 160
- Aryans, 24
- Ashmore, Wendy, 55, 58
- Attarian, Christopher J., 132–133
- authority
 harvested by *nyamakalaw*, 188
 persuasive and contractual, 207
 resistance to, 188, 189, 205, 215, 222
- authority axis, 35, 40
- autonomy, 28
See also freedom
- axes, groundstone, 127
- Azawad Basin (Mali), 60, 70, 117
- Azawagh paleochannel, 49
- Aztec social order, 130

252 Index

- Babylon
 creation epic, 20
 Larsa kingdom, 214
 Balée's premises, 50–52
 Bambara millet farmers, 68, 113, 120, 122, 179
 Bani River, 61
 banishment, 96
 Baoulé paleochannel, 49
 Bara-Issa, 65, 68
 Barkérou site, 127
The Basin of Mexico (Sanders, Parsons, and Santley), 193
 Bayo, Laminigbé, 134
 beads, glass, 175, 176
 Bedaux, Rogier M. A., J. D. Van der Waals and, *Djenné. Une Ville Millénaire au Mali*, 131
 Bénédougou, 146
 Bérétoouma people, 126–127
 Bida (great snake), 49, 138
 bifurcation, 33
 biosphere, affected by human activity, 51, 55
 birds, 94
 blacksmiths, 137, 138
 technical knowledge and occult prowess, 151, 153, 155
 Bosumtwi, Lake, 80, 84
 boundaries, 108, 109, 114
 Boundou Boubou North cluster, 129
 Boundou Boubou South cluster, 128
 Bozo people, 120, 121–122, 149, 167
 bracelets, polished stone, 127
 Bradley, R. S., 79
 braided channels, 61
 Bras de Nampala paleochannel, 71
 Breasted, James Henry, 24
 Breuning, Peter, 95
 bronze, 148
 Brooks, George E., 85
 burial practices, 169, 177
- Cariaco Basin (Venezuela)
 monsoons, 85
 sediments as proxy measure for precipitation, 78
 catastrophic discontinuities, 79, 81, 84
 cattle
 terracotta statuettes, 127 *See also* herders
 causation, levels of, 50
 ceramics, 128, 174, 199
 Fine Channeled and Impressed Ware, 147
 Jenne-jeno sequence, 147
- Painted Ware, 147
 Tellem footed bowl, 176
 Upper Inland Niger Delta Fineware, 147, 169, 174, 200
 Chad, Lake, 75, 82, 83, 84
 Chang, K.-C., 210, 221–225
 chaos, 56, 227
 Sahelian climate as, 58, 73, 79
 charcoal burners' corporation, 152
 Charlton, T. H., D. L. Nichols and, *The Archaeology of City-States*, 21
 Childe, V. Gordon, 13, 17
 China
 clustered settlement patterns, 221–225, 226
 Shang dynasty, 221
 chronology, 15, 46, 49, 147
 anchoring sequence, 165, 180
 ecological clustering (800–400 BC), 164–167, 174
 early cities (400 BC–AD 400), 173–175
 globalization of Middle Niger cities (AD 1600), 179
 stable city island (AD 1400–1600), 163–164, 179
 urban prosperity (AD 400–1000/1100), 175–177
 urban shake-up (AD 1000/1100–1400), 177–179
 Cincinnatus, 228
 cities
 with citadels, 11, 175, 224
 definitions, 13, 17–18, 129, 149–151, 163, 192
 as emergent intelligence, 44
 Greco-Roman, 23–24
 heterogeneity in, 148
 as metaphors, 25
 origins south of the Sahara, 3
 as pattern-amplifying machines, 42, 136
 proto-cities, 164–167, 174, 210
 with state-level organization, 6, 10–12, 13, 14
 traditional theories of, 10–12
 without state-level organization, 12, 14, 16, 43 *See also* urbanism
 city walls, 175, 224
 civilization, 13
 cladograms, 29, 30
 Clark, Mary, 184, 200
 Clay, Albert, 24
 climate
 growing seasons, 91
 Holocene proxy measures, 77

- land-atmospheric-oceanic system, 76, 79
 Sahelian, as chaotic, 58, 73, 79 *See also*
 meteorological data; paleoclimate
- climate change, 76, 80, 111
 anthropogenic, 46
 deglaciation, 79, 81
 human response to, 53
 time scale
 10^2 , 86
 10^3 , 85, 115
 10^4 , 84, 115
 10^5 , 78
 interannual, 87
 inter-decadal, 87
- climate modes, 79
 anomaly types, 85–87, 86
- climate phases
 Phase I: Oscillatory Transition, 81
 Phase II: Stable (First Holocene Pluvial),
 80, 81
 Phase III: Stable (Second Holocene
 Pluvial), 82
 Phase IV: Fluid Frontiers, 83
 Phase V: Big Dry, 84
 Phase VI: Stable Optimum, 84
 Phase VII: High Unpredictability, 84–86
- climatic pulses, 89
See also Pulse Model
- clustered settlements
 Chinese, 221–225, 226
 Egyptian, 217
 Iron Age, 123, 128–129
 Mesopotamian, 211, 225
 Middle Niger, 128–129, 139, 141–142
- clustering
 as a proto-urban process, 164–167,
 174
 of specialist groups, 102, 210
 in an unpredictable environment, 106,
 108, 109, 185
- co-evolution, 32, 33, 42, 56
- cognitive archaeology, 187
- Colombijn, F., 132
- colonization hypotheses, 173
- communication via criers, 7
- community good, 139
- complexity, 32
- conflicts
 inter-ethnic, 121–122
 over land use, 112, 121
- Conrad, David, 134, 139
- copper, 147, 148, 157
- core-periphery, 223, 224
- core rules (Mande)
 power (*nyama*) and, 136–138, 203
 of reputation, 41–42, 114, 135–137, 149,
 205, 208
 specialists and, 129
- core values
 distribution of environmental risks, 96,
 111, 205
- corporate, definition, 16–18
- corporate diversity, 16–18, 40
- corporate groups
 archaeological recognition of, 148
 collaboration of, 141
 identity, 108, 134–135, 149, 160,
 160–162
 proxy measure of, 162
See also ethnic groups; specialist groups
- corvée labor, 215
- co-speciation, 32
- Covenantal Piety, 22, 23
- creation epics
 Babylonian, 20
 Mesopotamian, 14
- crops, 63, 95–96, 117
- Cultural Ecology, 45
- culture areas, 174
- Dahl, G., 101
dalimasigi. *See* knowledge quests
 (*dalimasigi*)
- Dantu site, 225
- Daounas highlands, 69
- data
 freedom from bias, 193
 goodness of fit, 193, 194
 non-comparability of, 193
- Dean, Jeffrey, 87
- Débo, Lake, 65, 66, 68
- debt, salutary and undischageable, 113, 203
- decentralization, 208, 214–216
- decision making
 coercive, 132
 by consensus, 132
- deglaciation, 79, 81
- deltas
 bird foot, 66
 dead, 60, 70 *See also* Méma Basin (Mali)
 live, 61
- DeMenocol, Peter, 75
- democracy, 12
- desertification, 53
- determinism, 29, 51
- diagnostic artifacts, 163, 170
- Diaka channel, 65
- Dia Urban Cluster, 167–170, 168, 174,
 177, 181–183, 182
 hinterlands, 168, 200–201, 201

254 Index

- discovery, 5
 definition, 1
 discrimination, typology of, 162
 diversification, 149
 vs. specialization, 119
 within specialization, 52
 diversity
 corporate, 16–18, 40
 ecological, 141, 142, 143, 188
 divine right of kings, 25
Djenné. Une Ville Millénaire au Mali (Bedaux and Van der Waals), 131
 Dô, Lake, 69
 Dogon people, 113, 120, 155
 donkey-carts, 3, 4
 Doupwil site, 179
 Dyula (Wangara), 146–147, 148, 167
- Early Dryas, 81
Echinocloa stagnina, 66
 ecological abstractions, 111, 120
 via mythology, 112
 Ecological Resilience, 149
 economy, urban, 129, 133
 Ecosocial Interdependence, 222, 225
 ecosystems, hierarchical concept of, 28, 55, 139, 140, 142
 edaphic conditions. *See* soils
 Egypt, 1
 Predynastic period, 209–210, 216–221, 218
 See also Nile Valley
 El-Ahmar paleochannel, 49, 70–71, 117
 elites, 15, 21, 150, 217
 lack of, 189
 emergent intelligence, cities as, 44
 endogamy, 113
 energized crowding, 130, 134
 environment, 33, 45
 erg, definition, 66
 Erg of Bara basin (Mali), 65, 67–68, 120
 Erg de Ouagadou, 71
Etheria elliptica (freshwater oyster), 123
 ethnic groups
 ecological abstractions and, 114
 identity, 106, 110, 112, 130
 subsistence-defined geokistic map, 121
 See also corporate groups; specialist groups
 Euphrates River
 floodplain, 1, 53, 56–57
 See also Mesopotamia
 evidence
 high preponderance of, 162
 inferential testimony of, 162
 evolutionary mutation, 24
ex astra state hierarchy, 18–23, 19, 26, 143, 211, 223
 excavation, 183, 184
 Jenne, 184
 Jenne-jeno, 170–173
 Feature 21, 155, 156
 House 10, 153–155, 154
 mille-feuille strata, 145
 SM-O wall complexes, 178
 unit LX, 170
 units and cores, 172
 mechanical coring, 184
 test strategy, 163, 164
 exchange, 127, 141, 149, 175, 205
 gold trade, 6
- Faguibine, Lake, 64, 69
 Faita people, 127
 Fala de Molodo paleochannel, 71
 farmers, 103, 105
 Bambara millet, 68, 113, 120, 122, 179
 Marka (Nono) rice, 65, 112–113, 120, 120–122, 149, 167
 Ferlo Valley, 117
 field journal, 3
 Fine Channeled and Impressed Ware, 147
 Fineware. *See* Upper Inland Niger Delta
 Fineware
First Cities (Andrews), 13–14
 fish, 94
 fisherfolk, 103, 108, 120, 149, 150
 flexibility, 41, 58, 73, 143
 Flohn, H., 34
 flood area, 90–92
 floodplains
 comparison of, 71
 Middle Niger, 56–57, 61–63
 Nile, 56–57
 Tigris/Euphrates, 1, 53, 56–57
 vegetation, 66
 flora, 92–94
 crops, 63, 95–96, 117
 floodplain vegetation, 66
 grasses, 93
 foraminifera, planktonic, 74
 Frank, Barbara E., 158
 freedom, 22, 25
 freedom from bias, 193
 Friedman, Renée, 220
 fruits, 94
 Fulani (Peul) herders, 65, 66, 120, 122, 179
 funerary features, 171
 See also burial practices
 Furon, Raymond, 71

- Galia site, 179
 Gao (Mali), 92
 Gao Trough, 60
 Gaou, Lake, 69
 Garrard, Timothy, 157
 gatekeepers, 15, 19, 139
 gatherers, 96
 generalists vs. specialists, 125–126, 127
 Geni. *See* Jenne (Mali)
 geokistic maps
 Méma Basin, 98, 100
 Nile Valley, 97
 subsistence-defined ethnic groups, 121
 geokistics, as a predictive model for settlement patterns, 98 *See also* geokistic maps
 geology
 faulting and subsidence, 60–61
 satellite image of folded rocks, 64
 geomorphology, 57, 59, 60–63
 anastomosing rivers, 60, 61, 215
 Méma Basin, 70–73, 72
 Ghana Empire, 12, 49, 177
 gold, 157, 176
 gold trade, 6
 goldweights, 157
 goodness of fit, 193, 194
 Gorgol paleochannel, 49, 117
 Goundam Hills, 69
 Gourma-Rharous (Mali), 69
 granary/altar, 185
 grasses, 93
 Greco-Roman cities, 23–24
 Green, F. W., 219
 grinding stones, 144–147
 growing seasons, 91
 Guinea, coast deep-drilling project, 73

 Hambarketolo site, 3, 152, 184
 Hamdallahi site, 180
 Han dynasty, 175
 Haribomo, Lake, 69
 Hassan, Fekri, 79, 96, 98, 217, 219
Heartland of Cities (Adams), 193
 herders, 95, 103, 126
 Fulani (Peul), 65, 66, 120, 122, 179 *See also* pastoralism
 heterarchies
 ethos of resistance to authority, 188, 189, 205, 215, 222
 logic of, 43, 141, 187–189
 Middle Niger, 44, 208, 228
 phase transform diagram, 207
 as superordinate systems, 28
 heterogeneity in cities, 148

 Hierakonpolis (Egypt), 210, 217–221, 218
 hierarchical segmentation, 223, 225
 hierarchies
 advantages of, 27–28
 alternatives to, 189, 211
 collapse of, 207, 227
 ex astra state hierarchy, 18–23, 19, 26, 143, 211, 223
 fused, 28–29, 135
 social/political structure, 15–16, 17, 177, 202
 hierarchy–heterarchy nesting, 215, 222, 223, 225, 227, 228
 High Amplitude Variability (HAV), 79, 87
 High Temporal Variability (HTV), 79, 87
 Hilprecht, Hermann, 24
 historical documents, 130
 Historical Ecology, 45–46, 50, 53–56, 119
 Balée’s premises, 50–52 *See also* landscape
 Hoekstra, T. W. (Allen *et al.*), 204, 205, 206
 Hoffman, Michael A., 219
 Holocene Pluvial
 First, 80, 81
 Second, 82
 Hopewell peoples (North America), 138
 Hopkins, Anthony E., 147
 horizontal authority, 141 *See also* heterarchies
 horses, introduction of, 177
 households, 149
 Human Ecology, 45
 hunters, 96, 138
 hydrology, 46, 46–48, 47, 59, 72
 hypotheses
 colonization hypotheses, 173
 orbital monsoon hypothesis, 76

 Ice Age–Holocene hinge, 80
 identity
 ambiguity of, 109, 114
 corporate groups, 108, 134–135, 149, 160, 160–162
 ethnic groups, 106, 110, 112, 130
 as one’s place in the environment, 107
 representation of, 120, 135
 social self-selection, 133–134
 specialist groups, 130, 133–134
 Imperial Tradition, 177
 Inca social order, 130
 infanticide, 96
 infestations, 96
 interaction spheres, 224
 intermarriage, regulation of, 113
 invisibility function, 162

256 Index

- Iron Age sites, 127
 clustered, 123, 128–129
 Méma Basin, 124
 iron ore, 147
 iron production, 108, 138, 151–156, 176
 Islam, 160, 161, 177
 Israel, 24
 Issa-Ber River, 68
- Jacobsen, Thorkild, 14
 Jantsch, Erich, 34
 Jenne (Mali), 131, 174, 179–180, 202
 alternative spellings and names, 6
 hinterlands, 120, 198
 SM-O wall complexes, 178
 surface collection, 183
 Jenne-jeno site
 abandonment, 177, 181, 199
 alternative spellings and names, 7
 ceramic sequence, 147
 cladograms, 30
 discovery, 1–5
 excavation, 170–173
 Feature 2, 155, 156
 House 10, 153–155, 154
mille-feuille strata, 145
 unit LX, 170
 units and cores, 172
 hinterlands, 108, 183
 mound, 2
 relationship to Dia, 183
 research strategy, 183–185
 Urban Complex, 184, 186, 187
 Johnson, Steven, 43–44, 150
 Judaism, 26
- Kangousa site, 108–109
 Kaniana site, 122, 184
 Kauffman, Stuart, 32, 33
 Keightley, David, 221
 Kemp, Barry J., 217–219
 kinship bonds, fictive, 113
 Knapp, A. B., 55, 58
 knowledge, occult, 121, 141, 153, 190
 of blacksmiths, 151, 153, 155
 knowledge quests (*dalimasigi*), 138–139,
 140, 190, 203
 Knox, P. L., 150
 Koanta lineage, 167
 Kobadi people, 126–127
 Koechlin, Jean, 87, 92
 Koli-Koli channel, 68
 Kolima cluster, 127
 Kolima Sud, 127
 Kolima Sud-Ouest, 127
- Kolimbini paleochannel, 49
 Konaré, Adam Ba, 208
 Konaré, Alpha Oumar, 4, 12, 162, 207–208
 Koran, 161, 180
 Korientzé, Lake, 65, 68, 69
 Kostof, Spiro, 130, 134
 Kuhn, Thomas, 29
 Kutzbach, J. E., 76
- Lakes Region (Mali), 68–69
 landscape, 55–56
 archaeological analysis of, 129
 knowledge quests and, 139
 perceptions of, 50, 58, 89, 100, 111, 149
 Mande, 139–142, 149, 187–191
 self-organizing, 42, 44, 52, 136–137, 205,
 225 *See also* phase transform
 diagrams
 co-evolution and, 32–33
 Level I, 102–104, 103
 Level II, 104, 104
 Level III, 105, 106
 Level IV, 105, 107
 as “over-engineered,” 43
 specialist groups knowledge of, 101
 total landscape phenomena, 51–53
 traits
 chaotic matrix of biophysical, 56
 wealth of resources, 56, 96
 landscape amplification, 140, 142
 Larsa kingdom, 214
 Late Glacial Maximum, 80
 laterite, 63, 69
Lates niloticus (Nile perch), 126
 Late Stone Age, 174
 Méma Basin sites, 124
 migrations, 84
 settlement patterns, 123–128
 Late Stone Age–Iron Age transition,
 164–167
 LaViolette, Adria, 180
 Levant, 24
 Levtzion, Nehemia, 12
 Liangchengzhen site, 225
 Little Ice Age, 75, 84
 locust, desert (*Schistocerca gregaria*), 96
 looters, 8, 160
 Lorenz, Edward, 34, 76, 87
- MacDonald, Kevin, 123–128, 194
 Macina Basin (Mali), 54, 66–67, 67
 magic square, 161, 180
 Makaske, Bart, 61
 Malfante, Antonio, 6
 Mali Empire, 12, 177, 190, 202

- mammals, 94
 domesticated, 95 *See also* herders
- Mande people
 core rules of reputation, 41–42, 114,
 135–137, 149, 205, 208
 heroes and heroines, 134, 137, 138, 190,
 203
 sacred power-places, 138, 139–142,
 187–191
 view of landscapes, 139–142, 149,
 187–191
- Mangabéra site, 194, 196, 197
- Manzanilla, L., 11
- mapping of sites, 184
- maps
 geokistic
 Méma Basin, 98, 100
 Nile Valley, 97
 subsistence-defined ethnic groups, 121
- Macina Basin, 54
- Méma Basin, 46, 46–48, 54
- Upper Delta Basin, 57
- Mara site, 167–170, 168
- Marka (Nono) rice farmers, 65, 112–113,
 120, 120–122, 149, 167
- Mashkan-shapir (Mesopotamia), 214–216
- masons' corporation, 158
- material culture, 111
- Mauny, Raymond, 22
Tableau Géographique de l'Ouest Africain,
 9–10
- Mauritania, 117
 coast deep-drilling project, 73
- Maya peoples
sacbeob roadway, 138
 social order, 130
- McIntosh, Susan
 on copper–bronze–brass evolution, 176
 on culture areas, 174
 diversification within specialization, 51
 Jenne-jeno impressions, 3, 5
 Middle Niger as the “Island of Gold,”
 176
 on neoevolutionary theory, 36
 reorganization of production centers, 155
 reorganization of trade, 183
 Timbuktu hinterland survey, 194
- McNaughton, Patrick, 137, 140
- Medieval Warm period, 84
- Méma Basin (Mali)
 abandonment, 177
 dead delta, 60
 geokistics map, 98, 100
 geomorphology, 70–73, 72
 hydrology, 46, 46–48, 72
- map, 54
- Pulse Model and, 117
- satellite image, 99
- settlement patterns, 123–129
- sites, 123–129, 124
- vehicular survey, 195
- Mesoamerica, 11
- Mesopotamia
 creation epic, 14
 Early Dynastic hierarchy, 214
 floodplain, 1, 53, 56–57
 geomorphology, 57
 Mashkan-shapir, 214–216
 urban history, 24, 130, 211
 Uruk period, 209, 209–210, 211–214
 Warka Survey, 212
- metalworking, copper–bronze–brass
 evolution, 176
- meteorological data, 73, 85
- methodology
 judgmental survey, 192–197
 master units, 170
 surface recording, 184
 systematic survey, 197–199, 200, 225
- micro-desertification, 53
- Middle Niger basins, 16, 56, 58
 Azawad, 60, 70, 117
 Erg of Bara, 65, 67–68, 120
 floodplain, 56–57, 61–63
 geology/geomorphology, 59, 60–63
 hydrology, 47
 Lakes Region and Niger Bend, 68–69
- Macina, 54, 66–67, 67
- Méma, 46, 46–48, 72
 abandonment, 177
 dead delta, 60
 geokistics map, 98, 100
 geomorphology, 70–73, 72
 hydrology, 46, 46–48, 72
 map, 54
 Pulse Model and, 117
 satellite image, 99
 settlement patterns, 123–129
 sites, 123–129, 124
 vehicular survey, 195
- Upper Delta, 46, 46–48, 63, 64–66
 geomorphology, 57
- migrations, 84, 116, 174
See also Pulse Model
- Milankovitch (orbital-beat) cycles, 76–79
- millet (*Pennisetum americanum*), 63, 68, 95,
 105
- Millinski, Manfred, 42, 114
- Missions Paléoenvironnements du Sahara*
Occidental et Central, 1980–88, 81

258 Index

- monoculture, dangers of, 119
 Monod, Théodore, 22
 monsoons
 Atlantic data, 74
 Cariaco Basin (Venezuela), 85
 global patterns, 76
 Monteil, Charles, 167
 monuments, 15, 25, 26
 Mopti (Mali), 92
 Morris, L., 21
 mosques, 177
 mud brick, cylindrical, 158
 mythology, 112, 114, 120
 as legitimization, 161
 reinforcing rules of interaction, 122
- Naqada (Egypt), 217–221
 Nara Trough, 60
 Ndoni Tossokel people, 126–127
 nesting of hierarchy–heterarchy, 215, 222, 223, 225, 227, 228
 Neumann, Katharina, 95
 Niakené Maoudo paleochannel, 71
 Niane, D. T., 179
 Niangay, Lake, 69
 Nicholson, Sharon, 73, 85–87
 nickpoints, climatic, 79
 Niessouma cluster, 128
 Niger Bend, 68–69
 Niger–Chad Sudanian ichthyological province, 94
 Niger River, 46, 61, 62
 Nile Valley, 100
 floodplain, 56–57
 geokistic map, 97
 geomorphology, 57
 settlement patterns, 218
 See also Egypt
- Nissen, Hans, Robert M. Adams and, *The Uruk Countryside*, 193, 211
 Nono rice farmers. *See* Marka (Nono) rice farmers
 Nubia, 216
 nucleation, 52
nyama (power), 140, 153, 188–191
 core rules and, 136–138, 203
 Nyansanare levee, 65
- occult knowledge, 121, 141, 153, 190
 of blacksmiths, 151, 153, 155
onomasticon, 138, 139, 140
 orbital-beat cycles, 76–79
 orbital monsoon hypothesis, 76
 origin traditions, 167, 170–173
Oryza barthii spp. (wild rice), 63, 66
Oryza glaberrima (African rice), 63, 95, 120
Oryza sativa (Asian rice), 63, 120
 “over-engineering,” 43, 207
 See also flexibility
 oyster, freshwater (*Etheria elliptica*), 123
- pacemakers, 136
 Painted Ware, 147
 paleochannels, 47, 49, 65, 68, 70–71, 117
 paleoclimate, 80
 climate change
 interannual time scale, 87
 inter-decadal time scale, 87
 10² time scale, 86
 10³ time scale, 85, 115
 10⁴ time scale, 84, 115
 10⁵ time scale, 78
 Late Glacial Ice Age, 65
 Pleistocene dry phase, 65
 proxy measures, 73–75, 80
 reconstruction, 75, 85
 trends, 73
 Paléo-Débo, Lake, 65, 66
 paradoxes
 diversification within specialization, 52
 of specialization, 109, 119
 Sustainability Paradox, 203–204, 206
 Park, Thomas K., 73
 Parsons, Jeffrey R., William T. Sanders, Robert S. Santley and, *The Basin of Mexico*, 193
 pastoralism, 105, 117
 See also herders
 patchiness, climatic, 75
 pattern-amplifying machines, cities as, 42, 136
Pennisetum americanum (millet), 63, 68, 95, 105
 perceptions of landscape, 50, 58, 89, 100, 111, 149
 perch, Nile (*Lates niloticus*), 126
 permanence, signposts of, 14
 PET (potential evapotranspiration), 92
 Petit-Maire, Nicole, 81
 phase (intransitivity) diagrams, 34
 phase transform diagrams, 34–40
 of heterarchical cities, 207
 Middle Niger, 35–39, 43, 44, 79, 201, 202
 See also self-organizing landscape
 phase transitions, 33, 76, 79, 87, 104
 piety, 26
 planktonic foraminifera, 74
 politics, 220
 peer, 217
 regional, 216

- Pollock, Susan, 214
 polynucleated sprawl, 181, 185
 Pondori depression, 65
 population axis, 35, 40
 population density, 7
 potential evapotranspiration (PET), 92
 potters' corporation, 105, 158
 power
 3-D spatial blueprint of, 139, 141, 188
 despotic, 143
 nyama, 140, 153, 188–191
 core rules and, 136–138, 203
 of place, 138, 139–142, 187–191
 resistance to, 188, 189, 205, 215, 222
 of the state, 26
 of symbols, 162
 precipitation
 Cariaco Basin sediments as proxy
 measure for, 78
 Jenne (Mali), 88
 Timbuktu (Mali), 88
 precipitation patterns
 anomaly types, 85–87
 Prigogine, I., 31, 33, 36, 40
Projet d'Inventaire des Sites Archéologique, La Zone Lacustre (Raimbault and Sanogo), 194
 proto-cities, 164–167, 174, 210
 proto-polities, 210
 proxy measures
 Cariaco Basin sediments, 78
 for Holocene climate, 77
 paleoclimate, 73–75, 80
 of specialization, 131
 Pulse Model, 102–106, 114, 115, 116
 predicting settlement patterns, 110, 119, 165
 resolving the paradox of specialization, 109, 119
 serial evolution of accommodation and, 71, 110
 testable implications of, 106–108, 117–119, 123–125, 128
 undercounting diversity, 149
 See also accommodation systematics
 Quibell, J. E., 219
 radiocarbon dating, 164
 Raimbault, Michel, Kléna Sanogo and,
 Projet d'Inventaire des Sites Archéologique, La Zone Lacustre, 194
 Raynaut, Claude, 96
 reality, social construction of, 111
 reciprocity, 42, 114, 137, 141, 206
 reductionism, 29–31, 34, 51
 reputation, 43
 core rules of (Mande), 41–42, 114, 135–137, 149, 205, 208
 research strategy, 163, 183–185, 197–200
 resilience, 53
 definition, 205–206
 ecological, 149
 vs. sustainability, 206
 within sustainability, 207
 resources, availability of, 56, 96
 responsibility, definition, 41
 rice, 63, 68, 105
 rice, African (*Oryza glaberrima*), 63, 95, 120
 rice, Asian (*Oryza sativa*), 63, 120
 rice, wild (*Oryza barthii* spp.), 63, 66
 Rimaibe people, 120, 122, 149
 risk management, 96, 111, 205
 rivers
 braided channels, 61
 deltas, 60, 61, 66, 70
 paleochannels, 47, 49, 65, 68, 70–71, 117
 rulers, divine right of, 25
 rules of interaction, 112–114, 117, 120, 132
 mythology reinforcing, 122
 See also core rules (Mande)
 al-Sa'di, 177
 Ta'rikh es-Sudan, 6–8
 Saharan–Sahel frontier, 116
 Sahel Drought, 75, 86
 Sahelian climate modes, 86
 salination of soils, 92
 salinity of ocean water, 74
 salt, 148
 Sanders, William T., Jeffrey R. Parsons,
 Robert S. Santley and, *The Basin of Mexico*, 193
 Sanogo, Kléna, Michel Raimbault and,
 Projet d'Inventaire des Sites Archéologique, La Zone Lacustre, 194
 Santley, Robert S., Jeffrey R. Parsons,
 William T. Sanders and, *The Basin of Mexico*, 193
 satellite communities, 181, 189
Schistocerca gregaria (desert locust), 96
 sea surface temperature (SST), 74–75
 as proxy measure for Holocene climate, 77
 Sebi-Marigot paleochannel, 65
 sedentarism, 105, 125
 sediments, Cariaco Basin, as proxy measure
 for precipitation, 78
 Ségou Basin (Mali), 60

260 Index

- self-definition, 130, 133
 self-interest vs. superordinate interest, 28
 self-organization, 31, 36–40, 43, 211
 as accommodation, 58, 102, 130
 self-organization and complexity studies, 27
 self-organization dynamics, 33–34
 self-organizing landscape, 42, 44, 52,
 136–137, 205, 225
 co-evolution and, 32–33
 Level I, 102–104, 103
 Level II, 104, 104
 Level III, 105, 106
 Level IV, 105, 107
 as “over-engineered,” 43
 See also phase transform diagrams
 Senegal, 117
 Senegal River, 46
 Senegal Valley, 57
 senilicide, 96
 settlement patterns
 geokistics as a predictive model for, 98
 See also geokistic maps
 Iron Age, 129
 Pulse Model predicting, 110, 119, 165
 of specialist groups, 96, 157, 158, 220
 Shangqiu Project, 224
 Shoma site, 167–170, 168, 200
 Shukla, Jagadish, 45, 73
 signal amplification, 139, 141
 Smith, Andy, 101
 Smith, Monica L., 132, 133, 181
 Smith, Zeric, 208
 snake, great (Bida), 49, 138
 Social Memory, 89
 social organization, 21
 horizontal, 189, 223
 individual’s position within, 223
 oscillation between heterarchy and
 hierarchy, 227
 terracotta statuettes as proxy measure of,
 158
 urbanization theory, 132
 See also heterarchies; hierarchies
 social values
 archaeological testing of, 188
 implicit, of archaeologists, 23, 25
 sodalities, 137
 soils, 89–92, 116
 solar radiation, 76, 79
 Somono people, 108, 120, 121, 149
 Songhai Empire, 120, 177, 202
 Soninké merchants, 183
Sorghum bicolor (sorghum), 63, 68, 95, 105
 Sorko Bozo people, 95, 149
 specialist groups
 archaeological recognition of, 131, 158
 clustering of, 102, 210
 core rules and, 129
 identity, 130, 133–134
 knowledge of landscape, 101
 settlement patterns, 96, 157, 158, 220
 in an unpredictable environment, 106,
 107, 110, 117, 119
 vs. generalists, 125–126, 127
 See also corporate groups; ethnic groups;
 specific specialities
 specialization, 96, 117, 206
 diversification within, 52
 paradox of, 109, 119
 proxy measures of, 131, 158
 vs. diversification, 119
 SST (sea surface temperature), 74–75
 as proxy measure for Holocene
 climate, 77
 states
 agro-literate, 21
 cities with state-level organization, 6,
 10–12, 13, 14
 infrastructure, 16
 power of, 26
 urbanism and, 211, 217–219
 See also *ex astra* state hierarchy
 statuettes, terracotta, 8, 158
 of cattle, 127
 male–female pairs, 155
 as proxy measure of social complexity,
 158
 Stone, Elizabeth, 214–215
 stories. *See* mythology
 subsistence, 134, 174, 176
 Sundström, Lars, 122
 survey methodology
 judgmental survey, 192–197
 systematic survey, 197–199, 200, 225
 sustainability, 29, 52, 53, 205
 definition, 204–205
 resilience within, 207
 vs. resilience, 206
 sustainability axis, 35
 Sustainability Paradox, 203–204, 206
 symbiosis, 27, 122
 symbols
 of belonging, 161
 magic square, 161, 180
 power of, 162
Tableau Géographique de l’Ouest Africain
 (Mauny), 9–10
 Tainter, J. A. (Allen *et al.*), 204, 205, 206
 tales. *See* mythology
 Taoudenni syncline, 60, 70

- Ta'rikkh es-Sudan* (al-Sa'di), 6–8
 Tegdaoust, 183
 Télé, Lake, 69
 Tellem footed bowl, 176
tells, 22
 definition, 12
 Thomas, David, 21
 Tichitt (Mauritania), 95
 Tigris River
 floodplain, 1, 53, 56–57
 See also Mesopotamia
 Timbuktu (Mali), 69, 91
 hinterlands, 194
 survey, 196
 Togola, Téréba, 123, 128–129, 166–167,
 194, 194
 Tossaye Sill, 60
 total landscape phenomena, 51–53
 trade, 147–148
 local, 148
 long-distance, 148, 175
 networks, 147
 riverine exchange system, 176
 trans-Saharan camel trade, 148
 reorganization of, 183
 traders, 146–147
 Tragedy of the Commons, 41, 43, 114
 Traoré, Baukassou, 162
 Traoré, Salumoy, 155
 Trigger, Bruce, 17, 149, 192, 217–219
 Tuareg people, 122
 tumuli, 177
 twins, ancestral, 113
Typha swamp, 92

 Underhill, Anne P., 225
 universals of life in large concentrations,
 131–132
 unpredictability, 58, 119
 Upper Delta Basin (Mali), 46, 46–48, 63,
 64–66
 map, 57
 Upper Inland Niger Delta Fineware, 147,
 169, 174, 200
 Urban Complexes, 181, 188
 urbanism, 10, 22, 23, 36–40, 224, 225
 definition, 185
 statehood and, 211, 217–219
 theocratic, 26
 See also cities
 urbanization
 criteria, 222
 theory of, 132
 urban society, 209
 criteria, 13
The Uruk Countryside (Adams and Nissen),
 193, 211

 Vallée du Serpent, 48–50, 138
 hydrology, 47
 Van der Waals, J. D., Rogier M. A. Bedaux
 and, *Djenné. Une Ville Millénaire au
 Mali*, 131
 Vansina, Jan, 111, 160
 variability, 53, 86, 87, 163, 168, 170
 in the archaeological record, 163
 vegetation
 of the floodplain, 66
 zones, 91
 Vernet, Robert, 80, 84, 85, 89
 Vieillard, G., 8

 Wagadu Empire, 49
 Walado, Lake, 66
 Wangara. *See* Dyula (Wangara)
 Warka Survey, 211, 212
 Waso Boran people (Kenya), 101
 water balance, 92
 water management, 215
 water spirits, 112, 138, 149, 153, 190
 wealth, 90
 West Africa, 5–8
 West Africa craton, 60
 Wilkinson, T. J., 192, 215
 Wilkinson, Toby A. H., 216, 219
 Wilson, John, 210, 217
 Wright, Rita, 211, 215

 Xolimbinié Valley, 117, 118

 Yahwism, 22, 23–27, 227
 Younger Dryas, 80

 Zeder, Melinda, 129, 133
 Zhengzhou (China), 221
 Zimansky, Paul, 214–215