

C. REFERENCES CITED (NSF grant-supported project authors in bold)

1. Agha, G.A. 1987. *Actors: A model of concurrent computation I distributed systems*. MIT Press, Cambridge, Massachusetts.
2. Ahl, V.A. and T.F.H. Allen. 1996. *Hierarchy theory*. Columbia University Press, New York.
3. Ahmand, R., **F.N. Scatena**, and A. Gupta. 1993. Morphology and sedimentation in Caribbean montane streams: Examples from Jamaica and Puerto Rico. *Sedimentary Geology* 85: 157-169.
4. Anderson, J. M. 2000. Food web functioning and ecosystem processes: problems and perceptions of scaling. In D. C. Coleman and P. F. Hendrix (eds.). *Invertebrates as webmasters in ecosystems*. CABI Publishing, New York, NY, USA.
5. Anderson, D.M. and L.H. MacDonald. 1998. Modelling road surface sediment production using a vector geographic information system. *Earth Surface Processes and Landforms* 23: 95-107.
6. Auyang., S. 1998. *Foundations of Complex-Systems Theories in Economics, Evolutionary Biology and Statistical Physics*. Cambridge University Press, New York, NY.
7. Aspinall, R. and D. Pearson. 2000. Integrated geographical assessment of environmental condition in water catchments: Linking landscape ecology, environmental modeling and GIS. *Journal of Environmental Management* 59: 299-319.
8. Axelrod, R. and M.D. Cohen. 1999. *Harnessing complexity: Organizational implications of a scientific frontier*. The Free Press, New York.
9. Bak, P. 1996. *How nature works: The science of self-organized criticality*. Copernicus, New York, NY.
10. Baker, B. 1998. Rethinking roads in the nation's forests. *BioScience* 48: 156.
11. Ball, P. 1998. *The self-made tapestry: Pattern formation in nature*. Oxford University Press, Oxford.
12. Barabasi, A.L. and R. Albert. 1999. Emergence of scaling in random networks. *Science* 286: 509-512.
13. Barlovic, R., A. Schadschneider, and M. Schreckenberg. 2001. Random walk theory of jamming in a cellular automaton model for traffic flow. *Physica A* 294: 525-538.
14. Bart, J. 1995. Acceptance criteria for using individual-based models to make management decisions. *Ecological Applications* 5: 411-420.
15. Bateman, I.J., A.A. Lovett, and J.S. Brainard. 1999. Developing a methodology for benefit

- transfers using geographical information systems: Modelling demand for woodland recreation. *Regional Studies* 33: 191-295.
16. Bell, D.C., J.S. Atkinson, and J.W. Carlson. 1999. Centrality measures for disease transmission in networks. *Social Networks* 21: 1-21.
 17. Bell, M.G. and Y. Iida. 1997. *Transportation network analysis*. Wiley, New York.
 18. Beller, W., P. D'Ayala, and P. Hein (eds.). 1990. *Sustainable development and environmental management of small islands*. Man and the Biosphere Series, 5. Parthenon Publishing Group, and UNESCO, Paris.
 19. Bergin, D.A. 1999. Influences on classroom interest. *Educational Psychology* 34: 87-98.
 20. Bersier, L.F., P. Dixon, and G. Sugihara. 1999. Scale-invariant or scale-dependent behavior of the link density property in food webs: A matter of sampling effort? *American Naturalist* 153: 676-682.
 21. Bhat, G., J. Bergstrom, R.J. Teasley, J.M. Bowker, and H.K. Cordell. 1998. An ecoregional approach to the economic valuation of land- and water-based recreation in the United States. *Environmental Management* 22: 69-77.
 22. Bian, L. 2000a. Object-oriented representation for modeling mobile objects in an aquatic environment. *International Journal of Geographical Information Science* 14: 603-623.
 23. Bian, L. 2000b. Component modeling for the spatial representation of wildlife movements. *Journal of Environmental Management* 59: 235-245.
 24. Bilby, R.E., K. Sullivan, S.H. Duncan. 1989. The generation and fate of road-surface sediment in forest watersheds in southwestern Washington. *Forest Science* 35: 453-468.
 25. Bischetti, G.B., C. Gandolfi, and M.J. Whelan. 1998. The definition of stream channel head location using digital elevation data. *Hydrology, Water Resources and Ecology in Headwaters*. IAHS Publication 248: 545-552.
 26. Bishop, I.D. 2001. Predicting movement choices in virtual environments. *Landscape and Urban Planning*. 56: 97-106.
 27. **Box, P.W.** 1999. The Swarm GIS-CA libraries. <http://www.nr.usu.edu/swarm>.
 28. **Box, P.W.** 2002a. Spatial units as agents: Making the landscape an equal player in agent-based simulations. In: H.R. Gimblett (ed.) *Integration of agent-based modelling and geographic information systems*. Oxford University Press. In Press.
 29. **Box, P.W.** 2002b. An agent-based algorithm for determining recreational anchorage carrying capacity. *Journal of Artificial Societies and Social Simulation*. (Forthcoming, October 2002)
 30. Brainard, J., A. Lovett, and I. Bateman. 1999. Integrating geographical information systems into travel costs analysis and benefit transfer. *International Journal of Geographical Information Science* 13: 227-246

31. Bransford, J.D., A.L. Brown, and R.R. Cocking (eds.). 1999. How people learn: Brain, mind, experience, and school. National Research Council, Washington, D.C.
32. Brown, J.H. 1994. Complex ecological systems. Pp. 414-449 IN: G.A. Cowan, D. Pines, and D. Melzer (eds.) Complexity: Metaphors, models, and reality. Addison-Wesley, Santa Fe Institute studies in the science of complexity, 18, Reading, Massachusetts.
33. Brown, S., A.E. Lugo, S. Silander, and L. Liegel. 1983. Research history and opportunities in the Luquillo Experimental Forest, USDA Forest Service General Technical Report No. SO-44. Southern Forest Experiment Station, New Orleans, Louisiana.
34. Budy, P., C. A. Toline, **T. A. Crowl, A. P. Covich, and F.N. Scatena**. 2002. Population structure and conservation genetics among tropical, diadromous shrimp (*Atya lanipes*). Molecular Ecology. In press.
35. Chomitz, K.M. and D.A. Gray. 1996. Roads, land use and deforestation: A spatial model applied to Belize. World Bank Economic Review 10: 487-512.
36. Chong. C.T. , S.T. Larned, R.A. Kinzie, and **A.P. Covich**. 2000. Species interactions between estuarine detritivores: Inhibition or facilitation? Hydrobiologia 434: 11-16.
37. Chou, Y-H. 1997. Exploring spatial analysis in geographic systems. Onword Press, Santa Fe, NM.
38. Chowdhury, D., L. Santen, and A. Schadschneider. 1999. Vehicular traffic: A system of interacting particles driven far from equilibrium. Current Science 77: 411-419.
39. Chowdhury, D., L. Santen, and A. Schadschneider. 2000. Simulation of vehicular traffic: A statistical physics perspective. Computing in Science and Engineering 2: 80-87.
40. Clark, J.J. and R.R. Wilcock. 2000. Effects of land-use change on channel morphology in northeastern Puerto Rico. Geological Society of America Bulletin 112: 1763-1777.
41. Cohen, J. and J. Stewart. 1994. The collapse of chaos: Discovering simplicity in a complex world. Penguin, New York.
42. Colwell, R. 1998. Balancing the biocomplexity of the planet's life system: A twenty-first century task for science. BioScience 48: 786-787.
43. Conte, R., R. Hegselmann, and P. Terna (eds.) 1997. Simulating social phenomenon. Springer, Berlin.
44. Cooper, S.D., S. Diehl, K. Krantz, and O. Sarnelle. 1998. Implications of scale for patterns and processes in stream ecology. Australian Journal of Ecology 23: 27-40.
45. Costanza, R. 2000. The dynamics of the ecological footprint concept. Ecological Economics 32: 341-345.
46. **Covich, A.P.** 1988a. Geographical and historical comparisons of Neotropical streams: Biotic diversity and detrital processing in highly variable habitats. Journal of the North American Benthological Society 7: 361-386.

47. **Covich, A.P.** 1988b. Atyid shrimp in the headwaters of the Luquillo Mountains, Puerto Rico: Filter feeding in natural and artificial streams. *Verhandlungen der Internationalen Vereinigung für Theoretische und Angewandte Limnologie* 23: 2108-2113
48. **Covich, A.P.** 1993. Water and ecosystems. Pg. 40-55 IN: P.H. Gleick (ed.) *Water in crisis*. Oxford University Press.
49. **Covich, A.P.** 1996. Stream biodiversity and ecosystem processes. *Bulletin of the North American Benthological Society* 13: 294-303.
50. **Covich, A.P.** 1999. Leaf litter processing: The importance of species diversity in stream ecosystems. pp.15-20 IN: N. Friberg and J.D. Carol (eds.), *Biodiversity in benthic ecology*. Proceedings from the Nordic Benthological Meeting, National Environmental Research Institute, Silkeborg, Denmark.
51. **Covich, A.P.** 2000. Energy flow and ecosystems. Pp. 509-523 in S.A. Levin (ed.) *Encyclopedia of Biodiversity*, vol. 2. Academic Press, San Diego, CA.
52. **Covich, A.P., T. A. Crowl**, S.L. Johnson, D. Varza, and D.L. Certain. 1991. Post-hurricane Hugo increases in atyid shrimp abundance in a Puerto Rican montane stream. *Biotropica* 23: 448-454.
53. **Covich, A.P., T.A. Crowl**, S.L. Johnson, and M. Pyron. 1996. Distribution and abundance of tropical freshwater shrimp along a stream corridor: Response to disturbance. *Biotropica* 28: 484-492.
54. **Covich, A.P.** and W.H. McDowell. 1996. The stream community. Pg. 433-460 IN: D.P. Reagan and R.B. Waide (eds.) *The food web of a tropical rain forest*. University of Chicago Press, Chicago, Illinois, USA.
55. **Covich, A.P., M.A. Palmer**, and **T.A. Crowl**. 1999. Role of benthic invertebrate species in freshwater ecosystems. *Bioscience* 49: 119-127.
56. **Covich, A.P., T.A. Crowl**, and **F.N. Scatena**. 2001. Linking habitat stability to floods and droughts: Effects on shrimp in montane streams, Puerto Rico. *Verhandlungen Internationale Vereinigung Limnologie* 27: 2430-2434.
57. **Covich, A.P., T.A. Crowl**, and **F.N. Scatena**. 2002. Drought effects on freshwater shrimp in tropical headwater streams of the Luquillo Experimental Forest, Puerto Rico. *Freshwater Biology*. In press.
58. Cropper, M., C. Griffiths, and M. Mani. 1999. Roads, population pressures, and deforestation in Thailand, 1976-1989. *Land Economics* 75: 58-73
59. **Crowl, T. A., W. H. McDowell, A. P. Covich**, and S. L. Johnson. 2001. Freshwater shrimp effects on detrital processing and nutrients in a tropical headwater stream. *Ecology* 82:775-783.
60. **Crowl, T.A., N. Bouwes, M.J. Townsend, A.P. Covich, and F.N. Scatena**. 2000. Estimating the potential role of freshwater shrimp on an aquatic insect assemblage in a tropical headwater stream: A bioenergetics approach. *Verhandlungen Internationale Vereinigung Limnologie*. In press.

61. **Crowl, T.A. and A.P. Covich.** 1994. Responses of freshwater shrimp to chemical and tactile stimuli from large decapod predators: Implications for habitat selection. *Journal of the North American Benthological Society* 13: 291-298.
62. **Crowl, T.A., C.R. Townsend, and A.P. Covich** 1992. Hierarchical design and the use of geographic information systems to bridge the gap between river science and management. *Proceedings of the International Symposium of the Spatial Information Research Centre*, 2: 27-35
63. **Crowl, T.A., C.R. Townsend, N. Bouwes, and H. Thomas.** 1997. Scales and causes of patchiness in stream invertebrate assemblages: Top-down predator effects? *Journal of the North American Benthological Society*. 16:277-285.
64. Cummins, K.W., C.E. Cushing, and G.W. Minshall. 1995. Introduction: An overview of stream ecosystems. Pg. 1-8 IN: C. E. Cushing, K. W. Cummins and G. W. Minshall (eds.) *River and stream ecosystems. Ecosystems of the world 22.* Elsevier, New York, New York, USA.
65. Dagorn, L., F.Menczer, P. Bach, and R.J. Olson. 2000. Co-evolution of movement behaviours by tropical pelagic predatory fishes in response to prey environment: A simulation model. *Ecological Modelling* 134: 325-341.
66. Daily, G.C., T. Soderqvist, S. Aniyar, K. Arrow, P. Dsgupta, P.R. Ehrlich, C. Folke, A. Jansson, B.O. Jansson, N. Kautsky, S. Levin, J. Lubchenco, K.G. Maler, D. Simpson, D. Starrett, D. Tilman, and B. Walker. 2000. Ecology- the value of nature and the nature of value. *Science* 289: 395-396.
67. Deadman, P.J. 1999. Modelling individual behaviour and group performance in an intelligent agent-based simulation of the tragedy of the commons. *Journal of Environmental Management* 56: 159-172.
68. Deadman, P. and H.R. Gimblett 1994. A role for goal-oriented autonomous agents in modeling people-environment interactions in forest recreation. *Mathematical and Computer Modelling* 20: 208.
69. DeAngelis, D.L. 1980. Energy flow, nutrient cycling, and ecosystem resilience. *Ecology* 61: 764-771.
70. DeAngelis, D. L. 1992 *Dynamics of nutrient cycling and food webs.* Chapman and Hall, New York.
71. DeAngelis, D. L. and L.J. Gross. 1992 *Individual-based models and approaches in ecology: Populations, communities, and ecosystems.* Chapman and Hall, New York.
72. DeAngelis, D.L. and J.H. Petersen. 2001. Importance of the predator's ecological neighborhood in modeling predation on migrating prey. *Oikos* 94: 315-325.
73. Del Mar Lopez, T., T.M. Aide, and J.R. Thomlison. 2001. Urban expansion and the loss of prime agricultural lands in Puerto Rico. *Ambio* 30: 49-54.

74. Detti, R. and V. Pasqui. 1995. Vector and raster structures in generating drainage-divide networks from digital terrain models. Pp.35-55 IN: A. Carrara and F. Guzzetti (eds.) Geographical information systems in assessing natural hazards. Kluwer Academic Publishers, Amsterdam.
75. Dieckmann, U., R. Law, and J.A.J. Metz (eds.) 2000. The geometry of ecological interactions: Simplifying spatial complexity. Cambridge University Press, Cambridge University, New York.
76. Dodds, P.S. and D.H. Rothman. 2000. Scaling, universality, and geomorphology. Annual Review of Earth and Planetary Sciences 28: 571-610.
77. Eastman, J.R. 1999. Multi-criteria evaluation and GIS. Pp. 493-502 In: P.A. Longley, M.F. Goodchild, D.J. Maguire, and D.W. Rhind (eds.) Geographical Information Systems. John Wiley & sons, New York.
78. Englen, Gu. 2002. Xplorah: The Spatial Decision Support System for Puerto Rico. Research Institute for Knowledge Systems. The Netherlands.
79. Fall, A. and J. Fall. 2001. A domain-specific language for models of landscape dynamics. Ecological Modelling 141: 1-18.
80. Farina, A. 2000. The cultural landscape as a model for the integration of ecology and economics. BioScience 50: 313-320
81. Fielder, F.R. and **J.A. Ramirez**. 2000. A numerical method for hydrodynamic modeling of overland flow. International Journal .for Numerical Methods in Fluids 32: 219-239.
82. Flecker, A.S. 1996. Ecosystem engineering by a dominant detritivore in a diverse tropical stream. Ecology 77: 1845-1854.
83. Forman, R.T.T. 2000. Estimate of the area affected ecologically by the road system in the United States. Conservation Biology 14: 31-35.

84. Forman, R.T.T. and L. E. Alexander. 1998. Roads and their major ecological effects. *Annual Review of Ecology and Systematics* 29: 207-231.
85. Fouladvand, M.E. 2000. Reaction-diffusion models describing a two-lane traffic flow. *Physical Review E* 62: 5940-5947.
86. Fransen, P.J.B., C.J. Phillips, and B.D. Fahey. 2001. Forest road erosion in New Zealand: Overview. *Earth Surface Processes and Landforms* 26: 191-204.
87. Freeman, M. 1993. The measurement of environmental and resource values: Theory and methods. *Resources for the Future*, Washington DC.
88. Furniss, M.J. , T.S. Ledwith, M.A. Love, B. McFadin, S.A. Flanagan. 1997. Response of road-stream crossings to large events in Washington, Oregon, and Northern California. In: *The water/road interaction; Technology series: An introduction*. U.S.D.A. Forest Service Technology and Development pRogram, 9777-1805 SDTDC.
89. Gardiner, J.L. 1997. River landscapes and sustainable development: A framework for project appraisal and catchment management. *Landscape Research* 22:95-114.
90. Garcia-Martino, A.R., G.S. Warner, **F.N. Scatena**, and D.L. Civco. 1996a. Rainfall, runoff relationships in the Luquillo Mountains of Puerto Rico. *Caribbean Journal of Science* 32: 413-424.
91. Garcia-Martino, A.R., **F.N. Scatena**, G.S. Warner, and D.L. Civco. 1996b. Statistical low flow estimation using GIS analysis in humid montane regions in Puerto Rico. *Water Resources Bulletin* 32: 1259-1271.
92. Garcia-Montiel, D.C. In press. La presencia humana en los bosques neotropicales humedos. In: M. Guariguata and G. Kattan (eds.) *Ecologia de bosque lluvioso Neotropical*. Editorial Agroamerica, San Jose, Costa Rica.
93. Garcia-Montiel, D.C., and **F.N. Scatena**. 1994. The effect of human activity on the structure and composition of a tropical forest in Puerto Rico. *Forest Ecology and Management* 63: 57-78.
94. Garnier, J. and J.-M. Mouchel (eds.). 2000. *Man and river systems: The functioning of river systems at the basin scale*. Developments in Hydrobiology 146. Kluwer Academic Publishers, Dordrecht, The Netherlands.
95. Gellis, A.C., R.M.T Webb, W.J. Wolfe, and S.C.I. McIntyre. 1999. Effects of land use on upland erosion, sediment transport, and reservoir sedimentation, Lago Loiza Basin, Puerto Rico. U.S. Geological Survey Water-Resources Investigations Report 99-4010, 60 pp.
96. Gellmann, M. 1994. *The quark and jaguar: Adventures in the simple and complex*. W.H. Freeman, New York.
97. Giboda, M., E.A. Malek, and R. Correa. 1997. Human schistosomiasis in Puerto Rico: Reduced prevalence rate and absence of *Biomphalaria glabrata*. *American Journal of Tropical Medicine and Hygiene* 57: 564-568.

98. Giacometti, A. 2000. Local minimum energy landscapes in river networks. *Physical Review E* 62:6042-6051.
99. Gimblett, H. R., T.C. Daniel, and C. Roberts. 2000. Grand Canyon river management: Simulating rafting the Colorado River through Grand Canyon National Park using spatially explicit intelligent agents. In: *Fourth International Conference on Integrating GIS and Environmental Modeling (GIS/EM4)*.
100. Goodwin, R.A., J.M. Nestler, D.P. Loucks, and R.S. Chapman. 2001. Simulating mobile populations in aquatic ecosystems. *Journal of Water Resources Planning and Management-ASCE* 127: 386-393.
101. **González-Cabán, A. and J. Loomis.** 1997. Economic benefit of maintaining ecological integrity of Rio Mameyes, Puerto Rico. *Ecological Economics* 21: 63-75.
102. **González-Cabán, A. and J. Loomis.** 1999. Measurement of the economic benefits of the ecological integrity of the Mameyes River in Puerto Rico. *USDA Forest Service Pacific Southwest Research Station Research Paper (240)*: 1-62.
103. Goodchild, M., B. Parks, and L. Steyaert. 1993. *Environmental modeling with GIS*. Oxford University Press, New York.
104. Goodman, B. 2000. US Forest Service proposes ban on road construction. *BioScience* 50: 744.
105. Goodwin, R.A., J.M. Nestler, D.P. Loucks, and R.S. Chapman. 2001. Simulating mobile populations in aquatic ecosystems. *Journal of Water Resources Planning and Management-ASCE* 127: 386-393.
106. Grimm, V. 1999. Ten years of individual-based modelling in ecology: What have we learned and what could we learn in the future? *Ecological Modelling* 115: 129-148.
107. Gross, L.J. 2000. Education for a biocomplex future. *Science* 288: 807.
108. Gupta, V. and E. Waymire. 1989. Statistical self-similarity in river networks parameterized by elevation. *Water Resources Research* 25: 463-476.
109. Haining, R., S. Wise, and J.S. Ma. 1998. Exploratory spatial data analysis in a geographic information system environment. *Journal of the Royal Statistical Society series D: The Statistician* 47: 457-469.
110. Harris, R. 1999. Computer-conferencing issues in higher education. *Innovations in Education and Training International* 36: 80-91.
111. Hartwick, J. and N. Olewiler, 1986. *The Economics of Natural Resource Use*. Haper and Row, New York, NY
112. Heins, W.A. and J.R Walker 1998. Using a campus waterway for undergraduate course exercises and summer-research experiences. *Journal of General Education* 46: 45-50.

113. Hiebeler, D. 1994. The Swarm simulation system and individual-based modeling In: Proceedings of decision support 2001. Advanced technology for natural resource management. September conference held in Toronto, Canada.
114. Higashi, M., B.C Patten, and T.P. Burns. 1993. Network trophic dynamics- the modes of energy utilization in ecosystems. *Ecological Modelling* 66:1-42.
115. Hirata, H. 1995. Information and ecological networks. Pp.623-642 IN: B.C. Patten and S.E. Jorgensen (eds.) *Complex ecology*. Prentice Hall, Englewood Cliffs, New Jersey.
116. Hirsch, R.M. 1990. The influence of man on hydrologic systems. Pp. 329-359 IN: *The Geology of North America, vol. O-1*, (eds.) M.G. Wolman and H.C. Riggs. Surface Water Hydrology, Geological Society of American, Boulder, CO.
117. Holland, J.H. 1992. *Adaptation in natural and artificial systems*. MIT Press, Cambridge, Massachusetts, 2nd edition.
118. Holland, J.H. 1995. *Hidden order: How adaptation builds complexity*. Helix Press, Addison-Wesley, Reading, Massachusetts.
119. Hooke, R.L. 1999. Spatial distribution of human geomorphic activity in the United States: Comparison with rivers. *Earth Surface Processes and Landforms* 24: 687-692.
120. Hulot, F.D., G. Lacroix, F.O. Lescher-Moutoué, and M. Loreau. 2000. Functional diversity governs ecosystem response to nutrient enrichment. *Nature* 405: 340-344.
121. Hunter, J.M. and S.I. Arbona. 1995. Paradise lost- An introduction to the geography of water pollution in Puerto Rico. *Social Science & Medicine* 40: 1331-1355.
122. Huriot, J.M., T.E. Smith, and J.F. Thisse. 1989. Minimum-cost distances in spatial analysis. *Geographical Analysis* 21: 294-315.
123. Huston, M., D. DeAngelis and W. Post. 1998. New Computer Models Unify Ecological Theory. *BioScience* 38: 682-691.
124. Ibbitt, R.P, A.I. McKerchar, and M.J. Duncan. 1998. Taieri River data to test channel network and river basin heterogeneity concepts. *Water Resources Research* 34: 2085-2088.
125. Ibbitt, R.P, G.R. Willgoose, and M.J. Duncan. 1999. Channel network simulation models compared with data from the Ashley River, New Zealand. *Water Resources Research* 35: 3875-3890.

126. Imbernon, J. 1999. A comparison of the driving forces behind deforestation in the Peruvian and the Brazilian Amazon. *Ambio* 28: 509-513.
127. Itami, R. M., G.S. MacLaren, K. M, Hirst, R. J. Raulings, and H.R. Gimblett. 2000. RBSIM 2: Simulating human behavior in national parks in Australia: Integrating GIS and intelligent agents to predict recreation conflicts in high use natural environments. In: Fourth International Conference on Integrating GIS and Environmental Modeling (GIS/EM4).
128. Jackson, R.B., S.R. Carpenter, C.N. Dahm, D.M. McKnight, R.J. Naiman, S.L. Postel, and S.W. Running. 2001. Water in a changing world. *Ecological Applications* 11: 1027-1045.
129. Jensen, H.J. 1998. Self-organized criticality: Emergent complex behavior in physical and biological systems. Cambridge University Press, Cambridge, U.K.
130. Johnson, A.R., C.A. Hatfield, and B.T. Milne. 1995. Simulated diffusion dynamics in river networks. *Ecological Modelling* 83: 311-325.
131. Johnson, G.D., W.L. Myers, and G.P. Patil. 1999. Stochastic generating models for simulating hierarchically structural multi-cover landscapes. *Landscape Ecology* 14: 413-421.
132. Johnson, S. L., **A.P. Covich**, **T.A. Crowl**, A. Estrada, J. Bithorn, and W.A. Wurtsbaugh. 1998. Do seasonality and disturbance influence reproduction in freshwater atyid shrimp in headwater streams, Puerto Rico? *Proceedings of the International Association of Theoretical and Applied Limnology* 26: 2076-2081.
133. Johnson, S.L. and **A.P. Covich**. 2000. Day and night differences in freshwater shrimp foraging activity as related to instream flow. *Regulated Rivers* 16: 91-99.
134. Jones, J.A., F.J. Swanson, B.C. Wemple, and K.U. Snyder. 2000. Effects of roads on hydrology, geomorphology, and disturbance patches in stream networks. *Conservation Biology* 14: 76-85
135. Kauffman, S. 1995. *At home in the universe*, Oxford University Press, Oxford.
136. Kartchner, S. 2002. *Recreational Use of Montane Streams of the Puerto Rican Rainforest*. Dept. of Forestry, Utah State University, Logan, UT
137. Kelly, K. 1994. *Out of control*. Forth Estate, London.
138. Kolar, C.S. and D.M. Lodge. 2000. Freshwater nonindigenous species: Interactions with other global changes. Pp. 3-30 IN: H.A. Mooney and R.J. Hobbs (eds.) *Invasive species in a changing world*. Island Press, Washington, D.C.
139. **Laituri, M.J. 2000**. Cultural perspectives of flooding. Pp. 451-468 IN: E.E. Wohl (ed.) *Inland flood hazards: Human, riparian, and aquatic communities*. Cambridge University Press, New York.
140. La Marche, J.L. and D.P. Lettenmaier. 2001. Effects of forest roads on flood flows in the Deschutes River, Washington. *Earth Surface Processes and Landforms* 26: 115-134.
141. Langbein, W.B. and L.B. Leopold. 1966. River meanders- theory of minimum variance. U.S. Geological Survey Professional Paper 422H.

142. Larsen, M.C. and J.E. Parks. 1997. How wide is a road? The association of roads and mass-wasting in a forested montane environment. *Earth Surface Processes and Landforms* 22: 835-848.
143. Larsen, M.C. and A. Santiago Roman. 2001. Mass wasting and sediment storage in a small montane watershed: An extreme case of anthropogenic disturbance in the humid tropics. Pp. 119-138 IN: J.M. Dorava, D.R. Montgomery, B.B. Palcsak, F.A. Fitzpatrick (eds.) *Geomorphic processes and riverine habitat*. American Geophysical Union, Washington, D.C.
144. Larsen, M.C. and A. Simon. 1993. A rainfall intensity-duration threshold for landslides in a humid-tropical environment, Puerto Rico. *Geografiska Annaler* 75A: 13-23.
145. Larsen, M.C. and A.J. Torres-Sanchez. 1990. Rainfall-soil moisture relations in landslide-prone areas of a tropical rain forest, Puerto Rico. IN: J.H. Krishna et al., (eds.), *Tropical hydrology and Caribbean water resources*. Proceedings of the International Symposium on Tropical Hydrology and Fourth Caribbean Islands Water Resources Congress, p. 121-130.
146. Larsen, M.C. and A.J. Torres-Sanchez. 1992. Landslides triggered by Hurricane Hugo in eastern Puerto Rico, September 1989. *Caribbean Journal of Science* 28: 113-125.
147. Leopold, L.B. and W.B. Langbein. 1962. The concept of entropy in landscape evolution. U.S. Geological Survey Paper 500-A.
148. Leopold, L.B. and T. Maddock. 1953. The hydraulic geometry of streamchannels and some physiographic implications. U.S. Geological Survey Professional Paper 252.
149. Levin, S.A. 1999. *Fragile dominion: Complexity and the commons*. Perseus Books, Reading, MA.
150. Levine, J. 2000. Species diversity and biological invasions: Relating local process to community pattern. *Science* 288: 852-854.
151. Ligtenberg, A., A.K. Bergt, R. van Lammeren. 2001. Multi-actor based land use modelling: spatial planning using agents. *Landscape and Urban Planning* 56: 21-33.
152. **Loomis, J.** 1989. A Bioeconomic Approach To Estimating the Economics Effects of Watershed Disturbance on Recreational and Commercial Fisheries. *Journal of Soil and Water Conservation* 44: 83-87.
153. **Loomis, J.** 1993. An investigation into the reliability of intended visitation behavior. *Environmental and Resource Economics* 3:183-191.
154. **Loomis, J.B.** 1998. Estimating the public's value for instream flow: Economic techniques and dollar values. *Journal of the American Water Resources Association* 34: 1007-1014.
155. **Loomis, J.B.** 2000. Vertically summing public demand curves: An empirical comparison of economic versus political jurisdictions. *Land Economics* 76: 312-321.
156. **Loomis, J.** and J. Cooper. 1990. Economic benefits of instream flow to fisheries. *Rivers* 1: 23-30.

157. **Loomis, J. and A. González-Cabán.** 1997. How certain are visitors of their economic values of river recreation: An evaluation using repeated questioning and revealed preference. *Water Resources Research* 33: 1187-1193.
158. **Loomis, J., P. Kent, L. Strange, K. Fausch, and A. Covich.** 1999. Measuring the total economic value of restoring ecosystem services in an impaired river basin: Results from a contingent valuation survey. *Ecological Economics* 33: 103-117.
159. Lopez del Mar, T., T.M. Aide, and **F.N. Scatena.** 1998. The effect of land use on soil erosion in the Guadiana watershed in Puerto Rico. *Caribbean Journal of Science* 34: 298-307.
160. Lorek, H. and M. Sonnenschein. 1998. Object-oriented support for modelling and simulation of individual-oriented ecological models. *Ecological Modelling* 108: 77-96.
161. Lorek, H. and M. Sonnenschein. 1999. Modelling and simulation software to support individual-based ecological modelling. *Ecological Modelling* 115: 199-216.
162. Lugo, A.E. 1986. Water and the ecosystems of the Luquillo Experimental Forest. General Technical Report SO-63. USDA Forest Service, Southern Forest Experiment Station, New Orleans, La. 17 pp.
163. Lugo, A.E. and **F.N. Scatena.** 1995. Ecosystem-level properties of the Luquillo Experimental forest with emphasis on the Tabonuco Forest. pp. 59-108, In A.E. Lugo and C. Lowe (eds.), *A Century of Tropical Forestry Research: Results From the First Half, Themes for the Second Century.* Springer-Verlag, New York.
164. Lugo, A.E. and C. Lowe (eds.) 1995. *Tropical forests: Management and ecology.* Ecological Studies 112, Springer-Verlag, New York. 461 pp.
165. Lugo, A.E. and H. Gucinski. 2000. Function, effects, and management of forest roads. *Forest Ecology and Management* 133: 249-262.
166. Luna, F. and B. Stefansson (eds.). 2000. *Economic simulations in Swarm: Agent-based modeling and object oriented programming.* Kluwer Academic Publishing, Boston.
167. MacDonald, L.H., D.M. Anderson, and W.E. Dietrich. 1997. Paradise threatened: Land use and erosion on St. Johns, U.S. Virgin Islands. *Environmental Management* 21: 851-863.
168. MacDonald, L.H., R.W. Sampson, and D.M. Anderson. 2001. Runoff and road erosion at the plot and road segment scales, St. John, U.S. Virgin Islands. *Earth Surface Processes and Landforms* 26: 251-272.
169. McDowell, W.H., A.E. Lugo, and A. James. 1995. Export of nutrients and major ions from Caribbean catchments. *Journal of the North American Benthological Society* 14: 12-20.
170. McGlade, J.M. 1999. Individual-based models in ecology. Pp.1-22 In: J.M. McGlade (ed.) *Advanced ecological theory: Principles and applications.* Blackwell Science, Malden, Massachusetts.
171. Meja-Nararro, M. and **E.E. Wohl.** Geographical hazard and risk evaluation using GIS: Methodology and model applied to Medellin, Colombia. *Bulletin of the Association of Engineering Geologists* 31: 459-481.

172. Meyer, J.L. 1997. Stream health: Incorporating the human dimension to advance stream ecology. *Journal of the North American Benthological Society* 16: 439-447.
173. Meyer, J.L. and J.B. Wallace. 2001. Lost linkages in lotic ecology: Rediscovering small streams. Pp. 295-317 In: M. Press, N. Huntly, and S. Levin (eds.) *Ecology: Achievement and challenge*. Blackwell Science, Boston.
174. Meyer, W.B. and B.L. Turner II (eds.) 1994. *Changes in land use and land cover: A global perspective*. Cambridge University Press, Cambridge, U.K. 537 pp.
175. Milne, B.T. 1998. Motivation and benefits of complex systems approaches in ecology. *Ecosystems* 1: 449-456.
176. Minar, N., R. Burhart, C. Langton, and M. Askenazi. 1998. The Swarm simulation system: A toolkit for building multi-agent simulations. Santa Fe Institute Working Paper 96-06-042 (<http://www.santafe.edu/projects/swarm/overview>.)
177. Molnár, P. and **J. A. Ramírez** . 2000. Optimality in energy expenditure and downstream hydraulic geometry on Ashley and Taieri Rivers, New Zealand. *Journal of Hydrology* (In press).
178. Molnár, P. and **J. A. Ramírez**, 1998a: Energy dissipation theories and optimal channel characteristics of river networks. *Water Resources Research* 34: 1809-1818.
179. Molnár, P. and **J. A. Ramírez**, 1998b: An analysis of energy expenditure and downstream hydraulic geometry at Goodwin Creek. *Water Resources Research* 34: 1819-1829.
180. Montgomery, D.R. 1994. Road surface drainage, channel initiation, and slope instability. *Water Resources Research* 30: 1925-1932.
181. Montgomery, D.R. 1999. Process domains and the river continuum. *Journal of the American Water Resources Association* 35: 397-410.
182. Montgomery, D.R. and J.M. Buffington. 1997. Channel-reach morphology in mountain drainage basins. *Geological Society of America Bulletin* 109: 596-611.
183. Muller, F., R. Hoffmann-Kroll, and H. Wiggering. 2000. Indicating ecosystem integrity-theoretical concepts and environmental requirements. *Ecological Modelling* 130: 13-23.
184. Naeem, S. 1998. Species redundancy and ecosystem reliability. *Conservation Biology* 18: 53-70.
185. Naeem, S., D.R. Hahn, and G. Schuurman. 2000. Producer-decomposer co-dependency influences biodiversity effects. *Nature* 403: 762-764.
186. Naiman, R.J. and H. DeCamps. 1997. The ecology of interfaces: Riparian zones. *Annual Review of Ecology and Systematics* 28: 621-658.
187. Nakamura, F., F.J. Swanson, and S.M. Wondzell. 2000. Disturbance regimes of stream and riparian systems: A disturbance -cascade perspective. *Hydrological Processes* 14: 2849-2860.

188. National Research Council. 1996. National Science Education Standards. National Research Council, Washington, D.C.
189. Nelson and Hellerstein, 1997
190. Nulden, U. 1999. Thematic modules in an asynchronous learning network: A Scandinavian perspective on the design of introductory courses. *Group Decision and Negotiation* 8: 391-408.
191. O'Connor, P, **A.P. Covich**, **F.N. Scatena**, and L.L. Loope. 2000. Non-indigenous bamboo along headwater streams of the Luquillo Mountains, Puerto Rico: Leaf fall, aquatic leaf decay and patterns of invasion. *Journal of Tropical Ecology* 16: 499-516.
192. Olander, L.P., **F.N Scatena**, and W.L. Silver. 1998. Impacts of disturbance initiated by road construction in a subtropical cloud forest in the Luquillo Experimental Forest, Puerto Rico. *Forest Ecology and Management* 109:33-49.
193. O'Neil, R.V. 1996. Recent developments in ecological theory: Hierarchy and scale. Pp.7-14 IN: J.M. Scott, T.H. Tear, and F.W Davis (eds.) *GAP analysis: A landscape approach to biodiversity planning*. American Society of Photogrammetry and Remote Sensing, Bethesda, Maryland.
194. O'Neil, R.V., R.H. Gardner, B.T. Milne, M.G. Turner, and B. Jackson. 1991. Heterogeneity and spatial hierarchies. Pp. 85-96 IN: J. Kolasa and S.T.A. Pickett (eds.) *Ecological heterogeneity*. Springer-Verlag, New York.
195. O'Sullivan, D. 2001. Exploring spatialprocess dynamics using irregular cellular automaton models. *Geographical Analysis* 33: 1-18.
196. Pahl-Wostl, C. 1998. Ecosystem organization across a continuum of scales: A comparative analysis of lakes and rivers. Pp.141-191 IN: D.L. Peterson and V.T. Parker (eds.) *Ecological scale: Theory and applications*. Columbia University Press, New York.
197. Palmer M.A., **A.P. Covich**, B.J. Findlay, J. Gibert , K.D. Hyde, R.K. Johnson, T. Kairesalo, S. Lake, C.R. Lovell, R.J. Naiman, C. Ricci, F. Sabatier, and D.L. Strayer. 1997. Biodiversity and ecosystem processes in freshwater sediments. *Ambio* 26: 571-577.
198. Palmer, M.A., **A.P. Covich**, S. Lake, P. Biro, J.J. Brooks, J. Cole, C. Dahm, J. Gibert, W. Goedkoop, J. Verhoeven, and W. J. Van De Bund. 2000. Linkages between aquatic sediment biota and life above sediments as potential drivers of biodiversity and ecological processes. *BioScience* 50: 1062-1075.
199. Parendes, L.A. and J.A. Jones. 2000. Role of light availability and dispersal in exotic plant invasion along roads and streams in the H.J. Andrews Experimental Forest. *Conservation Biology* 14: 64-85.
200. Patil, G.P., W.L. Myers, Z. Luo, G.D. Johnson, and C. Taille. 2000. Multiscale assessment of landscapes and watersheds with synoptic multivariate spatial data in environmental and ecological statistics. *Mathematical and Computer Modelling* 32: 257-272.

201. Pelletier, J.D. 1999. Self-organization and scaling relationships of evolving river networks. *Journal of Geophysical Research- Solid Earth* 104: (B4) 7359-7375.
202. Phillips, J.D. 1999. Divergence, convergence, and self-organization in landscapes. *Annals of the Association of American Geographers* 89: 466-488.
203. Pickett, S. T.A. 1999. The culture of synthesis: Habits of mind in novel ecological integration. *Oikos* 87: 479-487.
204. Pimm, S.L. 1982. *Food webs*. Chapman and Hall, London.
205. Pimm, S.L. 1991. *The balance of nature*. University of Chicago Press, Chicago.
206. Pimm, S.L. 1999. The dynamics of the flow of matter and energy. Pp.172--194 In: J.M. McGlade (ed.) *Advanced ecological theory: Principles and applications*. Blackwell Science, Malden, Massachusetts.
207. Polis, G.A., W.B. Anderson, and R.D. Holt. 1997. Toward an integration of landscape and food web ecology- the dynamics of spatially subsidized food webs. *Annual Review of Ecology and Systematics* 28: 289-316.
208. Post, D.A. and J.A. Jones. 2001. Hydrologic regimes of forested, mountainous, headwater basins in New Hampshire, North Carolina, Oregon, and Puerto Rico. *Advances in Water Resources*. (In press)
209. Power, M.E. 2001. Prey exchange between a stream and its forested watershed elevates predator densities in both habitats. *Proceedings of the National Academy of Sciences USA* 98:14-15.
210. Power, M.E., M.S. Parker, and J.T. Wootton. 1996. Disturbance and food chain length in rivers. Pg. 286-297 IN: G.A. Polis and K.O. Winemiller (eds.), *Food webs: Integration of patterns and dynamics*. Chapman and Hall, New York, New York, USA.
211. Pringle, C.M., G.A. Blake, **A.P. Covich**, K.M. Buzby, and A. Finley. 1993. Effects of omnivorous shrimp in a montane tropical stream: Sediment removal, disturbance of sessile invertebrates and enhancement of understory algal biomass. *Oecologia* 93: 1-11.
212. Pringle, C.M. and T. Hamazaki. 1998. The role of omnivory in a Neotropical stream: Separating diurnal and nocturnal effects. *Ecology* 79: 269-280.

213. Pringle, C.M., N. Hemphill, W.H. McDowell, A. Bednarek, and J.G. March. 1999. Linking species and ecosystems: Different biotic assemblages cause interstream differences in organic matter. *Ecology* 80: 1860-1872.
214. Pringle, C.M. and **F.N. Scatena**. 1999. Aquatic ecosystem deterioration in Latin America and the Caribbean. Pp. 104-111 IN: L. U. Hatch and M.E. Swisher (eds.), *Managed ecosystems: The MesoAmerican experience*, Oxford University Press, New York.
215. Pringle, C.M., M.C. Freeman, and B.J. Freeman. 2000. Regional effects of hydrologic alterations on riverine macrobiota in the new world: Tropical –temperate comparisons. *BioScience* 47: 769-784.
216. Puckridge, J.T., F. Sheldon, K.F. Walker, and A.J. Boulton. 1998. Flow variability and the ecology of large rivers. *Marine and Freshwater Research* 49: 55-72.
217. Pyron, M., **A.P. Covich**, and R.W. Black. 1999. On the relative importance of pool morphology and woody debris to distributions of shrimp in a Puerto Rican headwater stream. *Hydrobiologia* 405: 207-215.
218. Quinn, P., F. Gallart, J. Llatron, and K. Russell. 1998. Nesting localized patch models and data within catchment models and data. Pp.275-281. IN: *Hydrology, Water Resources and Ecology in Headwaters* IAHS Publication.
219. Railsback, S.F. 2001. Concepts from complex adaptive systems as a framework for individual-based modelling. *Ecological Modelling* 139: 47-62.
220. Railsback, S.F., R.H. Lamberson, B.C. Harvey, and W.E. Duffy. 1999. Movement rules for individual-based models of stream fish. *Ecological Modeling* 123: 73-89.
221. Ricciardi, A. and J.B. Rasmussen. 1998. Predicting the identity of future biological invaders: A priority for aquatic resource management. *Canadian Journal of Fisheries and Aquatic Sciences* 55: 1759-1765.
222. Rinaldo, A. 1999. Hydraulic networks in nature. *Journal of Hydraulic Research* 37: 847-859.
223. Rinaldo, A., I. Rodriguez, and R. Rigon. 1998. Channel networks. *Annual Review of Earth and Planetary Sciences* 26: 289-327.
224. Rodriguez-Iturbe, I. and A. Rinaldo. 1997. *Fractal river basins: Chance and self-organization*. Cambridge University Press, New York.
225. Rollings, N.M. and D.J. Brunckhorst. 1999. Linking ecological and social functions of landscape: II. Scale and modeling of spatial influence. *Natural Areas Journal* 18: 65-72.

226. Santos-Roman, D.M. 1999. Multivariate analysis of water quality and physical characteristics of selected watersheds in Puerto Rico. M.S. Thesis, University of Connecticut, Storrs. 220 pp.
227. **Sasaki, Y. and Box, P. W. (2002). An agent-based exploration of von Thünen's location theory. *Journal of Artificial Societies and Social Simulation*. Tentative publication in October 2002.**
228. **Scatena, F.N.** 1989. An introduction to the physiography and history of the Bisley Experimental Watersheds in the Luquillo Mountains of Puerto Rico. General Technical Publication SO-72, Southern Forest Experiment Station, USDA Forest Service, New Orleans, LA.
229. **Scatena, F.N.** 1990a. Culvert flow in small drainages in montane tropical forests: Observations from the Luquillo Experimental Forest of Puerto Rico. Pp. 237-245 IN: Tropical Hydrology and Caribbean Water Resources, American Water Resources Association, Middleburg, VA.
230. **Scatena, F.N.** 1990b. Selection of riparian buffer zones in humid tropical steeplands. Pp. 328-337 IN: Research needs and applications to reduce erosion and sedimentation in tropical steeplands. IASH-AISH Publication 192.
231. **Scatena, F.N.** 1995. Relative scales of time and effectiveness of watershed processes in a tropical montane rain forest of Puerto Rico. American Geophysical Union Geophysical Monographs 98: 103-111.
232. **Scatena, F.N.** and A.E. Lugo. 1995. Geomorphology, disturbance, and the soil and vegetation of two subtropical wet steepland watersheds of Puerto Rico. Geomorphology 13: 199-213.

233. **Scatena, F.N.** and S.L. Johnson. 2001. Instream flow analysis of the Luquillo Experimental Forest, Puerto Rico: Methods and analysis. General Technical Report IITF-GTR-11. USDA International Institute of Tropical Forestry, USDA Forest Service, Rio Piedras, Puerto Rico, 30 pp.
234. **Scatena, F.N.** In press. Geomorphic hierarchies and the vegetation of humid tropical forests in Latin America. In: M. Guariguata and G. Kattan (eds.) *Ecología de bosque lluvioso Neotropical*. Editorial Agroamerica, San Jose, Costa Rica.
235. **Scatena, F.N.,** S. Doherty, H.T. Odum, and P. Karecha. 2002. Emergy evaluation of Puerto Rico and the Luquillo Experimental Forest. USDA Forest Service General Technical Report. Rio Piedras, Puerto Rico. (In press).
236. Schellekens, J., L.A. Brunijnzeel, F.N. Scatena, N.J. Bink, and F. Holwerda. 2000. Evaporation from a tropical rain forest, Luquillo Experimental Forest, eastern Puerto Rico. *Water Resources Research* 36: 2183-2196.
237. Schneiderman, B., E.Y. Borkowski, M. Alvai, and K. Norman. 1998. Emergent patterns of teaching / learning in electronic classrooms. *Educational Technology Research and Development* 46: 23-42.
238. Shin, Y.J. and P. Cury. 2001. Exploring fish community dynamics through size-dependent trophic interactions using a spatialized individual-based model. *Aquatic Living Resources* 14: 65-80.
239. Simon, A., M.C. Larsen, and C.R. Hupp. 1990. The role of soil processes in determining mechanisms of slope failure and hillslope development in a humid-tropical forest, eastern Puerto Rico. *Geomorphology* 3: 263-286.
240. Spellerberg, I.F. 1998. Ecological effects of road and traffic: A review. *Global Ecology and Biogeography Letters* 7: 317-333.
241. Stefansson, B. 2000. Simulating economic agents in Swarm. Pp. 3-61 In: Luna, F. and B. Stefansson (eds.). *Economic simulations in Swarm: Agent-based modeling and object oriented programming*. Kluwer Academic Publishing, Boston.
242. Strahler, A.N. 1964. Quantitative geomorphology of drainage basins and channel networks, section 4-II. Pages 4-39 in V. T. Chow, editor. *Handbook of Applied Hydrology*. McGraw-Hill, New York.

243. Takemon, Y. 1997. Management of biodiversity in aquatic ecosystems: Dynamic aspects of habitat complexity in stream ecosystems. Pp. 259-275. IN: T. Abe, S.A. Levin, and M. Higashi (eds.) Biodiversity: An ecological perspective. Springer-Verlag, New York.
244. Talling, P.J. 2000. Self-organization of river networks to threshold states. *Water Resources Research* 36: 1119-1128.
245. Tesfatsion, L. 2002. Agent Based Computational Economics. ISU Working paper #1. Dept. of Economics, Iowa State University, Ames, IA.
246. Thill, J.-C. 2000. Geographic information systems in transportation research. Pergamon Press, New York.
247. Thoennessean, M., E. Kashy, Y. Tsai, and N.E. Davis. 1999. Impact of asynchronous learning networks in large lecture classes. *Group Decision and Negotiation* 8: 371-384.
248. Thomlinson, J.R. and L.Y. Rivera. 2000. Suburban growth in Luquillo, Puerto Rico: Some consequences of development of natural and semi-natural systems. *Landscape and Urban Planning* 49: 15-23.
249. Thompson, R.M. and C.R. Townsend. 1999. The effect of seasonal variation on the community structure and food-web attributes of two streams: Implications for food-web science. *Oikos* 87: 75-88.
250. Tomlin, C.D. 1990. Geographic information systems and cartographic modeling. Prentice-Hall, Englewood Cliffs, N.J.
251. Trombulak, S.C. and C.A. Frissell. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. *Conservation Biology* 14: 18-30.
252. Tucker, G.E., F. Catani, A. Rinaldo, and R.L. Bras. 2001. Statistical analysis of drainage density from digital terrain data. *Geomorphology* 36: 187-202.
253. Turner, B.L., II, W.C. Clark, R.W. Kates, J.F. Richards, J.T. Mathews, and W.B. Meyer (Eds.). 1990. *The Earth as transformed by human action: Global and regional changes in the biosphere over the past 300 years*. Cambridge University Press, Cambridge, U.K.
254. U.S. General Accounting Office. 2001. Land management agencies: Restoring fish passage through culverts on Forest Service and BLM lands in Oregon and Washington Could Take Decades. GAO-02-136. Washington D.C.
255. Unwin, D.J. 1996. GIS, spatial analysis and spatial statistics. *Progress in Human Geography* 20: 540-551.
256. Unwin, A. and D. Unwin. 1998. Exploratory spatial data analysis with local statistics. *Journal of the Royal Statistical Society series D- The Statistician* 47: 415-421.
257. Van Driel, J.H., D. Beijaard, and N. Verloop. 2001. Professional development and reform in science education: The role of teacher's practical knowledge. *Journal of Research in Science Teaching* 38: 137-158.

258. Van Winkle, W., H.I. Jager, S.F. Railsback, B.D. Holcomb, T. Studley, and J. Baldrige. 1998. Individual-based model of sympatric populations of brown and rainbow trout for instream flow assessment: Model description and calibration. *Ecological Modeling* 110:175-207.
259. Vannote, R.L., G.W. Minshall, K.W. Cummins, J.R. Sedell, and C.E. Cushing. 1980. The river continuum concept. *Canadian Journal of Fisheries and Aquatic Sciences* 37: 130-137.
260. Veneziano, D. and J.D. Niemann. 2000a. Self-similarity and multifractality of fluvial topography: 1. Mathematical conditions and physical origin. *Water Resources Research* 36: 1923-1936.
261. Veneziano, D. and J.D. Niemann. 2000b. Self-similarity and multifractality of fluvial topography: 2. Scaling properties. *Water Resources Research* 36: 1937-1951.
262. Vitousek, P.M., H.A. Mooney, J. Lubchenco, and J.M. Melillo. 1997. Human domination of Earth's ecosystems. *Science* 277: 494-499.
263. Vogt, K.A., D.J. Vogt, P. Boon, **A. P. Covich**, **F.N. Scatena**, H. Asbjornsen, J.L. O'Hara, J. Perez, T.G. Siccama, J. Bloomfield, and J.F. Ranciato. 1996. Litter dynamics along stream, riparian and upslope areas following Hurricane Hugo, Luquillo Experimental Forest, Puerto Rico. *Biotropica* 28: 458-470.
264. Wagner, A. 1999. Causality in complex systems. *Biology and Philosophy* 14: 83-101.
265. Waldrop, M.M. 1992. *Complexity: The emerging science at the edge of order and chaos*. Simon & Schuster, New York. 380 pp.
266. Waters, T.F. 1995. *Sediment in streams. Sources, biological effects and control*. American Fisheries Society Monograph 7. Bethesda, Maryland.
267. Wemple, B.C., J.A. Jones, and G.E. Grant. 1996. Channel network extension by logging roads in two basins, western Cascades, Oregon. *Water Resources Bulletin* 32: 1195-1207.
268. Wemple, B.C., F.J. Swanson, and J.A. Jones. 2001. Forest roads and geomorphic process interactions, Cascade Range, Oregon. *Earth Surface Processes and Landforms* 26:191-204.
269. Westervelt, J.D. and L.D. Hopkins. 1999. Modeling mobile individuals in dynamic landscapes. *International Journal of Geographic Information Science* 13: 191-208.
270. Wickham, J.D. R.V. O'Neill, and K.B. Jones. 2000. A geography of ecosystem vulnerability. *Landscape Ecology* 15: 495-504.
271. Wilkie, D., E. Shaw, F. Rotberg, G. Morelli, and P. Auzel. 2000. Roads, development, and conservation in the Congo basin. *Conservation Biology* 14: 1614-1622.
272. Wilson, M.A. and S.R. Carpenter. 1999. Economic valuation of freshwater ecosystem services in the United States: 1971-1997. *Ecological Application* 9: 772-783.
273. **Wohl, E.E.** 2000. *Mountain rivers*. American Geophysical Union Press, Washington, D.C., 320 pp.

274. Wood, P.J., and P.D. Armitage. 1997. Biological effects of fine sediment in lotic environments. *Environmental Management* 21: 203-217.
275. Young, K.R. 1994. Roads and the environmental degradation of tropical montane forests. *Conservation Biology* 8: 972-976.
276. Ziegler, A.D. and T.W. Giambelluca. 1997. Importance of rural roads as source areas for runoff in mountainous areas of northern Thailand. *Journal of Hydrology* 196: 204-222.
277. Ziegler, A.D. , A.D. Sutherland, and T.W. Giambelluca. 2000. Runoff generation and sediment production on unpaved roads, footpaths and agricultural land surfaces in northern Thailand. *Earth Surface Processes and Landforms* 25: 519-534.
278. Ziegler, A.D., T.W. Giambelluca, and T.W. Sutherland. 2001. Erosion prediction on unpaved mountain roads in northern Thailand: Validation of dynamic erodibility modelling using KINEROS2. *Hydrological Processes* 15: 337-358.