

Index

Note: References in bold type refer to chapters; references in italic type refer to tables, figures and plates

- Abies* spp., 378
- abiotic components, effects of biotic components
on see biotic components
- Acacia amentacea*, 14
- Acacia aneura* (mulga): and animal interactions, 89–90; and nutrient cycling, 308, 336
- Acacia cyanophylla*, 326, 348, 349, 375
- Acacia decussata*, 110
- Acacia ehrenbergiana*, 39
- Acacia greggii*, 36, 339
- Acacia gummifera*, 364
- Acacia jacquemontii*, 14, 485, 486
- Acacia ligulata*, 375
- Acacia raddiana*, 364
- Acacia senegal*, 14, 485
- Acacia* spp., 25, 34
- Acacia tortilis*, 485, 486
- Acamptopappus shockleyi*, 36
- Acantholepis frauendorfii*, 336
- Acantholimon renostatum*, 36
- Acridae, 132
- Achromobacter* spp., 341
- Actinomycetes, 330
- Acytonema* spp., 344
- Acyronix jubatus*, 378
- Addax nasomaculatus*, 94
- Allenia subaphylla*, 171, 172, 177
- afforestation, of shifting dunes, 485–6
- Africa, desert reserves of, 504–6
- agonistic behaviour, of animal spp., 72–4, 76
- agriculture (crop production), 486–93; crop varieties, 490; drought evasion, 490; fertilizer use, 491; inter-cropping, 491; and limited irrigation, 491–2; and salinity problem, 493; water harvesting and run-off recycling, 488–90; *see also* Indian Desert
- Agriophyllum latifolium*, 172
- Agropyron desertorum*, 19, 471
- Agropyron fragilis*, 186–7, 193
- Agropyron inerme*, 114
- Agropyron spicatum*, 35
- Ailopus* spp., 92
- Aimophila carpalis*, 156, 212
- Albizia lebbek*, 485
- Alcephalus babalus*, 378
- Aleppo pine forests, plant communities of, 359–60, 365; *see also* *Pinus halepensis*
- alfa grass steppes, plant communities of, 360–1, 365
- algae, 330; algal crusts and reduction of soil erosion, 111; and nitrogen fixation, 304, 344
- Algeria, 23–4
- Alhagi camelorum*, 36
- Alhagi mororum*, 20
- Alhagi persarum*, 172
- Allactaga elatior*, 73
- allelopathy, in desert plants, 38–9
- Allenrolfea occidentalis*, 16
- Allium mongolicum*, 182
- Allium polyanthum*, 182
- allogenic succession, 371–3; erosion, 371–2; sedimentation, 373
- alluvial fans, 272–4, 284, 288
- alluvial flats, 276, 284
- Alternaria* spp., 331
- aluminium, cycling of, in plants, 184
- Alyssum desertorum*, 172, 177
- Ambrosia dumosa*, 36, 281, 282, 326
- amensalism, *see* allelopathy
- America, North, deserts of, 557; birds, habitat preferences of, 54; and plant–plant interactions, 33–46; plant spp. diversity, 60–1; reserves of, 495, 496, 497, 498, 502–3, 509–18; secondary production in, 200–1, 202–40; shrub patterns in, 40–3
- Amiatermes abruptus*, 89
- Amiatermes agrilus*, 89
- Amiatermes laurensis*, 118
- Amiatermes obtusidens*, 89
- Amiatermes perarmatus*, 89
- Amiatermes ritiosus*, 121
- Ammodendron argenteum*, 185, 186–7, 188, 193
- Ammodendron conollyi*, 170, 171, 172, 173; gas exchange, 178
- Ammonones deserti*, 572
- ammonification, 340
- Amphiphila arenaria*, 17
- Ammospermophilus harrisi*, production by, 203, 205–7, 243, 250
- Amnothamnus lehmannii*, 171, 172
- Amphispira belli*, 245
- Amphispira bilineata*, 211, 212; production by, 238–40, 245
- Anabaena* spp., 344
- Anabasis articulata* *arenarium*, 23
- Anabasis aphylla*, 177, 372; mineral cycling in, 183
- Anabasis arietoides*, 326, 327, 344, 346
- Anabasis oropediorum*, 362, 375
- Anabasis salsa*, 173, 185, 186–7, 188
- Anabasis* spp., 25, 37
- Anacyclus clavatus*, 361, 376
- Anacyclus cyrtolepidioides*, 363
- analysis of data *see* data analysis
- Andropogon scoparius*, 14

Index

- animal–animal interactions, 51–76; agonistic behaviour, 72–4; interspecific competition, 53–62; modelling of 52–3, 63; predation, 62–72, 76
- animals: animal–animal interactions *see* plant–animal interactions; energy flow and water dynamics, 285–92, 371, 378; and grazing, 468–9; life-history patterns *see* life-history; and mineral dynamics, 334, 335–8; modelling, of processes, 398–9; population variations, 127–35, 159–62; processes, 398–9, 568–72; and soil effects, 112–21, 328; survival strategies, 573; temperature regulation of, 570; *see also particular groups and species*
- annual plants, model of life history, 389–91
- annual variations, in vegetation, 21–3
- Antechinomys* spp., 88
- Anthemis melampodina*, 578
- Anthemis pedunculata*, 363
- ants: anthill effect, 375; and denudation of soil surface, 114–15, 116; and plant interactions, 86–7, 98–100; seed-harvesting spp., and energy flow, 288, 290; species separation of, 55–6, 58, 60; *see also particular groups and species*
- Antilocapra americana*, 94, 138
- Anza-Borrego Desert State Park, USA, 513–14
- Aphanopleura leptoclada*, 172
- Apicotermes* spp., 117
- Apodemus flavicollis*, 243
- arable lands, effects of rainfall fluctuations on, 366–9
- Aral Sea, 22
- Argania spinosa*, 364
- Argentina: reserves in, 500–1; shrub patterns and available moisture, 43–4, 72
- Argyrolobium uniflorum*, 363
- ARIDCROP model, 404, 439–43
- Aristida acutiflora*, 371
- Aristida ciliata*, 371
- Aristida karelinii*, 170, 172; gas exchange, 176
- Aristida obtusa*, 363
- Aristida pennata*, 172
- Aristida plumosa*, 371
- Aristida pungens*, 374
- Aristida* spp., 96, 335
- Arizona, USA: secondary production in, 202–14; *see also Sonoran Desert*
- Aroga websteri*, 68
- arroyos (water courses), 15, 274–5
- Artemisia campestris*, 361, 363, 368, 374
- Artemisia frigida*, 182
- Artemisia herba-alba*, 15, 23, 24, 562, 572; dynamics of, 360, 361, 362; erosion effects on, 372; and plant–plant interactions, 34–5; and rainfall fluctuations, 367–9; and steppization, 376; water and energy flow, 278, 279
- Artemisia kemnerica*, 171, 172
- Artemisia monosperma*, 14, 21, 328, 331
- Artemisia pauciflora*, 19
- Artemisia* spp., 37, 185, 378
- Artemisia terrae-albae*, 173, 177; mineral element cycling in, 183, 184, 185, 186–7, 188
- Artemisia tenuifolia*, 193
- Artemisia tridentata*, 15, 16, 36; herbicide control of, 470; and nutrient cycling, 308, 311, 336, 347; root systems of, 333
- Artemisia turanica*, 177
- Artemisia vachanica*, 22
- Artemisiella*, 19
- Arthrocemone glaucum*, 16, 363
- arthropods: population dynamics of, 132, 289–90, 291–2, 295; predator–prey ratios, 69; species diversity, 61; species separation of, 54–5; *see also microarthropods and particular groups and species*
- Arundo plinii*, 364
- Asclepiadaceae*, 337
- Asilidae*, 69
- Aspergillus* spp., 330, 331, 332, 341
- Asphodelus microcarpus*, 20, 370
- Aster xylosteus*, 14
- Astragalus ammodendron*, 193
- Astragalus chivensis*, 172
- Astragalus filicaulis*, 177
- Astragalus gombiformis*, 374
- Astragalus gombo*, 374
- Astragalus longipetiolatum*, 171, 172
- Astragalus micropterus*, 36
- Astragalus paucijugus*, 170, 176
- atmospheric processes, in deserts, 560–1; *see also evaporation, precipitation*
- Atraphaxis serrschanica*, 177
- Astragalus* spp., 316
- Atractylis candida*, 363
- Atractylis humilis*, 376
- Atractylis serratooides*, 360, 361, 376
- Atriplex canescens*, 105
- Atriplex confertifolia*, 14, 36, 45, 105, 106, 471
- Atriplex corrugata*, 14
- Atriplex dimorphostegia*, 180
- Atriplex glauca*, 363
- Atriplex halimus*, 24, 347, 363, 364, 374, 566, 576
- Atriplex lentiformis*, 36
- Atriplex leucooclada*, 36
- Atriplex malvana*, 363
- Atriplex mollis*, 363
- Atriplex nummularia*, 105, 109, 333
- Atriplex nuttallii*, 14, 115
- Atriplex paludosa*, 105
- Atriplex* spp., 108, 310, 315, 341, 530, 569; salt accumulation by, 105; water uptake, 109, 110
- Atriplex tridentata*, 106, 349
- Atriplex vesicaria*, 39, 86–7, 105, 328, 334, 336, 338, 339, 345, 346–7; nutrient cycling, 302, 303, 308, 311, 342; root systems of, 333
- Atta vollenweideri*, 116
- Auriparus flaviceps*, 212
- Austracris* spp., 92
- Australia, 39, 558; animal populations of, 131; desert reserves of, 503–4; ecosystem modelling in, 404–7; kangaroo species segregation, 54; and plant–animal interactions *see* plant–animal interactions; predator–prey systems, 67, 68; termite activity in, 113–21; vegetation, spatial variations in, 15; water dynamics in, 277; water uptake by plants in, 109–10

Index

- Austroicetes cruciata*, 52
 autogenic succession, 373–5; anthill effect, 375;
 dune stabilization, 374–5; effect of plant cover,
 373–4; ‘nebka effect’, 374
- Avedat Desert, Palestine, 15
- Avena sativa*, 435, 436, 439
- Avena sterilis*, 18, 436
- Avicennia marina*, 16
- Avra Valley, Arizona; shrub patterns and available
 moisture, 40, 41
- Azotobacter chroococcum*, 343
- Azotobacter* spp., 314, 331, 342, 343–4
- Bacillus* spp., 345
 bacteria, 576; nitrogen fixation, 343–4; *see also*
 micro-organisms
- BACROS simulation, of transpiration coefficients,
 437–9
- bajadas *see* alluvial fans
- basins *see* swales, watersheds
- Bassia obliquicuspis*, 110
- Bassia* spp., 93, 105
 beetles, tenebrionid: life-history patterns of, 144;
 population dynamics, 133, 137; populations,
 regulation of, 159; species segregation,
 75
- Bellevalia desertorum*, 575
- Berberis trifoliata*, 14
- Bettongia* spp., 94
- biomass data, 286–8, 290–2; *see also* production,
 productivity
- biotic components: and effect on abiotic
 components, 105–21, 575–6; animal effects on
 soil, 112–21; dynamic behaviour of, and water
 and energy flow, 271–95; plant effects on soil,
 105–21
- birds: agonistic behaviour of, 74; breeding season
 effects, 154, 155, 156; clutch size, 147–8,
 149–50, 151, 153, 155–6; energy flow, 289,
 295; habitat preference of, 54, 571–2; and
 plant interactions, 89; population variations,
 127–8, 130, 131, 136–7; predatory influence,
 70, 71–2; production by, 211–14, 238–40,
 244–5; species diversity of, 61; *see also*
 particular groups and species
- Bison bison*, 94, 467
- Blepharis persica*, 563, 568
- blowouts, 11
- Boerhavia* spp., 93
- Bombyliidae, 69
- Bootettix punctatus*, production of, 215
- boron, cycling of, 316
- Bos ibericus*, 378
- Bos primigenius*, 378
- Botrytis pyramidalis*, 330
- Brachanthemum gobicum*, 174, 175, 182
- Brassica tournefortii*, 363
- breeding of animals, 147–56; *see also* reproduction
- Brickellia incana*, 36
- Bromus tectorum*, 35, 114, 346
- Bouteloua eriopoda*, 22
- burning *see* fire
- burrowing, effects on soils, 115–17
- Cadaba rotundifolia*, 40
 calcium, in soil: and cycling of, in plants, 184; and
 effect of termites on, 119–21
- California, 21, 510, 511, 513–4; root systems of
 perennials in, 34; *see also* Mohave Desert
- Calipepla squamata*, 130, 147
- Calligonum aphyllum*, 177
- Calligonum aritch*, 364, 375
- Calligonum azel*, 364, 375
- Calligonum caput-medusae*, 170, 176
- Calligonum comosum*, 59, 337, 364
- Calligonum polygonoides*, 485, 486
- Calligonum setosum*, 172
- Calligonum* spp., 14, 171, 172, 173, 326
- Calotropis procera*, 337
- Camelus bactrianus*, 94
- Camelus dromedarius*, 94, 378
- Camelus thomasi*, 378
- Campylorhynchus brunneicapillus*, 74, 130, 131, 212,
 213, 214
- Canis anthus*, 378
- Canis familiaris dingo*, 67
- Canis latrans* (coyote), 52, 54; and predator-prey
 system, 64, 65–7, 71; and population
 dynamics, 130, 131; and species separation,
 56–7, 63, 65
- Capparis decidua*, 39
- Capparis spinosa*, 14
- Capra ibex nubiana*, 570
- carbon, organic, soil content of: and effect of
 plants on, 107–8, 303–4; and effect of termites
 on, 119–21
- Cardiosis* spp., 59
- Carduus gaetulus*, 363
- Carex pachystylis*, 362, 566
- Carex physodes*, 170, 172, 185, 188–9, 193
- Carlina involucrata*, 370
- Carnegiea gigantea*, 213
- carnivores, species separation of, 56–7
- Carpodacus mexicanus*, 212
- Carthamus lanatus*, 370
- Cassia armata*, 36, 208, 338, 339
- Cassia* spp., 378
- catchments *see* watersheds
- cattle, and compaction of soils, 112–13; *see also*
 domestic stock
- Cedrus* spp., 378
- Celtis pallida*, 14
- Cenchrus ciliaris*, 371, 485
- Cenchrus setigerus*, 485, 491
- Cenchrus* spp., 96, 491
- Centaurea dimorpha*, 363
- Centaurea nicaensis*, 376
- Centrioptera muricata*, 136, 140
- Centurus uropygialis*, 212, 213
- Cerastes cerastes*, 292
- Cercidium floridum*, 39
- Cercidium* spp., 213
- Cereus giganteus*, 44
- Ceratonia siliqua*, 378
- Chaenactis* spp., 45
- chamaephytic steppes, plant communities of,
 362–3, 365, 371
- Chamerops humilis*, 378

Index

- check-dam, and control of erosion and sedimentation, 539–40
- Chelaner* spp., 86, 87, 288
- chemical effects, on soils: by plants, 105–12; by termites, 112–21
- Chenopodiaceae, 109–10, 173, 179, 378
- Chenopodium murale*, 180
- Chihuahuan Desert, USA, 54, 56, 60, 129, 131–2, 447–8; and animal biomass, 286–8, 290–2; litter production, 292–3; primary production, 283–5; water and energy flow in, 271, 272–7
- Chile, desert reserves of, 501
- Chilopsis linearis*, 37
- chloride concentrations, in soil under plants, 105–6
- chlorine, cycling of, 184, 315
- Chloris* spp., 93
- Choriotis* spp., 147
- Choristoneura fumiferana*, 133
- Chortoicetes terminifera*, 52; life cycle of, 92; and plant interactions, 91–3, 99; population dynamics, 130, 133, 134, 135–6
- Chroococaceae, 330
- Chrozophora gracilis*, 172
- Chrysanthemum coronarium*, 361, 376
- Chrysothamnus* spp., 471
- Cistus libanotis*, 360, 361
- Cistus villosus*, 375
- Citellus beecheyi*, 116
- Citrullus colocynthis*, 36
- Cleistogenes songorica*, 182
- Cleome arabica*, 363, 370
- Clerodendrum phlomidoides*, 485
- Clethrionomys glareolus*, 243
- Clethrionomys rutilis*, 243
- Climacoptera lanata*, 172
- climate see atmospheric processes, Indian (Thar) Desert
- climatic fluctuations: over long periods, 378–9; rainfall effects, 366–71; and variations in vegetation, 21–5, 365–71; *see also* precipitation
- Clostridium* spp., 314, 331, 342, 343
- clutch size, of birds, 147–8, 149–50, 151, 155–6, 238–9
- concrete, for water harvesting, 522
- Cnemidophorus* spp., 54, 57
- Cnemidophorus tigris*, 57, 130, 149; production by, 201, 228–34, 238
- Colaptes chrysoides*, 212
- Colchicum tunicatum*, 574–5
- Coldenia canescens*, 15
- Coleogyne ramosissima*, 36
- Colinus virginianus*, 147
- Collomia coccophorus*, 109, 344
- Colorado Desert, USA, 58, 72
- Columba livia*, 571
- Columbiformes, 147
- commensalism, of plant communities, 44–6
- Commiphora* spp., 14
- compaction of soil, and effects of animals on, 112–13, 114–15
- competition: root, 34–8; interspecific *see* interspecific competition; *see also* plant–plant interactions
- component processes, of deserts, 559–60
- Compositae, 378; *see also individual species*
- Condalia oborata*, 14
- Condalia obtusifolia*, 14
- Corax corvus ruficollis*, 570
- Coronilla scorpioides*, 376
- coyote *see* *Canis latrans*
- Cressa cretica*, 16
- Cricetinae, 73, 129
- crops *see* agriculture
- Crotalaria burhia*, 336
- Crotalus* spp., 292
- Crotaphytus wislizenii*, 68, 73, 130, 244
- Crucianella filifolia*, 172
- Crucianella maritima*, 17
- Ctenodactylus gundi*, 378
- Cubitermes* spp., 117
- Cucurbita palmata*, 36
- cultigene vegetation (weeds), 361, 363, 365, 368, 380
- cultivation *see* agriculture
- Cupressus dupreziana*, 327, 330, 338
- Cupressus* spp., 378
- Curlew Valley, Utah USA: and spatial variations of vegetation, 15, 65, 67
- Cutandia dichotoma*, 363
- Cutandia divaricata*, 363
- Cyamopsis psoralioides*, 491
- Cyanophyceae*, 576
- Dactylis hispanica*, 371
- Dactyloctenium radulans*, 92
- Danthonia caespitosa*, 334, 336
- data analysis, of shrub patterns and moisture availability, 39–44
- Death Valley, California, USA, 21, 510, 511
- decomposition, microbial: of litter, 292–3; model of, 401; and nutrient cycling, 304–5, 314; *see also* litter, dynamics of
- Delphinium camptocarpum*, 172
- demography *see* population
- Dendroctonus ponderosae*, 133
- Dendroctonus rufipennis*, 133
- denitrification, 345
- denudation of soil surface, by animals and insects, 114–15
- desert reserves *see* reserves
- desertization, 377
- Diarthron vesiculosum*, 172
- Dichanthium annulatum*, 336
- Dichondra* spp., 93
- Digitaria nodosa*, 371
- Diplotaxis harra*, 568
- Diplotaxis muralis*, 374
- Dipodidae, 73, 129, 146
- Dipodomys merriami*, 54, 58, 130, 154; production by, 202, 203–7, 243, 249–50
- Dipodomys microps*, 130
- Dipodomys ordii*, 54
- Dipodomys* spp., 242, 265
- dispersal of plants, 426–7
- Distichlis stricta*, 16
- diversity, and interspecific animal competition, 59–62, 559–60; and precipitation, 59–62

Index

- domestic stock, 568–9; energy flow in, 290, 295; in Indian Desert, 483–4; management of arid-land resources for, 455–72; and manipulation of grazing, 468–9; and plant interactions, 94–7; and nutrient cycling, 308, 336
- Drepanotermes perniger*, 90, 113
- Drepanotermes rubriceps*, 113, 118, 120
- Drepanotermes* spp., 89, 114
- dunes, 11, 59; afforestation of, 485–6; production potential of, 485–6; stabilization of, and spatial variations of vegetation, 16–17, 18, 374–5
- dynamics, long-term, of aridland vegetation, 357–82, 448–9; and climatic fluctuations changes, 365–71; ecological changes over long periods, 378–9; methodology, 357–9; present-day vegetation, 359–65; time-scales, 358
- earthworms, and effects on soil by burrowing, 116
- Echinops spinosissimus*, 17
- Echiochiton fruticosum*, 363, 374
- Eclipta* spp., 93
- ecosystem dynamics, modelling of, 385–407; animal processes, 398–9; ARIDCROP model, 404, 439–43; in Australia, 404–7; GAME, 406–7; grazing, 391–4; in Israel, 402–4; life cycle of annual plants, 389–91; NEGEV model, 402–4; plant processes, 396–7, 433–44; *see also* simulations; soil processes, 399–402; in United States, 388–402; WATBAL, 404
- Egypt: spatial variations in vegetation, 13–14, 15, 16, 17, 20; root systems of perennials in, 34
- Elaeagnus* spp., 37
- Elephas atlanticus*, 378
- Eliomys melanurus*, 68
- Elizaldia violacea*, 63
- Elyonurus tripsacoides*, 14
- Emex spinosus*, 374
- Encelia farinosa*, 38, 326
- energy flow: and litter dynamics, 292–3; in predators, 290–2; *see also* water and energy flow
- Ephedra lomatolepis*, 186–7, 188
- Ephedra nevadensis*, 36
- Ephedra slata*, 364
- Ephedra* spp., 179
- Ephedra trifurca*, 37
- Ephedra strobilacea*, 171, 172; gas exchange, 176; photosynthesis, 179
- ephemerals, effects of precipitation and temperature on germination, 21–2
- epiphytism, 45
- Equus mauritanicus*, 378
- Eragrostis ciliaris*, 92
- Eragrostis eriopoda*, 406
- Eragrostis papposa*, 363
- Eremias guttulata*, 571
- Eremophila gilesii*, 311
- Erica scoparia*, 378
- Eriogonum fasciculatum*, 36
- Erodium circutarium*, 515
- Erodium glaucophyllum*, 14
- erosion, 109–11, 371–3, 539–40
- Eropodium hirtum*, 278, 279, 280, 284
- Erucaria vesicaria*, 367, 375, 376
- Eryngium* spp., 370
- Erythropygia* spp., 147
- Escalante Desert, Utah, USA, 106
- Ethiopian Desert, 40
- Eucalyptus corynocalyx*, 110
- Eucalyptus* spp., 375
- Eudrilus eugeniae*, 116
- Euphorbia cheirolepis*, 172
- Euphorbia densa*, 172
- Euphorbia guyoniana*, 374
- Euphorbia terracina*, 363
- euro *see Ospranther robustus*
- Eurotia eversmanniana*, 177
- Eurotia lanata*, 36, 45
- Eurotia* spp., 15
- evaporation, control of, 544
- Fagonia arabica*, 326, 333, 340
- Fagonia kaherica*, 13
- Fagonia mollis*, 14
- Fagonia* spp., 348
- Fagus sylvatica*, 378
- Fallugia paradoxa*, 37, 139
- Felis lynx*, 378
- Ferocactus wislizenii*, 34
- Ferula assa-foetida*, 177
- fibreglass matting, for water harvesting, 523
- Filago* spp., 25
- fire, use of, for rangeland improvement, 469, 542
- Flourensia cernua*, 37, 276
- forage production: ecology of, 456; increased by herbicides, 470–1; *see also* grazing
- forests *see* afforestation; Aleppo pine
- Franseria dumosa*, 36, 38, 40, 45, 326
- Fraxinus* spp., 378
- Fumana ericooides*, 375
- Fumana thymifolia*, 360, 375
- fungi, 576; and mineral cycling, 330–1, 332; mycorrhizal, 304, 331, 581; *see also* micro-organisms
- Fusarium* spp., 331
- GAME model, 406–7
- garrigue (degraded forest), 360, 365
- gas exchange of plants, 176, 177; *see also* photosynthesis and respiration
- Gazella cuvieri*, 378
- Gazella dorcas*, 378, 570
- Gazella leptoceros*, 129
- Gazella* spp., 94
- Genista microcephala*, 361
- Genista saharae*, 364
- geohydrology of Indian Desert, 486
- Geococcyx californianus*, 148, 155–6; production by, 212, 213
- geological formations, and spatial variations in vegetation, 17–18
- Gerbillinae*, 73, 129, 146
- Gerbillus dasyurus*, 68
- Gerbillus pyramidum*, 129–31; breeding season, and rainfall effects, 155

Index

- Globularia alypum*, 360, 375
Gobi Desert: photosynthesis, 181–3; water relations of plants, 173–5
Gopherus agassizii, 137, 150
Gorgon taurinus prognu, 378
 grasshoppers, 60; and denudation of soil surface, 114; and plant interactions, 90–3, 99; production by, 215
Grayia spinosa, 36, 346
 grazing, and grazing systems, 580, 584; continuous, 466; deferred, 466; evolution of, 463–4; and growth forms of plants, 20–1; manipulation of, 468–72; model of, 391–4; overgrazing, 370, 519, 550; and rainfall fluctuations, 370–1; regulated, 465–6; rest-rotation, 467–8; rotation, 467; seasonal, 466
 Great Basin Desert, USA, 401; animal populations, 65, 68, 130; ‘nurse plants’ of, 45; population dynamics, 138; predator-prey ratios, 69; root competition between plants, 35; variations in primary production, 128
 Great Salt Lake, Utah, USA; salinity and spatial variations of vegetation, 16
 groundwater, extraction of, 544–5
Gymnocarpos decander, 376
- habitat: preferences in birds, 54, 571–2; spatial effects, 428
Halimodendron spp., 37
Halocnemum strobilaceum, 16, 363
Halocnemum spp., 348
 halophilous crassulaceous steppes, plant communities of, 363–4
 halophytes, 315
Haloxylon ammodendron: gas exchange, 176; mathematical model of population, 188–92; mineral cycling, 185, 186–7, 188; photosynthesis, 180, 183, 182; water relations of, 170, 173, 175
Haloxylon articulatum, 14, 36
Haloxylon persicum, 170, 171, 172, 173; gas exchange, 176; mineral cycling in, 185; photosynthesis, 179, 180
Haloxylon salicornicum, 14, 21
Haloxylon scoparium, 335
Haloxylon spp., 37
Hammada schmittiana, 363, 370
Hammada scoparia, 15, 278, 361, 370, 372, 376, 564, 578; production by, 283, 284, 285
Hammada spp., 37
Haplophyllum pedicellatum, 172
Helianthemum kahericum, 15, 360, 361, 376
Helianthemum lippii, 363, 374
Heliotropium argizoides, 170, 176
Hemerodromus africanus, 156
Hemilepistus reamuri, 570, 571, 572
 herbicides, 541–2; and increase of forage production, 470–1
 herbivores, and plant interactions in desert ecosystems *see plant-animal interactions*
Herniaria fontanesii, 360
Heteromyidae, 72, 73, 120, 146, 153, 286–7
Heteromys desmarestianus, 72, 144
- Hilaria jamesii*, 14
Hilaria mutica, 276, 292
Himantopus himantopus, 137
Hipparrhenis hirta, 371
Hippocratea bicontorta, 363
Hippocratea scabra, 361
 Hodotermitinae, 114
Hordeum murinum, 436
Hordeum sativum, 436, 439
 human interference *see man; management*
Hyaena striata, 378
Hymenocephala salsola, 36
 Hymenoptera, 289
Hypecoum pendulum, 172
Hyperiodrilus africanus, 116
Hyparrhenia hirta, 18
Hystrix cristata, 378
Hystrix indica, 574
- Idria* spp., 45
Ifloga spicata, 363
 Indian (Thar) Desert, management of, for crops, 278, 479–92; arid agriculture, 486–93; climate, 479–80; geohydrology of, 486; human population of, 482–3; land 480–2; livestock of, 483–4; production potential of, 485–6; surveys of land resources, 484–5
 insects: and denudation of soil surface, 114–15; diversity of species, 61; populations dynamics, 133, 139; predator-prey ratios, 69; *see also particular groups and species*
 interactions, in desert ecosystems, 9–25, 572–7; animal-animal *see animal-animal interactions*; nature of, 9–13; plant-animal *see plant-animal interactions; plant-plant, see plant-plant interactions; spatial variations of vegetation, 13–21*
 interspecific competition between animals, 53–62; and diversity, 59–62, 559–60; empirical evidence for, 54–8; hypotheses of, 53
 invertebrates: burrowing effects of, on soil, 116–17; population dynamics, 132, 137; predator-prey ratios, 69; *see also particular groups and species*
Iphiona mucronata, 14
Iridomyrmex spp., 87
Iris songarica, 172
 iron, cycling of, in plants, 184
 irrigation, 584; and crop production, 491–2
 Israel, ecosystem modelling in, 402–4
 Israeli desert system *see Negev Desert*
- jackrabbit, blacktailed *see Lepus californicus*
Jaculus jaculus, 129–30, 378; reproduction of, and rainfall effects, 155
Jaculus orientalis, 73
Jaculus spp., 287
 jerboas, territorial pattern of, 73
 Joshua Tree National Monument, California, USA, 21; mammalian production in, 208–10; *see also Mohave Desert*
Juniperus phoenicea, 360, 361, 375
Juniperus spp., 378

Index

- K*-selection of animal species, 143–54, 158, 266–7, 579
- Kalahari Desert, 59
kangaroos, species segregation of, 54
- Karakum Desert: gas exchange in plants, 176; photosynthesis, 178–83; water relations of plants in, 69–75
- Kochia prostrata*, 177, 193
- Koeleria salzmannii*, 363
- Koelpinia linearis* 172
- Krameria grayi*, 36
- Krameria parvifolia*, 281, 282; production by, 283, 284
- Krameria parviflora*, 15, 36
- Kyzylkum Desert, USSR, 73; gas exchange of plants, 177; photosynthesis, 178–81
- Lagomorpha, 146
- Lagorchestes* spp., 94
- Lamium amplexicaule*, 177
- land use, and ecological changes, 379–80; *see also* management
- Lappula caspia*, 172
- Larrea cuneifolia*: distribution of, and available moisture, 43–4
- Larrea divaricata*, 15; pattern analyses and available moisture, 39, 40, 41–2; and plant–plant interactions, 34, 46; root:shoot weight ratios, 36, 37
- Larrea* spp., 21, 45; leaf extracts of, and allelopathy, 38–9
- Larrea tridentata*, 208, 215, 272–3, 274, 326; litter production, 292; and nitrogen in soils, 338–9; production of, 283, 284, 285, 290, 456; root systems of, 333
- Lasiusurus hirsutus*, 14, 20
- Lasiusurus sindicus*, 336, 485
- Lasiusurus* spp., 491
- Launaea arborescens*, 336
- Launaea resedifolia*, 363
- Launaea* spp., 25
- Laurus nobilis*, 378
- leaf extracts, and allelopathy, 38–9
- Lecidea crystalifers*, 109
- Lepidium* spp., 93
- Lepidoptera, 133, 289
- Lepus americanus*, 131
- Lepus californicus* (black-tailed jackrabbit), 52; life-history patterns of, 146–7, 155; population trends, 64, 65–8, 71, 130, 131, 143
- lichens, nitrogen fixation and, 344
- life-cycles, modelling of, 389–91
- life-history patterns, of animals, 92, 143–56, 266–7; *r* and *K* selection, 143–54
- life-spans of perennial plants, 86
- Limoniastrum quyonianum*, 374
- Limonium pruinosum*, 14, 16
- Liomys salvini*, 144
- Liomys saliana*, 72
- Liriiodendron* spp., 126
- litter, dynamics of, 292–3, 311, 568
- livestock *see* domestic stock
- lizards: agonistic behaviour, 72, 73–4; demographic characteristics, 148–9, 150, 153; energy flow in, 291–2; niche separations of, 54, 55, 57, 60, 62; population dynamics, 130, 137, 138, 139, 156; predator–prey systems and, 68; production by, 201, 210, 228–38, 244, 255; *see also* particular species
- locusts: interaction with plants, 90–3, 99
- Locusta migratoria*, 52
- Locustana pardalina*, 52, 70
- longevity of plants, 86
- Lophortyx californicus*, 147
- Lophortyx gamebeli*, 70, 130, 131, 135, 137, 140–1, 147, 152; production of, 212, 213
- Lotus pusillus*, 363
- Lycioto-Limoniastretum halimu*, 16
- Lycium andersonii*, 36
- Lycium arabicum*, 20
- Lycium barbarum*, 485
- Lycium pallidum*, 36
- Lycium* spp., 25
- Lygaeidae, 57
- Lygeum spartum*, 24, 361
- Lynx rufus*, 54
- Macropus fuliginosus*, 52
- Macropus* spp., 94
- Macrotermes subhyalinus*, 113
- Macrotermitinae, 114, 119
- magnesium content, of soils: cycling of, in plants, 184; and effect of termites on, 119–21
- Maireana aphylla*, 110, 328
- Maireana astrotricha*, 105
- Maireana pyramidata*, 39
- Maireana restita*, 336
- Maireana sedifolia*, 109–10
- Maireana* spp., 109
- Malacothrix* spp., 45
- Malcolmia africana*, 177
- Malcolmia grandiflora*, 172
- Malva parviflora*, 370, 374
- Malye Barsuki: gas exchange in plants, 177; mineral cycling, 185, 186–7; photosynthesis, 178–81
- mammals: and plant interactions, 93–7, 99, 334; population dynamics of, 130; production by, 202–10, 217–28, 241, 243, 245–50, 252–4; *see also* domestic stock; *particular groups and species*
- man: and climatic fluctuations, 371; interference by, 194, 196; *see also* management
- management of desert ecosystems, for livestock forage, 455–72, 584; chemical control, 470–1; continuous grazing, 466; deferred grazing, 466; deferred rotation, 466–7; ecology of forage production, 456; evolution of grazing systems, 463–4; grazing manipulation, 468–72; improvement of, 461–2; by fire, 469, 542; mechanical control, 470; natural plant production, 456–61; nomadism, 464; rangeland improvement, 468–72; regulated grazing systems, 465–6; rest-rotation grazing, 467–8; rotation grazing, 467; seeding, 471; soil surface treatment, 469–70; strategies of, 462–8; transhumance, 464–5; *see also* grazing; Indian Desert

Index

- management, of water resources, **519–45**; conservation on upland watersheds, 529–31; erosion and sedimentation control, 537–40; groundwater, 544–5; micro-catchments and strip farming, 527, 528; vegetation management, 540–3; storage of water, 524–6; transpiration and evaporation control, 543–4; water harvesting, 488–90, 520–9, 527; water spreading systems, 531–7
- manganese, cycling of, in plants, **184**
- Marrubium alysson*, 370
- Mastotermes darwiniensis*, **89**
- Mastotermitidae*, **89**
- Matthiola livida*, 578
- Mausolea eriocarpa*, 171, **172**
- Medicago hispida*, **436**
- Medicago polymorpha*, **334**, **336**
- Medicago* spp., **93**, **338**
- Medicago truncatula*, **375**
- Megaleia rufa*, **52**, **89**, **94–7**, **99**; population fluctuations, **129**, **136**
- Megleia* spp., **94**
- Membracidae*, **133**, **290**
- Meridae*, **290**
- Meriones crassus*, **576**
- Meriones libycus*, **131**
- Meriones shawi*, **378**
- Meriones unguiculatus*, **131**
- Meranoplus* spp., **86**, **87**
- Mesembrianthemum crystallinum*, **374**
- Mesembryanthemum forskalii*, **14**
- Messor* spp., **86**, **288**
- meteorology *see* atmospheric processes
- Mexico, desert reserves in, **501**
- microarthropods, **57**, **293**
- microbial decomposition *see* decomposition
- micro-catchments, **527**, **528**
- Microcerotermes distinctus*, **89**
- Microcerotermes serratus*, **89**
- Microcoleus* spp., **330**
- micro-organisms, in soil, **328–33**, **341–3**, **559**, **561**; nitrogen fixation, **343–4**
- Micropalpus whitneyi*, **212**
- Microtus ochrogaster*, **243**
- Migda site, Negev Desert, water and energy flow in, **279–81**
- migration, **427**
- Mimus polyglottos*, **212**, **245**
- mineral cycling, **183–8**, **193–4**, **316**, **580–1**; animals and, **334**, **335–8**; micro-organisms in, **328–33**; nitrogen dynamics, **338–45**; organic matter and, **326–8**; phosphorus dynamics, **345–6**; potassium dynamics, **346–7**; and primary productivity, **183–8**, **194**; root systems and, **333–5**; short-term dynamics of, **325–50**; sodium chloride, **347–50**; *see also* nutrients, cycling of
- models and modelling, **385–407**, **434–43**, **448–9**, **581–2**; of animal-animal interactions, **52–3**, **63**; of arid ecosystem dynamics *see* ecosystem dynamics; of *Haloxylon ammodendron*, **188–92**; of secondary production, **251–5**; spatial effects *see* spatial effects; of water distribution, **422–4**; *see also* simulation
- Mohave Desert*, USA, **25**, **58**, **61**, **68**, **72**; animal populations, **130**, **131**, **149**, **155**; variations in primary production, **128**, **129**, **283–5**; productivity of, **19**, **458**, **459**; shrub patterns and available moisture, **40–4**; water and energy flow dynamics, **281–2**; *see also* Joshua Tree National Monument; Rock Valley
- moisture availability: for crop production, **488–90**; moisture retention, **194**; and pattern analysis of shrubs, **39–44**; root competition for, **34–8**, **46**; and spatial distribution of vegetation, **13–21**; *see also* water and energy flow
- Molothrus ater*, **212**
- Moltakea callosa*, **331**, **342**, **344**
- Monomorium* spp., **86**
- Mucor* spp., **330**
- Mucorales*, **332**
- mulga *see* *Acacia aneura*
- Mus musculus*, **55**, **131**
- Myiarchus cinerascens*, **212**
- Myiarchus tyrannulus*, **212**
- Mycobacterium* spp., **341**
- mycorrhizae, **304**, **331**, **581**
- Nama hispidum*, **15**
- Namib Desert, **55**, **59**, **70**
- Nasutitermes* spp., **89**
- Nasutitermes triodiae*, **120**, **121**
- Nasutitermitinae*, **114**
- ‘nebka effect’ in succession, **374**
- Negev Desert, Israel, **348**; modelling of ecosystem, **402–4**, **434–43**; plant–plant interactions in, **35**; predation, **68**; productivity, **19**, **283–5**; spatial variations of vegetation, **14**, **15**, **18**; water and energy dynamics, **278–81**
- nematodes, soil, production by, **216–17**
- Neotoma albigena*, **139**
- Neotoma lepida*, **74**
- Neotoma* spp., **129**, **161**
- Nerium deander*, **364**
- Nevada, **22**; secondary production in, **210**, **215**, **234–40**; *see also* Mohave Desert; Rock Valley
- New Mexico, **22**; *see also* Chihuahuan Desert
- New South Wales, Australia, **39**
- niche separation, **54**, **55**, **57**, **60**, **62**
- Nitrraria retusa*, **16**, **20**, **364**, **374**
- Nitrraria sibirica*, **175**, **182**
- Nitrraria* spp., **378**
- nitrification, **340–3**
- Nitrobacter* spp., **341**
- nitrogen in soils: ammonification, **340**; cycle of, **313**; cycling of, in plants, **184**, **185**, **311**; deficiency of, **313–14**, **317**; denitrification, **345**; dynamics of, **338–45**; fixation, **304**, **314**, **342–4**; nitrification, **340–3**; effect of plants on, **107–9**, **184**, **303–4**, **308**, **460**; proteolysis, **340**; effects of termites on, **119–21**, **304**
- Nitrosomonas* spp., **341**
- Noaea mucronata*, **361**
- Nodulana* spp., **330**
- Noea spinosissima*, **36**
- Nolettia chrysocomoides*, **363**, **374**
- nomadism, **427**, **464**
- Nostoc* spp., **344**

Index

- Notomys* spp., 131, 287
Novomessor spp., 288
 'nurse plants', 44–5
 nutrients cycling of, 184, 301–17, 336, 342, 346–7;
 accumulation of, 307; deficient elements,
 313–15; and domestic stock, 308, 336;
 excessive elements, 315–16; influence of
 precipitation, 301–2; intra-seasonal variation,
 309; structural variability, 303–4; temporal
 variability, 304–7; turnover rates, 309–12; *see*
 also mineral cycling, nitrogen in soils
- Odocoileus* spp., 94
Oenanthe lugens, 147
Oenanthe spp., 148
Olea europaea, 378
Onopordon arenarium, 363, 374
Onychomys leucogaster, 54
Onychomys torridus, 54; production by, 203, 205–7,
 241, 243, 250
Operophtera brumata, 63, 158
Opuntia bigelovii, 39–40
Opuntia lindheimeri, 14
Opuntia occidentalis, 74
Opuntia spp., 45, 213, 288
 organic matter, in arid soils, 326–8
 Orthoptera, 289
Oryctolagus cuniculus, 66, 141
Oryx leucoryx, 94
Oscillatoria spp., 330
Osphranter robustus, 94–7, 99
Osphranter spp., 95
 overgrazing, 370, 519, 550
Ovis canadensis, 94
Ovis trageraphus, 378
Oxalis spp., 93
- Panaxia dominula*, 133
Panicum antidotale, 485
Panicum obtusum, 277, 292
Panicum turgidum, 14, 20, 21, 331, 332, 485
Panthera leo, 378
Panthera pardus, 378
Parmelia conspersa, 109
Parthenium incanum, 37, 38
 PASTOR model, of grazing, 391–4
 patterns of plant distribution, 39–44; *see also*
 spatial effects; vegetation, spatial variations
Peganum harmala, 172, 341, 370, 374
Penicillium spp., 330, 331, 332
Pennisetum dichotomum, 348
Pennisetum typhoideum, 487
 perennial plants: and animal–plant interactions, 87,
 88; and chemical effects on soils, 105–9;
 life-spans of, 86; pattern analysis and available
 moisture, 39–44; root systems of, and
 plant–plant interactions, 34–8
Periploca loevigata, 364
 perlite ore, for evaporation reduction, 544
Perognathus formosus, 72, 130, 159; production by,
 202, 217–28, 242–3, 245–7, 248–9, 250, 252–4
Perognathus longimembris, 130
Perognathus parvus, 130, 135, 140
Perognathus spp., 242, 245
- Peromyscus crinitis*, 73
Peromyscus eremicus, 73; production by, 202, 203,
 206–7, 249, 250
Peromyscus spp., 286–7
 Peruvian Desert, 242
Phainopepla nitens, 148
Phalaris minor, 436
Phaseolus aconitifolius, 487
Phaseolus radiatus, 487
Pheidole spp., 86, 87, 288
Phillyrea media, 375, 378
Philolithus densicollis, 130, 133, 136, 137, 140
Phoenix dactylifera, 364
 phosphorus, cycling of, in plants, 184, 311;
 deficiency of, 314–15; dynamics of, 345–6;
 relation to plants, 107–9, 303–4, 308, 460
 photoperiod, and effects on breeding season, 155,
 156
 photosynthesis and respiration, 176–7, 178–83,
 192–3, 564–5
Phragmites communis, 364
Phragmitetum communis, 16
Phrynosoma cornutum, 73
Phrynosoma platyrhinos, 234–8
 phylogenetic momentum, 151
 physical effects, on soils *see* soils
Phyllotis griseoflavus, 72
Pinus halepensis, 360, 378; *see also* Aleppo Pine
Pinus ponderosa, 541
 piosphere effect, 428–30
Pipilo fuscus, 156, 212
Pistacia atlantica, 364
Pistacia lentiscus, 378
Pittosporum spp., 378
Plantago albicans, 361, 363
 plant–animal interactions, 85–100, 574–5; ants,
 86–7, 98, 99–100; birds, 89; grasshoppers and
 locusts, 90–3, 99; large mammals, 93–7, 99,
 334; rodents, 88, 98, 195; termites, 89–90, 98,
 99–100; *see also* grazing; piosphere effect
 plant–plant interactions, 33–46; allelopathy, 38–9;
 pattern analyses and available moisture,
 39–44; positive associations, 44–5; root
 systems of perennials, 34–8, 333, 566
 plants: allelopathy, 38–9, 46; commensalism, 44–5,
 46; community composition, variations in,
 13–19; growth forms, variations in, 20–1;
 model of life-history of annuals, 389–91;
 plant–animal interactions *see* plant–animal
 interactions; plant–plant interactions *see*
 plant–plant interactions; plant processes
 model, 396–7, 433–44; processes, 562–8;
 production of, 456–61; and soil effects,
 105–12; survival strategies of, 573; water
 relations of, 169–75; *see also* vegetation;
 particular groups and species
 playas (sinks), 16, 277, 288
Poa bulbosa, 278, 279, 362
Poa sandbergii, 336
Poa sinuata, 15
Poa spp., 22, 37
 pocket-mice, 217–28, 286–7; *see also* particular
 species
Pogonomyrmex occidentalis, 114–15

Index

- Pogonomyrmex rugosus*, 288
Pogonomyrmex spp., 86, 288
Poliopelta minuta, 212
Polygonum equisetiforme, 363
 polystyrene rafts, for water storage, 525–6
 population dynamics, 125–62, 289–92, 295, 563,
 577–80; animal life-history patterns, 143–56;
 demographic mechanisms, 136–8, 143–54;
 environmental mechanisms, 138–9;
 mathematical model, 188–92; magnitudes of
 variation, 126–35; precipitation effects, 135,
 139, 371; regulation and limitation, 156–62;
 short-term fluctuations, 125–43; temporal
 patterns, 139–43; *see also Lepus californicus*
- Populus alba*, 378
Populus spp., 37
 potassium, cycling of, in plants, 184; dynamics of,
 346–7; and effect of termites on, 119–21
- Poterium spinosum*, 18, 23
- precipitation, 42, 264, 586; and variations in
 animal populations, 135, 139, 371; annual
 variations, 21–2; and breeding season timing
 and intensity, 154–6; and diversity of species,
 59–62; and germination, 21–2; and grazing
 effects, 370–1; long-term variation in, 366–71;
 magnitude of variation in, 126–7; nutrients
 affected by, 301–2; primary production
 variations, 125, 126, 128, 366–7; and water
 dynamics, 272–5, 278, 280, 281, 287, 290–1,
 294–5
- predation, 62–72, 76; empirical evidence of,
 65–72; energy flow in predators, 290–2;
 predator–prey systems, 65–71; predatory
 influence, 70–2; theoretical considerations,
 62–4
- primary production, 240–1, 283, 284–5, 290,
 456–61, 577–80; magnitude of variation in,
 127, 128, 129, 283–5; and variation in
 precipitation, 126, 127, 128, 366–7; *see also*
 productivity, primary
- production, by desert animals, 199–256, 578; birds,
 211–14, 238–40, 244–5; mammals, 202–10,
 218–28, 241, 243, 245–50, 252–4; and contrast
 with other environments, 241–3; efficiency of,
 247–50; grasshoppers, 215; intraspecific
 variations, 243–7; lizards, 201–2, 210, 228–38,
 244, 250, 251, 253–5; models of, 251–5; and
 procedures of investigation of, 200–2; termites,
 210, 238, 241
- production, potential of Indian Desert, 485–6
- production, primary *see* primary production
- productivity, primary, 19, 169–97, 458–9;
 comparisons of producers, 283–5; cycles of
 mineral elements, 183–8, 193, 194;
 mathematical models of, 188–92;
 photosynthesis and respiration, 176–7, 178–83,
 192–3, 564–5; variations of, 18–19, 21–5;
 water input and transpiration, 169–75; *see also*
 primary production
- Prosopis cineraria*, 485
Prosopis glandulosa, 274–5, 290
Prosopis glandulosa var. *torreyana*, 37
Prosopis juliflora, 14, 39, 485, 486
Prosopis spp., 14, 34, 471
- Prosopis tamarugo*, 569
 proteolysis, 340
Psammomys obesus, 371
 psammophilous steppes, plant communities of, 363
Psammotermes spp., 337
Pseudomonas spp., 345
Pseudomys spp., 131
 pseudo steppes, plant communities of, 364
Pseudotsuga mensiezii, 61
Psoralea lanceolata, 326
Psyllidae, 290
Pterocles senegallus, 129
Pterocles spp., 147, 570
Pulicaria crispa, 346
Purshia tridentata, 45
Pycnostyctus spp., 92
Pyrethrum achilleifolium, 19
Pyrrholoxia sinuata, 212
- Quercus coccifera*, 378
Quercus faginea, 378
Quercus ilex, 378
Quercus spp., 471
Quercus suber, 378
Quercus turbinella, 542
- r-selection of animal species, 143–54, 158, 266–7,
 579
- radiotelemetry, and predation mortality rate, 63,
 65
- rainfall *see* precipitation
- Rajasthan Desert, India: spatial variations in
 vegetation, 14; *see also* Indian Desert
- Randonia africana*, 347
- rangeland management *see* management
- Rattus* spp., 131
- Rattus villosissimus*, 68
- Reamuria negevensis*, 15
- Reaumuria soongorica*, 173, 174, 175, 182
- Reaumuria* spp., 25
- Reboudia pinnata*, 436
- recreation and tourism, 495–518, 584–5; desert
 reserves in USA, 495, 496, 509–18; progress in
 desert preserves, 500–8
- Recurvirostra avosetta*, 137
- Red Sea, salinity and spatial variations in
 vegetation, 16
- regulation of populations, 156–62
- reproduction of animals, 147–56, 238–9
- reserves, 495–518; progress in, 500–8
- resources, of arid-lands, management of *see*
 management
- respiration *see* photosynthesis and respiration
- Retama retam*, 14, 364, 374
- Retama* spp., 25
- Rhagodia spinescens*, 110
- Rhamnus lycioides*, 375
- Rhanterium suaveoleus*, 363
- Rhazya stricta*, 328, 331, 346
- Rheum tataricum*, 173, 185
- Rheum turkestanicum*, 172
- Rhinoceros merki*, 378
- Rhinoceros simus*, 378
- Rhinotermitidae, 89

Index

- Rhizopus* spp., 330
Rhombomys opimus, 141
Rhus pentaphyllum, 364
Rhus tripartitum, 364
Ricinus communis, 375
 Rock Valley, Nevada, USA, 242; lizards in, 228–34; pocket mice in, 217–28, 286–7; secondary production in, 216–17; *see also* Mohave Desert; Nevada Desert
 rodents: agonistic behaviour of, 72–4; breeding season and effects of rainfall on, 155; life-history patterns of, 144–5, 146–7, 151–2; and plant interactions, 88, 98, 195; population dynamics of, 129–31; production of, 202, 203, 205–7, 217–28, 241–3; species separation of, 54, 55, 58, 60; water and energy flow, 286–8; *see also* particular groups and species
 rootplowing, 542, 543
 root: shoot ratio, 35–7, 46
 root systems, of perennials, 34–8, 333, 566; and mineral cycling, 333–5; and plant–plant interactions, 34–8
Rosmarinus officinalis, 360, 361, 375
Rubus ulmifolius, 378
Rumex tingitanus, 374
- Saccharum bengalensis*, 485
Saccharum spontaneum, 375
 Sahara Desert: animal population variations, 129; climatic fluctuations, 366; reserves in, 505
Salazaria mexicana, 36
Salicornia rubra, 16
Salicornia utahensis, 16
Salicornietum fruticosae, 16
Salicornietum herbaceae, 16
 salinity, and spatial variations of vegetation, 15–16, 17
Salix canariensis, 378
Salsola arbuscula, 171, 172, 173
Salsola gemmascens, 172
Salsola orientalis, 172, 177
Salsola passerina, 173, 174, 182
Salsola richteri, 170, 171, 172, 173; gas exchange, 176; photosynthesis, 180
Salsola rubens, 172
Salsola sclerantha, 172
Salsola spp., 25, 37
Salsola trentranda, 363
Salsola tetragona, 363
Salsola vermiculata, 36, 362, 363, 375
Salsola zygophylla, 363
Salsoletum tetrandrae, 16
 salt concentration, of soils: effects of plants on, 105–9; and problems of crop production, 493; *see also* sodium chloride
Salvadora oleoides, 14
 sand dunes *see* dunes
Sapindus spp., 378
 Saraya site, Negev Desert: water and energy flow in, 278, 279
Sarcobatus spp., 471
Sarcobatus vermiculatus, 106, 347, 348, 349
Sarcopoterium spinosum, 278, 279
Sceloporus graciosus, 149–50
- Sceloporus undulatus*, 149
Schedorhinotermes actuosus, 89
Schismus barbatus, 515
Schismus calycinus, 363, 568
Schistocerca gregaria, 52, 91; population variations, 127, 134, 142
Schumannia karelinii, 172
Scincus scincus, 334, 337
Scorophularia saharae, 374
Scorzonera pseudolanata, 575
 Sde-Boker site, Negev Desert: primary production, 283–5; water and energy flow, 278–9, 280
 seasonal variations, in vegetation, 23–5
 secondary production *see* production, by desert animals
 sedimentation, 373, 539–40
 seed consumers, energy flow, 286–9, 295
 seeding, for replacement of forage species, 471
 selection systems *see K*-selection; life-history patterns; *r*-selection
 selenium, cycling of, 316
Senecio gallicus, 363
Senecio subdentatus, 172
 sheep, and plant interaction, 95–7; *see also* domestic stock
Silene arenaria, 374
Silene colorata, 363
 silicon, cycling of, in plants, 184
 simulations, of plant production, 433–44; ARIDCROP model, 404, 439–43; BACROS model, 437–9; transpiration coefficient, 434–9; *see also* models
 sinks *see* playas
Sisymbrium irio, 374
Smilax aspera, 378
Smithopsis spp., 88
Smirnovia turkestanica, 170
 social aspects, of management, 549–53, 585
 sodium, cycling of, in plants, 184, 315
 sodium chloride, dynamics of, 347–50
 sodium monofluoroacetate (1080), 56
 soils: animal effects on, 112–21; chemical effects on, (by plants) 105–12, (by animals) 112–21, 576; compaction of, 112–15; denudation of, 114–15; desertization of, 377; management of, 469–72; micro-organisms *see* micro-organisms; and mineral cycling *see* mineral cycling; model of processes, 399–403; nitrogen in *see* nitrogen in soils; organic matter in, 107–8, 303–4, 336–8, 424–6; plant effects on, 13, 17–18, 19, 105–12; processes in, 399–402, 561; physical effects on, (by plants) 109–13, (by animals), 117–19, 576; and steepification of, 375–6; and trampling effects, 114; water dynamics, 273–7, 280–1; *see also* erosion
Solanum spp., 93
 Sonoran Desert, USA, 21, 22, 24, 34; animal populations of, 130, 146–7, 153, 155; animal species separation, 56, 60; predatory species, 69; shrub patterns and available moisture, 40–4
Sorex spp., 250
 Spain, desert reserves of, 502–3
Spartium junceum, 378

Index

- spatial effects, in modelling, 411–30; animal habitats, 428; heterogeneity of sites, 411–15; nomadic migrations, 427; organic matter and nutrients, redistribution of, 424–6; piosphere effect, 428–30; plant survival and dispersal, 426–7; variation in vegetation, 13–21; water input, redistribution of, 415–24; *see also* patterns of plant distribution
- species diversity *see* diversity
- species segregation, 54, 75
- species separation, 54–8, 60
- Sphincterochyla zonata*, 570, 571
- Sphingidae*, 133
- Spizella breweri*, 245
- stabilization of dunes, 16–17, 18, 324–5
- Stemphylium ilicis*, 332
- steppes, plant communities of, 362–3, 365; alfa grass, 360–2; chaemaphytic, 362–3; halophilous crassulecent, 363–4; psammophilus, 363; pseudo, 364
- steppization, 375–6
- Sterculia diversifolia*, 110
- Stipa gobica*, 182
- Stipa lagascae*, 371
- Stipa parviflora*, 371
- Stipa tenacissima*, 360, 361, 362, 367–9
- Streptomyces* spp., 346
- strip farming, 527
- Struthio camelus*, 129, 378
- Suaeda asphaltica*, 347
- Suaeda erecta*, 16
- Suaeda fruticosa*, 16, 348, 363
- Suaeda mollis*, 364
- Suaeda pruinosa*, 24, 363
- Suaeda torreyana*, 16
- Suaeda vermiculata*, 16
- succession, 267–8; allogenic, 371–3; autogenic, 373–5
- Sudan: spatial variations in vegetation, 15; pattern analyses, of vegetation and available moisture, 39
- sulphur, cycling of, in plants, 184
- Sus crofa*, 378
- Swainsona sweensonioides*, 314
- swales (basins), 276
- Sylvia nana*, 129
- Sylvilagus audubonii*, 146–7
- Sylvilagus audubonii cedrophilus*, 146–7
- Sylvilagus* spp., 153
- Tamarix africana*, 364
- Tamarix aphylla*, 364
- Tamarix boreana*, 364
- Tamarix gallica*, 364
- Tamarix mannifera*, 16
- Tamarix* spp., 37, 326, 327, 336, 337, 348, 374, 576
- Tamiasciurus hudsonicus*, 243
- Tassili n'Ajjer, 330, 337, 338, 343
- Tatera* spp., 287
- Taterillula* spp., 287
- Taurotragus derbianus*, 378
- Taxidea taxus*, 56, 57
- temperature: annual variations, 21–2; and effects on energy flow, 272–82, 294–5; and germination, 21–2
- temporal variations: in nutrient cycling, 304–7; in insect species, 61–2; and population dynamics, 139–43; in vegetation, 21–5
- Tenebrionidae* *see* beetles, tenebrionid
- Tephrosia purpurea*, 336
- termites, 58, 575; and plant interactions, 89–90, 98–100; production of, 201–2, 210, 238, 241; and effects on soils, 112–21, 304; *see also* particular groups and species
- Termitidae*, 89
- territoriality, 73
- Tetralinis* spp., 360
- Tetracme recurvata*, 172
- Texas, spatial variations in vegetation, 14–15
- Thamnosma montana*, 38, 45
- Thapsia garganica*, 370
- Thar Desert *see* Indian Desert
- Thymelaea hirsuta*, 14, 17, 370
- Thymelaea microphylla*, 361, 363
- Thymelaea nitida*, 361
- Thymelea* spp., 378
- Thymelaea tartonraira*, 361
- Thymus capitatus*, 375
- Thymus hirtus*, 360, 361, 375
- Tilia* spp., 378
- tortoise *see* *Gopherus agassizi*
- tourism *see* recreation
- Tournefortia sodiana*, 172
- toxins, water-soluble, of desert perennials, 38
- Toxostoma curvirostre*, 212, 213
- Toxostoma lecontei*, 129; productivity by, 238–40, 245
- trampling effects, on soils, by animals, 114
- transcinnamic acid, 38
- transhumance, 464–5
- transpiration, in plants, 169–75; coefficient, modelling of, 434–9; control of, 542–4; intensity of, 171–2
- Triodia irritans*, 39
- Triodia pungens*, 94, 95, 96
- Triticum sativum*, 436, 439
- Trochoidea seetzeni*, 68
- Troglodytes aedon*, 148
- Tulipa montana*, 574–5
- Tumulitermes bastilis*, 121
- Tumulitermes pastinator*, 120
- Tumulitermes* spp., 89
- Tunisia, Pre-Saharan zone; productivity, variations in, 18–19; reserves of, 505–6; water and energy flow, 282
- Turkey, desert reserves of, 506–8
- Typheto-Scirpetum littoralis*, 16
- Tyto alba*, 67
- Ulmus scabra*, 378
- Ulmus* spp., 378
- Uma notata*, 72
- United States of America, desert reserves in, 495, 496, 497, 498, 501, 502–3, 509–18; ecosystem modelling in, 388–402; *see also* America, North
- Urginea undulata*, 575
- Ursula guttulosa*, 92
- Urocyon cinereoargenteus*, 54

Cambridge University Press

978-0-521-10556-9 - Arid-Land Ecosystems: Structure, Functioning and Management,
Volume 2

Edited by D. W. Goodall and R. A. Perry

Index

[More information](#)***Index***

- Uromastix acanthinurus*, 292, 336, 337
Urosaurusornatus, 139
Ursus arctos, 378
Uta stansburiana, 68, 72, 73, 130, 137, 149, 159;
 production by, 201–2, 210, 238, 244, 250, 251,
 253–4
 Utah, spatial variations in vegetation, 14, 22; *see also* Curlew Valley; Escalante Desert; Great Basin Desert
 Uzbekistan, 22
 vegetation: and climatic fluctuations, changes in, 21–5, 365–71; composition of, 13–19;
 management of, to increase water yield, 540–3;
 maps, 359; present-day plant communities, 359–65; spatial variations, 13–22, 65, 67;
 temporal interactions, 21–5; variations in form, 20–1; *see also* dynamics, long-term, of arid-land vegetation; plants
Veromessor spp., 288
Veronica biloba, 172
Veronica campylopoda, 177
 vertebrates: population fluctuations, 136–7; soil effects of burrowing, 115–16; *see also particular groups and species*
 Vitamin A shortage, and population dynamics, 138
Vulpes fulva, 57
Vulpes macrotis, 71
Vulpes vulpes, 67
Vulpia myuros, 334, 336
 wadis, 10, 11–12
 WATBAL model, 404
 water: availability of *see moisture availability*; and erosion of soils, 111; modelling of, 422–4; redistribution of, 415–24; relations of plants to 169–75; *see also* precipitation; water and energy flow
 water and energy flow, 271–95, 558; and animal growth and behaviour, 285–92; and consumer factors, 286–92; dynamics of water, 272–82; resources, management of *see management*; spreading systems, 531–7; temperature effects, 272–82, 294–5
 water-courses *see* arroyos
 water resources *see* management of water
 watersheds, upland, conservation of, 529–31; characteristics of, 533–4
 water uptake, 109–10; *see also* transpiration
 weeds *see* cultigene vegetation
 Willow Creek Basin, Montana, USA: total soil moisture stress, 17
 wind erosion, of soil, and role of plants, 109–10
Xanthium spinosum, 373
 xerophytes, root:shoot ratio, 35–7, 46
Yucca elata, 37, 274
Yucca schidigera, 36
Yucca spp., 287
Zanthoxylon fagara, 14
Zeiraphera griseana, 133
Zenaida asiatica, 212
Zenaida macroura, 212
Zilla macroptera, 347
Zilla spinosa, 14, 20, 21, 336, 346
Zitelletum spinosae, 326
Ziziphus lotus, 364, 374
Ziziphus nummularia, 485
Zygophyllaceae, 344
Zygophyletum albae, 16
Zygophyletum dumosi, 23
Zygophyletum, 19
Zygophyllum album, 326, 333, 335, 344, 347
Zygophyllum coccineum, 14, 344
Zygophyllum dumosum, 14, 15, 35, 347, 563, 572
Zygophyllum fabago, 36
Zygophyllum simplex, 335, 348
Zygophyllum thoxylon, 174
Zygophyllum waterlotii, 347
Zygophyllum xanthoxylon, 173–5, 182