## Index

## Index

Agriculture agroforestry and tree gardens ecological advantages of, 12, 16, 174 potential for future, 12, 16, 174 shade coffee and, 174 tradition of, 11-12, 13, 146, 163, 174 aquiculture, integration with, 27, 163, 296, 299, 300 attitudes toward farming, 14, 116, 154, 157 commercial development, history (See Agriculture, history) large-scale commercial, 15-16, 17, 143, 152-153, 165, 176-179, 187-189, 407 potential for commercial agriculture, 12, 16, 17, 160, 173 semi-commercial, 15, 16, 143, 158, 165, 168, 170, 407 small-scale commercial, 13, 15, 165, 179-184, 407, 408 constraints to development, 10, 11, 13, 14, 15, 16, 17, 41-42, 44, 45, 115, 120, 121, 155-159, 292-294, 176, 179, 187, 207, 407, 409 container agriculture (See Agriculture, technologies) conventional field farming (See Agriculture, technologies) cooperatives (See Cooperatives) crops cash, 12, 13, 14, 18, 149-150, 151, 159, 160, 171-172, 173, 179-181, 184-188 (See also Markets and Market Development, export) import substitution (See Markets and Market Development, local) new, introduction of, 16, 170, 171, 173 subsistence, 13, 86, 145-149, 150, 171 underutilized, 172-173 deforestation, role in, 143, 151, 154 decline (See Agriculture, farm acreage, decline in; subsistence, decline of) disease control (See Agriculture, pest and disease control) energy development, integration with (See Energy, integration with agriculture) extension agents and services (See Extension) farm acreage, decline in, 152, 154 farm sizes, 165-166, 179 fertilizers, 13, 23, 42, 150, 164, 182, 188, 200-202 (See also Agriculture, soil amendments) history of agricultural development Caribbean, 84, 95-97, 98-100, 101, 151-154 Pacific, 83-84, 88, 89, 149-150 incentives, 36, 152, 409 (See also Renewable Resource Development and Management, incentives) irrigation (See Agriculture, technologies)

labor, 114, 115, 117, 120-121, 123, 151, 152, 154, 157, 162, 171

livestock animals, 6, 150, 152, 154, 172-173, 174-176, 187-188 feed, 155, 222, 284-285 markets (See Markets and Market Development) mechanization (See Agriculture, technologies) monoculture, 13, 98, 162-163, 188 opportunities for agricultural development, 11, 12, 76, 77, 159-211 pest and disease control post-harvest (See Food Preservation and Processing) preharvest, 21-22, 163, 188, 203-207 plantation agriculture history of (See Agriculture, history) modern, 164 polyculture, 21, 22, 161-162, 163, 203-204 (See also Agriculture, subsistence, characteristics of) production (See Agriculture, commercial; Agriculture, subsistence) research, 18, 33-35, 209-210, 359-360 small farmer profiles, 33, 354-355 soil amendments, 23, 200-203, 310 conservation, 23, 156, 193, 194-198, 365 degradation and erosion, role in, 42, 111, 150, 162, 188, 192-193 drainage, 178 fallow periods and, 193-195 subsistence 432 (defined) agroforestry (See Agriculture, agroforestry) backyard gardens, 13, 16, 149, 151, 168 characteristics of, 13, 15-16, 21, 86, 144-145, 163, 164, 165, 166-167, 168-169, 174, 203 conservation value of, 13, 15-16, 167 crops (See Agriculture, crops, subsistence) decline of, 16, 143, 167, 168 enhancement of, 160, 170, 171, 173-174, 407 need to protect, 16, 168 production, 166, 167-168 social value of, 16 technologies, 13, 145-149 sustainable, characteristics of, 161-166 technologies agroforestry (See Agriculture, agroforestry) container agriculture, 17, 18, 169, 179, 181-184 conventional (intensive) field farming, 179-181, 187-189 energy-integrated farming (See Energy, integration with agriculture) improved pasture, 17, 179, 187, 188 interplanting (See Agriculture, polyculture) irrigation, 13, 17, 107, 177-178, 182, 188-189 mechanization, 13, 17, 176-177 subsistence (See Agriculture, subsistence)

tourism and (See Tourism, market potential of) vertical integration of, 22, 23, 288, 291-292 wastewater treatment and, 28, 310 Aquiculture agriculture, integration with, 163, 296, 299, 300 constraints to development, 10, 11, 21, 232-235, 292-294 energy, integration with (See Energy, integration with aquiculture) extension agents and services (See Extension) interest in, 7, 20-21, 77, 249 juveniles for (See Aquiculture, constraints) opportunities for development, 11, 21, 76-77, 249-258, 236-258 research, 21, 33, 34-35, 233, 236, 250, 253, 257-258, 260-263, 360-362 site selection, 233, 250, 254 species algae, 236, 250, 252, 253 aquarium fish, 21, 236, 257 baitfish, 21, 236, 257 food fish, 20, 236, 250, 254, 255-257 giant clams, 242-244, 250, 253 pearl oysters, 226, 236, 242, 250, 252-253 prawns, freshwater, 236, 250, 255 shrimp, marine, 233, 236, 250, 255 technologies (See also Energy, integration with aquiculture) bottom culture, 20, 252-253 extensive, 251-253, 258 intensive, 258 marine enclosures, 20, 253-254 pond culture, 20, 21, 254-257 sea ranching, 20, 251 semi-intensive, 258 wastewater treatment and, 28, 310 Buffer systems freshwater/flood buffer, 9, 71, 132, 134-136 saltwater/storm surge buffer 9, 71, 72, 132, 136-137 Coastal Resource Management, 7, 76, 337-339, 356, 415, 416, 417, 422 Coastal Zone Management (See Coastal Resource Management) Colonial Era (See History) Compact of Free Association, 4, 40, 63, 90-91, 120, 338, 339, 358 Cooperatives, 22, 248, 259, 282, 288-291, 413, 414 Cyclonic storms 52, 54-55, 102 Deforestation (See Forests and Forestry) East West Center, 32, 34, 341, 352, 361, 403 Eastern Caribbean Center, 34, 361 Economic self-sufficiency defined, 6, 45, 122 role of renewable resources in achieving, 6, 13, 30, 45-46, 102, 113, 161

Education availability of college and graduate education in the U.S. islands Caribbean, 34, 359, 419 Pacific, 34, 357, 359, 401-402 ecology and resource issues, need for in school curricula, 35, 357-358, 408-409, 413, 419-420 liberal arts emphasis of higher education, 11, 116, 157 off-island pursuit of college and graduate education, 11, 35, 116, 419 public environmental education programs, need for, 211, 408, 413, 422-423 training for careers in agriculture and fisheries, need for, 117, 210-211, 347, 408-409, 412-413, 419-420 El Nine, 56 Employment (See also Agriculture, labor) alien, 118, 157, 121-122, 419, 423 government, preference for, 114, 119-120, 157 in resource-related careers, 114 part-time, 113, 115, 120, 152, 227, 228 unemployment, 114, 117-118, 120 wages, 114, 117-118, 414 Energy biomass, 302 integration with agriculture, 26, 27, 163, 296-300 integration with aquaculture, 27, 28, 296, 300-302 Ocean Thermal Energy Conversion, 28, 300, 382 solar (hypersaline) ponds, 28, 302 wave energy systems, 28, 301-302 Environmental Protection Agency, 204, 350, 386, 397, 418 Extension Services agriculture, 209-210 (See also USDA, research and extension) aquiculture and fisheries, 263-264 need for additional, 35-36, 206, 209-210, 263-264, 351, 363, 413 Fisheries artisanal fishery profiles, 33, 356 catch data, need for, 355, 410, 411 commercial (See also Renewable Resource Development Planning, neglect of fisheries in) large-scale, 229, 237, 240 small-scale, 20, 227, 236, 237, 238-240, 413, 418, 419, 420 conservation practices, traditional, 24, 25, 76, 246, 247-248 technologies, modern (See Fisheries, technologies) constraints to development of, 10, 11, 19, 20, 230-232, 233-235, 412 economically important species, 221-222, 226-227 (See also Reefs, ecological and economic importance of) fish aggregation devices (See Fisheries, technologies)

fishery cooperatives (See Cooperatives)

history Caribbean, 18, 96, 100-101, 229 Pacific, 18, 89, 221-222, 225-227 importance of, 18, 19, 20, 23, 86-87, 221-222, 225, 228-229, 415 markets (See Markets and Market Development) opportunities for development of, 20, 76, 235-249 overexploitation of, 6, 7, 20, 26, 109, 110, 226, 227, 229-230, 235, 237, 239, 245, 259, 411 pelagic, 20, 235, 237, 239, 240, 248, 411, 412, 419 reef (See Reefs) research, 20, 33-34, 231, 260-263, 360-362, 411 restocking (See Fisheries, technologies) subsistence, 20, 237, 238-240 technologies artificial reefs (See Reefs, artificial) conservation, 24, 110, 228, 237, 240, 244-248, 411, 416, 424-425 (See also Protected Areas; Reefs, protection of) fish aggregation devices, 26, 237, 240-241, 411 restocking, 26, 235, 237, 240, 241-244, 249, 258, 424 traditional, 87, 100 tourism and (See Tourism, market potential of) TURFS and (See Tenure systems) underutilized resources, 7, 228, 235, 238-240 Food preservation and processing, 21, 22, 187, 238, 276-282, 283, 284, 407-408, 412 Forests and Forestry cloud forests, 67 commercial development of, 18, 70, 154, 189-192 deforestation, 6, 69, 70, 72, 94, 98, 100, 103, 143, 151, 191-192, 333-334 lowland forests, 68 mangrove forests, 42, 72-73, 135, 138, 223-224, 229-230, 241-242, 246 montane forests, 67, 135, 136 protection of, 75, 334 reforestation, 7, 18, 26, 70, 71, 73, 76, 96, 192, 193, 198-200, 309, 365 secondary forests, management, 103, 191 submontane forests, 67 watershed value of forests, 26, 67, 68, 70, 77, 133, 134, 199 urban, 310-311 General Accounting Office, 31, 349 Ghyben-Herzberg lens, 58 Handicrafts (See Traditional Island Cultures and Customs, handicrafts] History (See also Agriculture, history; Fisheries, history) Caribbean, 6, 18, 83, 92-102 Pacific, 6, 18, 83-92

Intertropical Convergence Zone 52, 53, 55 Introduced Species, problems of, 103, 106, 251, 173, 206

Island characteristics climate, 7, 8, 52-55, 156 geography, 3, 4, 43, 369-376 (maps) hydrology, 7, 55-58 political status, 39-41 renewable resource ecosystems, 9, 10, 19, 43, 63-74, 131-140, 222-225, 231-232, 320-321 socioeconomic, 43-45, 113-123 soils, 8, 60-63, 156, 192 types atolls, 7, 8, 49, 50, 59, 84, 136-137 continental islands, 7, 51, 59-60 defined, 7, 49 high volcanic islands, 7, 49, 58-59, 84, 225 raised limestone islands, 7, 51, 59, 136-137 Markets and Market Development (See also USDA, Agriculture Marketing Service) export markets, 22, 160, 185-187, 235, 236, 237, 288, 364, 408, 420, 424 local markets, 17, 22, 155, 158, 159-160, 170, 259, 284, 285-287, 291, 364, 379-380, 413, 414, 420 (See also Tourism, market potential of; School Lunch Program, island products, potential use in) regional markets, 22, 287-288, 408 Micronesia Area Tropical Agriculture Data Center, 33, 356 Ocean Thermal Energy Conversion (See Energy, Ocean Thermal Energy Conversion) Out-Migration 7, 113, 118, 122 Pacific Basin Development Council, 32, 33, 352, 355, 411 Pacific Fisheries Development Foundation, 33, 355, 404, 411, 413 Pollution and Contamination, 6, 7, 103, 106, 108, 112-113, 181, 204224, 228, 232, 373, 376 Population Growth and Distribution Caribbean, 6, 43-44, 113 Pacific, 6, 43-44, 113 Protected areas, 24, 332-337 (See also Fisheries, technologies, conservation; Forests and Forestry, protection of; Reefs, protection of) Reefs artificial, 7, 26, 77, 235, 240, 241 buffer capacity of (See Buffer Systems, saltwater/storm surge buffer) damage and destruction of, 7, 74, 102, 109-110, 111, 112, 192, 222, 233, 235, 246, 320, 375 defined, 49, 222

ecological and economic importance of, 43, 74, 223

productivity of, 11, 43, 74, 222-223, 225

protection of, 75, 226, 246-247

traditional use rights of in the Pacific (See Tenure systems, sea)

Renewable Resource Development and Management (See *also* Agriculture; Aquiculture; Fisheries) existing programs, basic characteristics of, 330-331 goals, 13, 45-46 incentives, 36, 364-366, 414-415, 420-421 intersectoral integration, potential for, 26, 27, 28, 163, 275, 296-311, 415 local participation in, 29, 30, 237, 248, 331-332, 336-337 planning (See Renewable Resource Development Planning) Renewable Resource Development Planning analytical techniques, 326-330, 340, 421, 422 approaches to 28, 29, 30, 321, 330-331 Coastal Resource Management (See Coastal Resource Management) components of, 319-320 Environmental Impact Statements, role in, 29, 326-327, 340, 422 information and data availability and needs, 28, 29, 30, 32-33, 261, 320, 322-323, 324-326, 340-341, 347, 351-356, 406, 410-411, 416-418, 425 interrelatedness of island resource systems and, 131-132, 139-140, 320-321, 347, 415 local participation in, 29, 30, 237, 248, 331-332, 336-337, 410, 415, 416, 424 needs and constraints, 28, 321-323, 409, 415-416, 420, 421-422 neglect of fisheries in, 415, 418 organization of, on U.S.-affiliated islands, 28, 321-322 regional coordination of 264, 295 tourism, planning for (see Tourism, planning for) Renewable resource ecosystems (See heading under Island characteristics) School Lunch Program impacts, evaluation of, 36, 157, 158, 365-366 island products, potential use in 36, 287, 413 Small Business Administration, 350, 397 Tenure systems communal, 44-45, 383 land, 14, 44, 88, 155, 176, 207, 334, 421 sea, 25-26, 226, 234, 246, 247-248, 262, 334, 383, 415 Tourism Caribbean, 101, 115, 304-305, 380 impacts of, 12, 110, 246, 302-303, 423 market potential of, 12, 235, 239, 258, 259, 286, 287, 302-309 Pacific, 303-304, 380 planning for, 12, 75, 415 role in island economies, 115, 304-305 Traditional Island Cultures and Customs (See also Tenure systems)

- authority structure of, 83, 84, 91-92, 94, 156, 226
- conservation value of 75, 83, 333, 382 (See *also* Agriculture, subsistence; Fisheries, conservation)

- extended family systems, 67, 91, 92, 156, 158, 237, 415, 422
- handicrafts, 235, 305-309, 357
- research on, need for 33, 247, 262-263, 361
- resource knowledge and skills, 10, 75, 87, 225-226, 331, 336, 357, 412-413
- retention of under new legal systems 25, 30, 247-248, 381-383
- subsistence economies, nature of, 84, 86, 87,118, 225
- westernization, effects on, 87-89, 92, 115, 157 226, 227-228, 414

Transportation Systems, 292-296 (See also Agriculture, constraints to development; Aquiculture, constraints to development; Fisheries, constraints to development)

- Trust Territory of the Pacific Islands (TTPI), 4, 30, 90, 338
- UNESCO Man and The Biosphere Program, 31, 75, 334, 341, 350, 351, 386, 396
- U.S. Agency for International Development, 34, 358-359
- U.S. Army Corps of Engineers, 33, 338, 356, 373, 395
- U.S. Department of Agriculture
  - Agricultural Cooperative Service, 291
  - Agricultural Experiment Station, 417
  - Agricultural Information Service, 283, 385, 395
  - Agricultural Marketing Service, 36, 283, 364
  - Agricultural Research Service, 283, 385, 395
  - Animal and Plant Health Inspection Service (APHIS), 206, 385
  - Beltsville Aerated Rapid Comporting (BARC) System, 201-202
  - Current Research Information System, 34, 360
  - Economic Research Service, 283
  - Farmer Cooperative Service, 290
  - food programs, 157, 158 (See also School Lunch Program)
  - Forest Service, 34, 105, 350, 385, 395
  - Minor Economic Crop Computer Database, 354
  - National Agriculture Library, 33, 356
  - Office of International Cooperation and Development, 34, 358
  - pest control, and, 205, 207
- programs related to island renewable resources, evaluating, 31, 36, 348, 349, 365-366
- research and extension, increased support for U. S. affiliated islands, 33, 34, 35, 362, 363, 417 Soil Conservation Service, 350, 395, 413
- U.S. Department of Commerce
- Economic Development Administration, 386
- National Oceanic and Atmospheric Administration, 31, 33, 35, 36, 337, 338, 348, 349, 350, 356, 360-361, 362, 363, 364, 386, 395
- U.S. Department of Defense, 41, 287 (See also U.S. Army Corps of Engineers; U.S. Military)
- U.S. Department of Education, 35, 357-358
- U.S. Department of Energy, 348, 350

- U.S. Department of the Interior
  - extension, 33 Fish and wildlife Service, 35, 76, 104, 338, 350, 362, 373, 375, 376, 386, 396
  - Office of Territorial and International Affairs, 31, 32, 35, 347, 349, 350, 351, 386, 396
  - programs related to island renewable resources, evaluating, 31, 32, 349, 352, 417, 418, 421
- U.S. Geological Survey, 350, 386
- U.S. Department of State, 34, 348, 362, 386, 396 U.S. military, 7, 41, 108, 109, 157, 287, 337, 373, 374, 375, 376, 377-380, 418
- Waste Treatment and Management, 28, 112, 164, 275, 309-310

- wildlife
- diversity, 7, 64
- endangered, 67, 75, 104, 105, 110, 170, 179, 243,
- 244, 374, 375 endemism, 7, 63-64, 66
- game species, 16, 169-170
- habitat on islands, 6, 66, 71, 76
- protection of, 66-67, 75, 104-106, 132, 373, 374, 375, 376, 421, 424-425 (See also Protected areas)
- value to science, 64
- vulnerability of, 8, 64, 66, 103, 375