Charles A. S. Hall
354 Illick Hall
SUNY College of Environmental Science and Forestry
One Forestry Drive, Syracuse, NY 13210
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CURRICULUM VITAE July 2017

EDUCATION

B.A. Colgate University, Hamilton, NY, Biology 1965 (Advisor: Oran Stanley)
M.S. Pennsylvania State University, Univ. Park PA, Zoology 1966 (Advisor: William Cooper)
Ph.D. University of North Carolina, Chapel Hill NC, Zoology 1970 (Advisor: H. T. Odum)

PROFESSIONAL POSITIONS (Post Ph.D.)

1970 - 1974 Research Associate, Staff Scientist II (half time), Department of Biology, Brookhaven National Laboratory, Upton, NY (Director: George Woodwell)

1975 - 1977 Research Scientist II (half-time), The Ecosystems Center, Marine Biological Laboratory, Woods Hole, MA (Director: George Woodwell)

1972 - 1985 Visiting Assistant Professor, Assistant Professor, Section of Ecology and Systematics, Cornell University, Ithaca, NY

1985 - 1987 Research Associate Professor, Biological Station and Department of Zoology, University of Montana, Yellow Bay and Missoula, MT

1987-1992 Associate Professor, SUNY College of Environmental Science and Forestry, Syracuse, NY

1992 -2012 Professor, SUNY College of Environmental Science and Forestry, Syracuse, NY

2001 -2012 ESF Foundation Distinguished Professor, SUNY College of Environmental Science and Forestry, Syracuse, NY

2012 (June) - Professor Emeritus, SUNY ESF

PROFESSIONAL INTERESTS AND GOALS

I have passed 70 and have reached the end of my life as a full time professor. My wife and I have purchased a very nice home on Flathead Lake, Montana and are enjoying being retired in one of the World's most beautiful and interesting places. I had been teaching 5 courses and a seminar for years and I do not have the energy I once had. Even in retirement I have been averaging a new publication every month or two and giving many talks, so I guess I am not

ready to be finished yet. My work will be increasingly oriented toward consolidating and archiving what I have built so that others can use what I and those I have worked with have accomplished.

My research has focused mostly on energy, with, in my final years as a professor, a good grant from the UK Department of International Development helping me to accomplish this and getting my last graduate students finished up. As the world increasingly experiences the effects of the depletion of cheap energy, interest in my work seems to have increased dramatically. In retrospect I am glad that I kept my underlying focus on energy even though I found it impossible to get much funding for that work until recently (although I got lots of money for other things I thought less important). I am especially interested in understanding the effects of peak oil and declining EROI on economic growth and possibilities, and how that might play out in the developing world. Many of these issues come full circle to the limits to growth arguments that fascinated me in graduate school. A critical issue is to determine how, if the pie is no longer getting larger, the remaining pie should be sliced. This is a political issue outside the bailiwick of my professional research, but one that requires good scientific analyses which I hope to contribute to.

There are two particular areas where this research coalesces: EROI analysis and the development of biophysical economics. As conventional sources of high grade energy falter energy companies turn increasingly to lower grade resources, often expressing the hope that new technologies will somehow make the exhaustion of our traditional resources unimportant. Thus it becomes important to examine the EROI of these new resources as well as to determine how that may change as these resources. This we are doing. The second area has to do with the kind of economics we teach young people and that we utilize to run our economy. All of our economic and financial theories were derived during periods of expanding energy availability. Now as we enter the time of cessation of growth in the availability of high quality energy (and the associated decline in economic growth) these theories are not working so well. What economic theories will be appropriate for periods of constricting energy availability? Another way to ask this question is "If real day to day economics is about stuff (food on the table, a roof over our heads, things we buy) why in the world is economics taught and undertaken today as (only) a social science rather than as a biophysical science? Thus one of my major research foci is the development of Biophysical economics. The development of the International Society of BioPhysical Economics with their now eight more or less annual meetings is one sign of the growing interest in these issues. Another is the many high quality books we have been able to encourage at

Springer including Nafeez Ahmed's "Failing States, Collapsing Systems: BioPhysical Triggers of Political Violence"; Alice Freidemann's "When trucks stop running" ; and June Sekera's "The Public Economy in Crisis" (not to mention many other fine books, including my own).

We are consolidating all of our teaching materials (syllabi, lecture recordings, power points and so on) on the site maintained by the New Economic Teaching Initiative and maintained by my former student and associate Jessica Lambert. We encourage anyone interested in teaching Biophysical economics as well as courses in global environment, energy, ecosystems or systems ecology to visit this site. There is also "advice for young professors" and other helpful materials for teachers.

HONORS

AAAS Fellow
Fulbright Fellow (Argentina)
Guest of honor, National Universities of Argentina
Outstanding Publication Award from both National Wildlife Federation and the University of Illinois Sigma Xi for:

> Cleveland, C.J., R. Costanza, C.A.S. Hall and R. Kaufmann. 1984. Energy and the United States Economy: a biophysical perspective. Science 225:890-897. (Note: Cleveland and Kaufmann were once my students.)

Moore Lecturer, University of Virginia Department of Environmental Sciences
100 Outstanding World Scientists of 2004
Who's Who in the United States
Who's Who of Emerging Leaders in America
Who's Who in American University Teaching
Who's Who in the West
Who's Who in American Science and Technology
American Men and Women of Science
Captain, Glenwood Pines Hockey Team 1979-1985
The ESF Foundation Award for Exceptional Achievement in Teaching- ESF College Foundation
Hubbert-Simmons award from the U.S. Association for the study of Peak Oil for excellence in Energy Education
SUNY Chancellor's Award for Creative Research
Lifetime Achievement Award from the International Society for BioPhysical Economics
10th Anniversary Best Paper published in the Journal Energies for Hall, Murphy and Balogh: "What is the Minimum EROI that a Sustainable Society Must Have?"

MAJOR STUDENT AWARDS

Anna Stewart:
SUNY ESF Alumni Memorial Scholar. 2011.
International Student Leadership Award of the International Center of Syracuse. 2010.
SUNY ESF Leroy C. Stegeman Award in Invertebrate Ecology. 2010.

Honorable Mention, National Science Foundation Graduate Research Fellowship Program. 2009.
Emerging Public Policy Leader Award, American Institute of Biological Sciences. 2009.
Outstanding Student Research in Ecology Award, Ecological Society of America. 2009.
Best Poster, American Institute of Biological Sciences Annual Conference on "Climate, Environment and Infectious Diseases." 2008.

Paul Detwiler (Ph.D., Cornell 1986) received the "Outstanding Graduate Student Publication" award from the Section of Ecology and Systematics at Cornell University for his publication entitled, "Land use change and the global carbon cycle: the role of soils" [Biogeochemistry 2:67-93] that was a chapter in his dissertation.

Peter Rand (M.S. 1990, ESF) received the outstanding Sea Grant paper award for "Factors limiting primary productivity in Lake Ontario tributaries receiving salmon migrations".

Ye Qi (Ph.D. 1994, ESF) received one (of only four nationally) NOAA Climate Change Postdoctoral Fellowships.

My student, Jerry Mead, has received a number of "outstanding papers" awards from the Great Lakes Research Consortium.
David Murphy, Outstanding Graduate Research Award

Also most of my graduate students get outstanding positions at major universities and NGOs in the U.S. and abroad. I am proud of every one of them!

PROFESSIONAL ASSOCIATION MEMBERSHIPS

Ecological Society of America
American Association for the Advancement of Science (Fellow)
International Society for Ecological Economics
Association Study of Peak Oil
Institute for New Economics
International Society for BioPhysical Economics

PROFESSIONAL ASSOCIATION SERVICE

Ecological Society of America: Member of Council and Representative to AAAS (1977-1990)
American Association for the Advancement of Science: Member of Section W: Atmospheric and Hydrospheric Sciences (1977-1990)

Biogeochemistry:	Editorial Board (1984-1989)
Ecological Economics:	Editorial Board (1989-present)
Conservation Biology:	Editorial Board (1985-1991)
Population and resources	Editorial Board (2000-present)
Institute for Integrated Economic Research	Scientific Advisory Panel (2010-present)

Founded and led International society for BioPhysical Economics: 2000-2018

INTERNATIONAL EXPERIENCE

1965 Colgate University Tropical Ecology Course, Ocho Rios, Jamaica
1972 Invited external reviewer, Bahia Jobos Nuclear Power Plant environmental assessment, Puerto Rico
1973 Invited lecturer, University of Stockholm, Sweden and Max Plank Institute for Limnology, Schlitz, Germany
1977 Research project meeting and field trips for project, "The role of tropical forests in the global carbon cycle," Costa Rica
1982 Invited participant, Wallenberg Foundation symposium on environment and economics, Stockholm
1982 Reviewer for U.S. Department of Energy - quality of tropical forest data, FAO, Rome, Italy
1984 Invited researcher, CATIE, Turrialba, Costa Rica Project: Energy and Central American Agriculture
1984 Co-principal teacher, Agroecology and modeling course, Nanjing University, Nanjing, China
1986 Fulbright Fellow and principal teacher for Agroecology and Modeling course, University of Buenos Aires, Argentina. Invited lecturer, Bariloche Institute
1986 Invited lecturer, FAO, Rome. Informal computer consultant, various institutes in Italy
1986 Invited lecturer, University of Stockholm, Sweden
1986 Invited lecturer, University of Oslo, Norway
1987 Invited speaker, IX International Conference of Tropical Ecology and the rehabilitation of disturbed ecosystems, Varnasi, India
1988 - 2006 Participant, LTER Research, Luquillo Forest, Puerto Rico
1988 Invited speaker, International Energy Agency conference on biomass energy, Garpenberg, Sweden
1989 Invited speaker, German Parliament (West Berlin) on tropical deforestation
1990 - 1995 Invited speaker, LTER Annual Meeting, Rio Piedras, Puerto Rico
1990 Invited main speaker, Seminario Internacional Sobre Economia y Ecologia, CATIE, Turrialba, Costa Rica
1991 Invited Plenary Speaker, Simposio Nacional Agricultura Sostenible, Mexico City
1992 European Union sponsored meeting, Invited speaker, Nagu Finland
1992 Invited Teacher, Common Market Advanced Education Program, Priority setting in environmental management, Urbino, Italy
1993 Co-taught geographical modeling course Unam & UAM, Mexico City(w/ M. Hall)
1995 Co-taught geographical modeling course - Instituto de Ecologia, Jalapa, Mexico
1994-95 Sabbatical at CATIE, Turrialba, Costa Rica
1998, 1999 Co-taught geographical modeling course – Universidad de Rio Cuarto, Cordoba, Argentina (with M. Hall)
2002 Co-taught geographical modeling course – Univ. de Juan Misael Saracho, Tarija, Bolivia (w/ M. Hall)
1998 & 2000 Attendee and Presenter, Conference on Energy and Environment, Puerto Venere, Italy

1999	Director, Symposium on analysis of effectiveness of development using geographical tools, San Jose, Costa Rica
2000	Invited plenary speaker (two papers) UNESCO Symposium on forests, water and people. Kuala Lumpur, Malaysia
2003	Invited participant in conference on emerging ecosystems. Brazilia, Brazil
2004	Research advisor for Mercy Borbor (Ecuador) –visited and advised in Ecuador
2004	Attendee and Plenary speaker for International meeting on advances in energy Research, Campinas Brazil
2004	Plenary Speaker, Conference on joint SUNY – Moscow State interactions, Moscow, Russia
2005	Plenary speaker, Association for the Study of Peak Oil. Lisbon, Portugal.
2005	Plenary Speaker, Chinese Academy Sciences Symposium on development Beijing
2005	Presenter: Chinese Normal University, Xinhua University, Shanghai University, Nanjing University, Nanjing Normal University
2005	Co-taught geographical modeling course – Universidad de Rio Cuarto, Cordoba, Argentina (with M. Hall)
2009	Co-taught geographical modeling course – Universidad de Rio Cuarto, Cordoba, Argentina (with M. Hall)

SELECTED PROFESSIONAL ACTIVITIES

1971-74	Participant, power plant environmental impact modeling studies, U.S. Atomic Energy Agency
1973	Participant, Symposium on external costs of energy production, U.S. Atomic Energy Agency
1974	Witness, Federal Power Commission Hearings: Indian Point Nuclear Plant Licensing
1975 - 1976	Member, NAS Panel: Environmental impact of resource management
1975	Member, NAS Panel: Global cycle of carbon
1976	Invited Participant, UNESCO Conference on the role of coastal lagoons, Duke University Marine Lab
1978	External reviewer for Sea Grant research program, University of Rhode Island
1979	Session Chairman, National Sea Grant Review, Baton Rouge, LA
1978 - 1984	Participant, U.S. Department of Energy Carbon Cycle Reviews
1979	Invited Speaker, Symposium on the role of tropical forests in the global carbon cycle, Rio Piedras, Puerto Rico
1980	Invited participant, Woods Hole Conference on options for the Hudson River power plants (this conference was a contributing factor in designing the settlement to the Hudson River power plant controversies: see NY Times, Dec. 20, 1908, page 1 and lead editorial)
1981	Our science paper, "Petroleum production and drilling in the United States: Yield per effort and energy return on investment" reported on page 1 of Wall Street Journal, Feb. 7, 1981 (Followed by many very interesting phone calls)
1982 - 1983	External Reviewer, Center for Complex Systems, University of New Hampshire
1984	Organizer and session chairman, AAAS Symposium "The role of the biota in the global carbon cycle"
1987	Organizer and chairman for ISEM-ESA conference on "Evaluating the role of theoretical models in ecology"

1987 - 1990	Participant in workshops on assessing and a modeling disturbance in tropical ecosystems
1991	Invited participant in NCAR Symposium on climate change and hydrology
1991	Invited plenary speaker at International symposium on agriculture and the environment, Ohio State
1992	Invited plenary speaker, International Society for the System Sciences, University of Denver
1995	Invited plenary speaker, International Society for Ecological Economics, Boston University
1999	Invited plenary speaker, International Society for Ecological Economics, Washington D. C.
2003	Sabbatical, University of Montana Biological Station
2005	Plenary Speaker, U.S. Chapter of ASPO (Association for the study of Peak Oil, Denver)
2005	
Various	Invited speaker, ESA, ISEM, AFS, AGU and many other meetings

(need to update but I am speaking frequently even in retirement)

INVITED LECTURER

I no longer keep track of individual lectures but I am asked to speak at major Universities about half a dozen times a year. Cumulatively I have spoken at the majority of the State Land Grant or Equivalent Universities, a majority of the Ivy League Universities, a majority of the major Canadian Universities and a large number of private liberal arts and engineering universities.

PUBLICATIONS OF CHARLES A.S. HALL {Chronological} as of July 2017.

Books are in bold.

*= "Flagship" or most important publications (in my view). Most of these are available as PDF files on my website. If you read them and like or don't like them please send me a brief response chall@syr.edu.

1969

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1. Hall, C.A.S. 1969. Mortality of the mayfly nymph, Ephemerella rotunda, at low dissolved oxygen concentrations. J. Elisha Mitchell Sci. Soc. 85(1): 34-39 (M.S. Thesis, Pennsylvania State University, 1966).

1970

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2. Manny, B.A. and C.A.S. Hall. 1970. Diurnal changes in stratification and dissolved oxygen in the surface waters of Lake Michigan. Pages 622 - 634 in Proceedings of the 12th Conference on Great Lakes Research. International Association for Great Lakes Research.

1971

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3. Hall, C.A.S. 1971. Preserving and enhancing the qualities of the waters of North Carolina. ESE Notes (Department of Environmental Science and Engineering) 8 (1): 1-2.

4. Woodwell, G.M. and C.A.S. Hall. 1971. The ecological effects of energy: a basis for policy in regional planning. Pages 50-58 in M.D. Goldberg, ed. Energy, Environment and Planning: The Long Island Sound Region. Proceedings of a Conference held at Brookhaven National Laboratory, October 1971.

1972

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5. *Hall, C.A.S. 1972. Migration and metabolism in a temperate stream ecosystem. Ecology 53 (4): 585-604. (Ph.D. Thesis, University of North Carolina, Chapel Hill, 1970).

6. Motten, A.F. and C.A.S. Hall. 1972. Edaphic factors override a possible gradient of ecological maturity indices in a small stream. Limnol. Oceanogr. 17 (6): 922-926.

7. Woodwell, G.M., P.H. Rich and C.A.S. Hall. 1972. Carbon in estuaries. Pages 221-240 in G.M. Woodwell and E.V. Pecan, eds. Carbon and the Biosphere. Brookhaven Symposium in Biology 24.

8. (Review) Hall, C.A.S. 1972. Aquatic biology and water pollution. Review of Biology and Water Pollution Control, by C.E. Warren and P. Doudoroff. Ecology 53 (2): 371-372.

9. (Review) Levin, S.A. and C.A.S. Hall. 1972. Systems Analysis and Simulation in Ecology, Vol. 1 edited by B.C. Patten. Biometrics 29: 832-833.

10. (Review) Hall, C.A.S. 1972. Ecology of Salt Marshes and Sand Dunes, by D.S. Ranwell. Trans. Am. Fish. Soc. 103 (2): 417-418.

1975

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11. Hall, C.A.S. 1975. The Biosphere, the Industriosphere and their Interactions. Bull. At. Sci. 31: 11-21.

12. Hall, C.A.S. 1975. Models and the decision-making process: The Hudson River power plant case. Pages 203-218 in S.A. Levin, ed. Ecosystems Analysis and Prediction. Proceedings of a Conference on Ecosystems, Alta, Utah, July 1974. Reprinted in Models as a Ecological Tools: Theory and Case Histories (Hall and Day, eds.)

13. Hall, C.A.S., C. Ekdahl and D. Wartenberg. 1975. A fifteen-year record of biotic metabolism in the Northern hemisphere. Nature 255: 136-138.

14. Hall, C.A.S. and R. Moll. 1975. Methods of assessing aquatic primary productivity. Pages 19-54 in H. Lieth and R.H. Whittaker, eds. The Primary Productivity of the Biosphere. Springer-Verlag, New York.

15. (Review) Hall, C.A.S. 1975. Electric Power Plants in the Coastal Zone: Environmental Issues, by J. Clark and W. Brownell. Trans. Am. Fish. Soc. 104: 418-420.

1976

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16. Haedrich, R.L. and C.A.S. Hall. 1976. Fishes and Estuaries. Oceanus 19 (5): 55-63.

17. Hall, C.A.S. 1976. Notes on the population biology ecosystem biology interface. Pages 37-40 in S.A. Levin, Ed. Ecological Theory and Ecosystems Models. The Institute of Ecology.

18. Hall, C.A.S. The implications of future energy supplies for environmental management. 1976. Env. Mgment. 1: 5-7.

19. Peterson, B.J., C.A.S. Hall, J.P. Reed, and T. Wood. 1976. Comparative respiration of Cape Cod ecosystems. Biol. Bull. 151 (2): 424.

20. (Review) Hall, C.A.S. and S.E.M. Bayley. 1976. The structure of Marine Ecosystems, by J.H. Steele. Trans. Am. Fish. Soc. 76: 825-826.

1977

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21. Hall, C.A.S., G. Rowe, J.H. Ryther and G.M. Woodwell. 1977. Acid rain, zooplankton fecal pellets and the global carbon cycle. Biol. Bull. 153: 427-428.

22. Woodwell, G.M., D.E. Whitney, C.A.S. Hall, and R. Houghton. 1977. The Flax Pond ecosystem study: exchanges of carbon in water between a salt marsh and Long Island Sound. Limnol. Oceanogr. 22 (5): 833-838.

23. Hall, C.A.S. 1977. Models and the decision making process: The Hudson River power plant case. Pages 345-364 in C.A.S. Hall and J. Day, eds. Models as Ecological Tools: Theory and Case Histories. Wiley Interscience, New York. 684 pp.

24. Hall, C.A.S. and J. Day. 1977. Systems and models: Terms and basic principles. Pages 5-36 in C.A.S. Hall and J. Day, eds. Model as Ecological Tools: Theory and Case Histories. Wiley Interscience, New York. 664 pp.

25. Hall, C.A.S., J. Day and H.T. Odum. 1977. A circuit language for energy and matter. Pages 37-48 in C.A.S. Hall and J. Day, eds. Models as Ecological Tools: Theory and Case Histories. Wiley Interscience, New York. 684 pp.

26. Wartenberg, D. and C.A.S. Hall. 1977. A simulation that failed: The biospheric productivity model. Pages 365-380 in C.A.S. Hall and J. Day, eds. Models as Ecological Tools: Theory and Case Histories, Wiley Interscience, New York. 684 pp.

27. Hall, C.A.S. and J.W. Day (eds.) 1977. **Ecosystem modeling in theory and practice. An introduction with case histories.** Wiley Interscience, NY. 684 pp. (First one quarter translated into Chinese).

1978

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28. Hall, C.A.S., R. Howarth, B. Moore, and C. Vorosmarty. 1978. Environmental impacts of industrial energy systems in the coastal zone. Annual Rev. of Energy 3: 395-475.

29. Howarth, Robert W. and C.A.S. Hall. 1978. What do you want to do with your last 27,000 gallons of oil? Human Ecology Forum. 8 (3): 2-5.

1979

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30. Hall, C.A.S., N. Tempel and B. Peterson. 1979. A benthic chamber for intensely metabolic lotic systems. Estuaries 2: 178-183.

31. Hall, C.A.S., M. Lavine and J. Sloane. 1979. Efficiency of energy delivery systems: Part I. An economic and energy analysis. Environ. Mgment. 3 (6): 493-504.

32. Hall, C.A.S., E. Kaufmann, S. Walker and D. Yen. 1979. Efficiency of energy delivery systems: Part II. Estimating energy costs of capital equipment. Environ. Mgment. 3 (6): 505-510.

33. Sloane, J., C.A.S. Hall and L. Fisher. 1979. Efficiency of energy delivery systems: Part III. Assessing potential savings through a comprehensive regional insulation program. Environ. Mgment. 3 (6): 511-515.

34. Woodwell, G.M., C.A.S. Hall, D.E. Whitney and R.A. Houghton. 1979. The Flax Pond ecosystem study: Exchanges of inorganic nitrogen between an estuarine marsh and Long Island Sound. Ecology 60: 695-702.

35. Woodwell, G.M., C.A.S. Hall, D.E. Whitney, R.A. Houghton and R.A. Moll. 1979. The Flax Pond ecosystem study: The annual metabolism and nutrient budget of a salt marsh in R.L. Jeffries and A.J. Davy (eds.). Ecological Processes in Coastal Environments. Blackwell Scientific Publications, 1979, pp. 491-511.

1980

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36. Detwiler, R.P. and C.A.S. Hall. 1980. The development of an empirically-driven simulation model of carbon exchange between human-impacted tropical ecosystems and the atmosphere. pp. 140-156 in S. Brown, A. Lugo, and B. Liegel, eds. The role of tropical forests on the world carbon cycle. United States Department of Energy EV-78-S-05-6047.

37. Lugo, A.E., S. Brown and C.A.S. Hall. 1980. The role of tropical forests in the carbon balance of the world. In Lois E. Schmitt, ed. Proceedings of the Carbon Dioxide and Climate Research Program, U.S. Department of Energy UC-11, pp. 261-276.

38. (Review) Hall, C.A.S. and R.P. Detwiler. 1980. The Global Carbon Cycle by B. Bolin et al. Bioscience 30 (4): 266.

39. (Review) Hall, C.A.S. and S.A. Levin. 1980. An introduction to systems analysis: with ecological applications. University Park Press, Baltimore and Arnold, London, J.N.R. Jeffers. Trans. Amer. Fish. Soc. 109(5): 582-584.

1981

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40. *Hall, C.A.S. and C.J. Cleveland. 1981. Petroleum drilling and production in the United States: Yield per effort and net energy analysis. Science 211: 576-579.

41. Hall, C.A.S. and C. Cleveland. 1981. Oil exploration. Science (letters) 213: 1448-1450.

42. Detwiler, R.P., C.A.S. Hall, P. Bogdonoff, C. McVoy and S. Tartowski. 1981. The role of tropical land use change in the global carbon cycle: detailed analysis for Costa Rica and Panama and preliminary analysis for Peru and Bolivia, p. 69-92. in W. Mitsch (ed.), Energy and Ecological Modeling. Symp. Proc., Elsevier Publishing Co.

43. Hall, C.A.S., C. Cleveland and M. Berger. 1981. Energy return on investment for United States Petroleum, Coal and Uranium, p. 715-724. in W. Mitsch (ed.), Energy and Ecological Modeling. Symp. Proc., Elsevier Publishing Co.

44. Kaufmann, R. and C.A.S. Hall. 1981. Energy return on investment for imported petroleum, p. 697-702. in W. Mitsch (ed.), Global Dynamics of Biospheric Carbon. U.S. Department of Energy CO2 Research Series 19. Washington, D.C.

1982

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45. Detwiler, R.P., C.A.S. Hall and P. Bogdonoff. 1982. Simulating the impact of tropical land use changes on the exchange of carbon between vegetation and the atmosphere, p. 141-159. in S. Brown, (ed.), Global Dynamics of Biospheric Carbon. U.S. Department of Energy CO2 Research Series 19. Washington, D.C.

46. Boynton, W.R., C.A.S. Hall, P.G. Falkowski, C.W. Keefe, and W.M. Kemp. 1982. Phytoplankton productivity in aquatic ecosystems. Encyclopedia of Plant Physiology. New Series Vol. 12D. pp. 305-327.

47. (Review) Hall, C.A.S. 1982. Comparison of Forest Water and Energy Exchange Models, edited by S. Halldin, EOS 63 (12): 204.

1983

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48. Hall, C.A.S., C.J. Cleveland and R. Kaufmann. 1983. Time series analysis of the U.S. energy and economic data. Pp. 69-72. in A.M. Jansson (ed.) Proc. Wallenberg Symposium. Stockholm.

49. Molofsky, J., E.S. Menges, C.A.S. Hall, T.V. Armentano and K. Ault. 1983. The effects of land use alterations on tropical carbon exchange. pp. 181-194. in T.N. Veziroglu (ed.), Miami International Symposium on the Biosphere, Elsevier Science Publishers.

1984

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50. *Cleveland, C.J., R. Costanza, C.A.S. Hall and R. Kaufmann. 1984. Energy and the United States economy: a biophysical perspective. Science 225: 890-897.

51. *Hall, C.A.S., R.P. Detwiler, P. Bogdonoff and S. Underhill. 1984. Land use change and carbon exchange in the tropics: I. Detailed estimates for Costa Rica, Panama, Peru, and Bolivia. Environ. Mgmnt. 9: 313-334. (Cover article).

52. Detwiler, R.P., C.A.S. Hall, and P. Bogdonoff. 1984. Land use change and carbon exchange in the tropics: II. Estimates for the entire region. Environ. Mgmnt. 9: 335-344.

53. Hall, C.A.S., R.P. Detwiler, P. Bogdonoff and S. Underhill. 1984. Land use change and carbon exchange in the tropics: III. Structure, basic equations and sensitivity analysis of the model. Environ. Mgmnt. 9: 339-346.

54. Hall, C.A.S. and D. DeAngeles. 1984. Models in Ecology: Paradigms found or paradigms lost? Bulletin of the Ecological Society of America 66: 339-346.

55. Cleveland, C.J., R. Costanza, C.A.S. Hall, and R. Kaufmann. 1984. Energy and economic activity. Science (letters) 230: 740.

1986

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56. Hall, C.A.S. 1984. The changing intellectual climate of fisheries management. Forum, Environ. Mgmnt. 10: 577-580.

57. Molofsky, J., C.A.S. Hall and N. Myers. 1984. A comparison of tropical forest surveys. U.S. Department of Energy. Carbon Dioxide Research Program TR032. Washington, D.C. 66p.

58. Detwiler, R.P. and C.A.S. Hall. 1984. Land use change and carbon exchange in the tropics: II. Estimates for the entire region: Reply. Environ. Mgmnt. 10: 577-580.

59. *Hall, C.A.S., C.J. Cleveland and R. Kaufmann. 1986. **Energy and Resource Quality: The ecology of the economic process**. Wiley Interscience, NY. 577 pp. (Second Edition. University Press of Colorado).

1987

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60. Paruelo, J.M., P.J. Aphalo, C.A.S. Hall and D. Gibson. 1987. Energy use and economic output for Argentina. pp. 169-184 in Gonzague Pillet (ed.). Environmental Economics. The analysis of a major interface. Leimgruber, Geneva.

61. Hall, C.A.S. 1987. Ecosystem scientists are also conservation biologists. Conservation Biology, 1: 263-264.

62. (Review) Hall, C.A.S. 1987. Energy and Ecology by David Gates. Bioscience. 38: 188.

1988

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63. *Detwiler, R.P. and C.A.S. Hall. 1988. Tropical forests and the global carbon cycle. Science 239: 42-47.

64. Detwiler, R.P. and C.A.S. Hall. 1988. The global carbon cycle. Science (letters) 241: 1738-1739.

65. Rykiel, E.J., W.E. Grant and C.A.S Hall (ed.) 1988. An evaluation of the role of theoretical models in Ecology. Special Issue, Ecological Modeling 43: 1-136.

66. Hall, C.A.S. 1988. An assessment of several of the historically most influential theoretical models used in ecology and of the data provided in their support. Ecological Modeling 43: 5-31.

67. Hall, C.A.S. 1988. What constitutes a good model and by whose criteria? Ecological Modeling 43: 125-127.

68. Hall, C.A.S. 1988. Energy, economics and forestry production: a neophysiocrat's perspective. p. 242-277. in G. Lonner and A. Tornquist (ed.). Economic evaluations of biomass oriented systems for fuel. International Energy Agency, Task III, Applications of Systems Analysis. Publ. by SIMS, Swedish University of Agricultural Studies, Uppsala.

69. Benke, A., C.A.S. Hall, C. Hawkins, R. Lowe-McConnell, J.A. Stanford, B. Subercrop and J. Ward. 1988. Bioenergetic consideration in the analysis of stream ecosystems. J.N. American Benth. Soc. 7 (4): 480-502.

70. Hall, C.A.S. 1988. Can yesterday's environmental education solve tomorrow's environmental problems? Keynote address for M.D. Johnson and Y.D. Choi (ed.). Managing environmental resources, Proceedings of the fifth annual Graduate Student Conference on Forestry and Environmental Science. pp. 1-2.

71. Hall, C.A.S., S. Brown, P. Bogdonoff, D. Barshaw, L. Kaufman, F. O'Hara and S. Underhill. 1988. Bibliography of tropical studies of importance for the global carbon cycle. U.S. Department of Energy Carbon Cycle series CDIAC- 24/V1. (1885 entries).

72. Hall, C.A.S. 1988. Ecology. World Book Encyclopedia. pp. E 50-55. (Revised:1993;1999).

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295. Hall, Charles A.S. (In press). Cities from a biophysical perspective. Chapter 2. Hall,

Myrna and Steven Balogh. Urban Ecology. Springer

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297. (Energy Return on Energy Invested – Prof. Charles Hall's Comments) In Gail Tverberg's blog.

298. Interview on Chris Martenson:

<https://www.peakprosperity.com/podcast/113808/dr-charles-hall-laws-nature-trump-economics>

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300. Laherrere, Jean and Charles A.S. Hall. Submitted to Nature. Hubbert linearization: a "new" and explicit method to estimate petroleum reserves and its application to U.S. shale gas and oil resources.

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1. Tian, HQ, R. Houghton and C. Hall. Tropical deforestation and the global carbon cycle revisited. Global Change Biology. (In Review)

TEACHING

List Of Thesis and dissertations: Students of Charles Hall
**********Need to Update**********

2015

- **Carlos Ramirez Pascuali** (PhD) Neoliberalism and energy concerns: historical appraisal and application to carbon pricing and Mexican oil dynamics.

2013

- **Balogh, Steven** (PhD , GPES). Feeding and fueling the cities of the twenty-first century. Potential implications of declining energy quality on the future growth and development of urban areas.
- **Myers, Seth** (With Myrna Hall) (PhD GPES)
- **Waggoner, Egan. 2013. (MS) Sweet spots, EROI and the limits to Bakken production.**

2012

- **Stewart Ibarra Anna M**. 2012. A Socio-Ecological Analysis of Vulnerability to Dengue Fever in Southern Coastal Ecuador. PhD Dissertation. Department of Environmental and Forest Biology. SUNY College of Environmental Science and Forestry.

2011:

- **Gupta, Ajay** "Energy and Material Constraints Concerning the Rapid Deployment of Photovoltaic Energy in the Twenty-First Century"

2010:

- **Balogh, Steven** (MS GPES) Simulating the potential effects of plug-in hybrid electric vehicles on the energy budget and tax revenues for Onondaga County, New York.
- **Murphy, David** (8/07, PhD GPES) Energy Return on Investment as a Metric for Biophysical Economics.
- **Guzman, Aileen** (12/2010, PhD GPES)
- **McMichael, Jillian** (MS GPES) (Quantifying the Impact of Oil Shocks on Long-Term Public Debt: A Scenario Analysis

2008:

- **Gagnon, Nathan** (MS GEPES) The energy costs and gains of oil and natural gas extraction worldwide.
- **Lash, Whitney** (MS EFB) Abundance, growth, and reproduction of *Cyrilla racemiflora* as a function of environmental gradients in the Luquillo Mountains of Puerto Rico.

2007:

- **Castello, Leandro** (PhD EFB with Donald Stewart) A socio-economical synthesis on the conservation of the pirarucu (*Arapaima*) in floodplains of the Amazon.
- **Murphy, David** (MS GEPES with Myrna Hall) The relation between land-cover and the urban heat island in northeastern Puerto Rico.
- **Organ, Jefferey** (MS EFB with William Porter) Linking white-tailed deer harvests to population and environmental processes through ecological modeling
- **Panday, Prajjwal** (MS GEPES with Myrna Hall) Quantifying water quality from spatially-derived landscape characteristics in the Catskill/ Delaware watershed in New York.

2006:

- **Chen, Amy (**MS GEPES). Some meteorological consequences of land use change from urbanization and industrialization along a rural to urban gradient in eastern Puerto Rico
- **Harris, Nancy** (PhD EFB) Measuring the carbon balance of a tropical forested ecosystem along a gradient of elevation in the Luquillo Mountains, Puerto Rico: an empirical and modeling study scaled from leaves to landscapes
- **Mead, Jerry** (PhD EFB) Spatial modeling of stream trophic structure for Little Sandy Creek
- **Organ, Jeffrey** (PhD EFB with William Porter) Ecological Modeling of White-tailed Deer Populations for use in Adaptive Wildlife Management
- **Quaye, Amos** (MS GEPES) A biophysical analysis of food production in Ghana: History and potential for food self sufficiency

- **Schmitt, Laura** (PhD EFB) The relation of soil erosion and poverty on the Island of Negros, The Philippines

2005:

- **Borbor, Mercy.** (PhD GEPES) Modeling how land use affects nutrient budgets in the Guayas Basin – Ecuador: Ecological and economic implications
- **Chetima, Mamadou** (MS GEPES) Quantitative analysis of the agro-pastoral system in the Republic of Niger: implications for food security planning
- **Wu, Wei** (PhD GEPES) Spatial Modeling of the Probability of Cloud Cover Evapotranspiration and Stream Flow in North-Eastern Puerto Rico

2003:

- **Cornell, Joseph D.** (PhD EFB) Modeling Forest Cover in Central America From 1880 - 2000 A.D. Using GIS
- **Hallock Jr., John L** (MS-EFB) Effects of a Recently-Licensed Hydroelectric Project and Channel Gradient on Benthic Macroinvertebrates in the Salmon River, New York
- **Kroeger, T.** (PhD GEPES) Exploring the Comparative Cost-Effectiveness of Economic Incentive and Command-And-Control Instruments, and of Renewable A Case Study of Lima-Callao, Peru
- **Minor, Maria**. (PhD- EFB) Assessing the sustainability of short-rotation forestry for energy production in New York State.
- **Parajuli, Rudriksha R.** (MS GEPES) An Analysis of the Relationship Between Human Population Growth and Cereal Supply in Nepal
- **Rubin, Benjamin Dana** PhD EFB with Paul Manion) Assessment of the Health and Sustainability of New York Forest Based on Forest Structure, Mortality and Disease

2001:

- **Taweesuk, Siripun** (PhD GEPES) Dynamic Simulation Modeling of the Land Use, Economy and Environment in Chiang Mai, Thailand Using GIS and Remote Sensing
- **Wang, Hongqing** (PhD EFB) Dynamic Modeling of The Spatial and Temporal Variations of Forest Carbon and Nitrogen Inventories, Including Their Responses to Hurricane Disturbances, in The Luquillo Mountains, Puerto Rico
- **Wells, Daniel** (MS EFB with Theresa Donovan) Using multivariate models to predict avian distribution in the St. Lawrence Plain region of New York.

2000:

- **Ko, Jae-Young** PhD; An integrated assessment of energy and resource efficiency trends at regional, national, and international scales

1999:

- **Borbor-Cordova, Mercy J**. MS; A systems analysis of Banana and Shrimp Production in Ecuador Emphasizing Their Environmental Impact on Costal Ecosystems
- **Killilea, Mary Elizabeth** MS; Variation in Abundance and Tree Growth in New York State as a Function of Environmental Gradients
- **Kroeger, T**. MS; Estimating I\the Importance of energy and Technological Progress in Economic Growth: An Econometric Analysis of the Growth Experience of Selected East Asian and Latin American Economies, 1970-95
- **McCabe, Jason A**. MS; Mass Trapping and Impact of *IPS PINI*, the Pine Engraver, in Itasca State Park, MN

1998:

- **Buzby, Karen M.** PhD; The Effect of Disturbance on the Ecological Efficiency of a Small Tropical Stream
- **Klocker, Julie Ann** MS; The Sustainability Trade-Offs of Coffee Production in Costa Rica
- **Marley, David** (MS GEPES) Spatial modeling of climate and photosynthesis in the Luquillo Mountains, Puerto Rico
- **Montanye, Dawn R**. MS; Examining Sustainability: An Evaluation of USAID Policies for Agricultural Export-Led Growth in Costa Rica

1996:

- **Everham, Edwin M. III** (PhD GEPES) Hurricane Disturbance and Recovery: An Empirical and Simulation Study of Vegetation Dynamics in the Luquillo Experimental Forest, Puerto Rico
- **Tian, Hanquin** (PhD GEPES) Metabolism of the Biosphere in Changing Global Environments: Carbon Flux an Land Use Change as Studied at Scales From Landscape to Global

1994:

- **Pontius, Robert Gilmore, Jr**. PhD; Modeling Tropical Land Use Change and assessing Policies to Reduce Carbon Dioxide Release From Africa
- **Qi, Ye.** (PhD GEPES) Human-induced biospheric change and the global carbon cycle: a spatial modeling approach and its application to tropical Asia.

1990

- **Nass, Bryan L.** MS; A Simulation Model of Plankton and Nutrient Dynamics for the Epilimnion of Oligotrophic Flathead Lake, Montana
- **Rand, Peter S**. MS; The Effect of Salmon Migrations on Phosphorus Dynamics and Primary Production in Two Tug Hill Streams, NY
- **Uhlig, James S**. MS; Changing Patterns of Shifting Cultivation in East Malaysia and Thailand and Their Effects on the Global Carbon Cycle

1989

- **Wooster, Katherine M.** (MS EFB) A Geographically-Based Microclimatological Computer Model for Mountainous Terrain With Application to the Luquillo Experimental Forest in Puerto Rico

Cornell University:

- **Tartowski, S.** (1999) Nitrogen biogeochemistry in a drought-pulsed ecosystem: the effects of grazers on vegetation and nitrogen cycling in an Australian semi-arid grassland. Ph. D. Dissertation, Cornell University, Ithaca NY.

- **Carter, Jacoby**. MS (1992) A comparison of the distribution of plant species in Flathead Lake and Swan Lake and its implications for Kerr Dam Management practices.

- **Detwiler, Ralph Paul** PhD; (1986) Tropical, forests and the global carbon cycle. . Ph.D. Dissertation, Cornell University, Ithaca NY.

Fall 1972

Bio. Sci. 479	Research in Ecology, Evolution and Systematics - Independent Study
Bio. Sci. 565	Special Topics in Limnology

Spring 1973

Bio. Sci. 462/3	Limnology (Lectures and Laboratory)
Bio. Sci. 479	Research in Ecology, Evolution and Systematics - Independent Study
Bio. Sci. 668	Ecosystems (with Whittaker and Marks)

Fall 1973

Bio. Sci. 479	Research in Ecology, Evolution and Systematics - Independent Study (including Honors students)
Bio. Sci. 565	Special Topics in Limnology
Bio. Sci. 568	Applied Ecology Seminar

Spring 1974

Bio. Sci. 462/3	Limnology (Lectures and laboratory)
Bio. Sci. 479	Research in Ecology, Evolution and Systematics - Independent Study (including Honors Students)
Bio. Sci. 568	Estuarine Ecology (with Barlow)

Fall 1974

Bio. Sci. 479	Research in Ecology, Evolution and Systematics - Independent Study (including Honors Students)

Spring 1975

Bio. Sci. 460	Systems Ecology (with Goodman)
Bio. Sci. 479	Research in Ecology, Evolution and Systematics - Independent Study

Fall 1975

Bio. Sci. 479	Research in Ecology, Evolution and Systematics - Independent Study

Spring 1976

Bio. Sci. 460	Systems Ecology
Bio. Sci. 568	Estuarine Ecology (with Barlow)

Fall 1976

Bio. Sci. 469	Research in Ecology, Evolution and Systematics - Independent Study

Spring 1977

Bio. Sci. 468	Systems Ecology
Bio. Sci. 768	Ecosystems (with Whittaker, Chabot and Likens)
Bio. Sci. 469	Research in Ecology, Evolution and Systematics - Independent Study

Fall 1977

Bio. Sci. 360	General Ecology

Bio. Sci. 469	Research in Ecology, Evolution and Systematics - Independent Study

Spring 1978

Bio. Sci. 468	Systems Ecology
Bio. Sci. 668	Marine and Estuarine Ecology (with Barlow)
Bio. Sci. 469	Research in Ecology, Evolution and Systematics - Independent Study

Fall 1978

Bio. Sci. 260	Introductory Ecology

Spring 1979

Bio. Sci. 768	Ecosystems (with Whittaker)
Bio. Sci. 469	Research in Ecology, Evolution and Systematics - Independent Study

Spring 1980

Bio. Sci. 468	Systems Ecology
Bio. Sci. 469	Research in Ecology, Evolutional Systematics - Independent Study
Bio. Sci. 666	Marine Ecology (with Barlow)
Bio. Sci. 760	Special Topics in Evolution and Ecology

Fall 1980

Bio. Sci. 260	Introductory Ecology (with Risch)
Bio. Sci. 469	Research in Ecology, Evolution and Systematics - Independnet Study

Spring 1981

Bio. Sci. 360	General Ecology (4 lectures)
Bio. Sci. 666	Marine Ecology (4 lectures)
Bio. Sci. 768	Ecosystems (with Likens and Shachak)

Fall 1981

Bio. Sci. 260	Introductory Ecology (with Risch)
Bio. Sci. 469	Research in Ecology, Evolution and Systematics - Independent Study
Bio. Sci. 405	Energy Seminar

Spring 1982

Bio. Sci. 468	Systems Ecology
Bio. Sci. 399	Energy Seminar
Bio. Sci. 49	Research in Ecology, Evolution and Systematics - Independent Study

Fall 1982

Bio. Sci. 405	Energy Seminar
Bio. Sci. 469	Research in Ecology, Evolution and Systematics - Independent Study

Fall 1983

Bio. Sci. 260	Introductory Ecology
Bio. Sci. 468	Systems Ecology

Spring 1984

Bio. Sci. 400	Applied Ecology

(I had from four to ten independent study students each semester.)

(I have given lectures in, and frequently led a major part of, both the January and the June-July Ecology course in MBL or at Shoals Marine Laboratory, including extensive stream and estuary field work and sometimes computer simulation of results.)

TEACHING: University of Montana

Summer 1986
Systems Ecology

Fall 1986
Energy Seminar

Winter 1987
Energy Seminar

TEACHING: SUNY Environmental Science and Forestry

Fall 1987
Systems Ecology

Spring 1988

Ecosystems
The Ecology of the Economic Process
Systems Ecology Seminar

Fall 1988
Systems Ecology

Spring 1989
Ecosystems
The Ecology of the Economic Process
Systems Ecology Seminar

Fall 1989
Systems Ecology

Spring 1990
Ecosystems
The Ecology of the Economic Process
Systems Ecology Seminar

Fall 1990
Systems Ecology

Spring 1991

Ecosystems
The Ecology of the Economic Process
Seminar: The physiology of global warming

Fall 1991
Systems Ecology

Spring 1992
Ecosystems
The Ecology of the Economic Process
Seminar: Modeling Tropical Forests

Fall 1992
Systems Ecology

Spring 1993

Ecosystems
The Ecology of the Economic Process
Seminar: Modeling Tropical Forests

Fall 1993

Systems Ecology

Spring 1994
Ecosystems
The Ecology of the Economic Process
Seminar: Modeling Tropical Forests

Fall 1994
Systems Ecology

Fall 1995
Systems Ecology
Seminar: Geographical Modeling

Spring 1996
Ecosystems,
Environment, resources and development

Fall 1996
Systems Ecology
Seminar:

Spring 1997
Ecosystems,

Environment, resources and development

Fall 1997
Systems Ecology

Spring 1998
Ecosystems,
Environment, resources and development

Fall 1998
Systems Ecology
Seminar: tropical ecology

Spring 1999
The global environment and the evolution of human culture,
Ecosystems,
Environment, resources and development

Fall 1999
Systems Ecology
Environment, resources and development

Spring 2000
The global environment and the evolution of human culture,
Ecosystems

Fall 2000
Systems Ecology
Environment, resources and development
Freshman Field course

Spring 2001
The global environment and the evolution of human culture
Ecosystems

Fall 2001
Systems Ecology
Environment, resources and development
Seminar on energy and history

Spring 2001
The global environment and the evolution of human culture
Ecosystems
Seminar on energy costs of producing an ESF graduate

Fall 2001
Systems Ecology
Environment, resources and development
Seminar on energy and history

Spring 2002
The global environment and the evolution of human culture
Ecosystems
Seminar on energy costs of Pyramid Mall

Fall 2002
Systems Ecology
Environment, resources and development

Spring 2003
The global environment and the evolution of human culture
Ecosystems

Fall 2003
Sabbatical at the University of Montana Biological Station.

Spring 2004
The global environment and the evolution of human culture
Ecosystems
Environment, resources and development
Seminar on energy costs of development

Fall 2004
Systems Ecology
Energy Course (With Manno)

Spring 2005
The global environment and the evolution of human culture
Ecosystems
Environment, resources and development
Seminar on tropical development

Fall 2005
Systems Ecology
Energy Course (with Lindberg)

Spring 2006
The global environment and the evolution of human culture
Ecosystems
Environment, resources and development
Seminar on tropical development

Fall 2006
Systems Ecology
Energy Systems

Spring 2007
The Global Environment and the Evolution of Human Culture

Ecosystems
Energy Resources and Development

Fall 2007
Systems Ecology
Energy Systems
Spring 2008
The Global Environment and the Evolution of Human Culture
Ecosystems
Energy Resources and Development

Fall 2008
Systems Ecology
Energy Systems

Spring 2009
The Global Environment and the Evolution of Human Culture
Ecosystems
Energy Resources and Development

Fall 2009
Systems Ecology
Energy (with T. Volk)

Spring 2010
The Global Environment and the Evolution of Human Culture
Odum Seminar
Ecosystems
Biophysical Economics

Fall 2010
Systems Ecology
Energy

Spring 2011
Sabbatical

Fall 2011
Systems Ecology
Energy Systems

Spring 2012
The Global Environment and the Evolution of Human Culture
Ecosystems
Biophysical Economics

Fall 2012
Systems Ecology
Energy Systems

Spring 2013
The Global Environment and the Evolution of Human Culture
Ecosystems
Biophysical Economics

Spring 2014
Biophysical Economics (On line)

RESEARCH AND TRAINING GRANTS

1972 Carbon budget of Flax Pond. National Science Foundation. $210,000 (with G.M. Woodwell).

1975 Cascadilla Creek Project. Cornell University faculty grant for the improvement of undergraduate education. $1300.

1978 Modeling exchanges of carbon between tropical vegetation and the atmosphere. U.S. Department of Energy. $179,000 (with A. Lugo and S. Brown).

1980 Energy analyses. Cornell University School of Agriculture and Life Sciences. $2000.

Continuation Funds, Carbon project. U.S. Department of Energy. $97,000.

Supplementary Funds, U.S. Department of Energy. $1200.

Computer funding for carbon analyses. National Institutes of Health. $2950.

1981 Continuation Funds, U.S. Department of Energy. $117,000.

1982 Merging the tropical biosphere model and carbon inventories with land use change estimates. U.S. Department of Energy. $41,000.

Travel Grant, U.S. Department of Energy. $7500 (with S. Brown).

Computer accessories. National Institutes of Health Institutional Grant. $3000.

Supplementary funding U.S. Department of energy. $3000.

1983 Incorporating historical factors in GLOBC7. U.S. Department of Energy. $47,000.

Simulation of spatial and temporal changes in primary and secondary production and salmon dynamics of the Northeast Pacific Ocean. Sea Grant. $1974.

Validation and transfer of GLOBC7. Holcomb Research Institute. $8000.

1984 Continuation funding. U.S. Department of Energy. $30,000.

1986 Travel grant. University of Oslo. $1500.

Preliminary study of the use of otoliths for assessing life histories of trout in the Clark Fork River. Montana Fish, Game and Parks. $3000.

An assessment of the importance of grazing, nutrient regeneration and regulatory nutrients on a large lake ecosystem model. Soap and Detergent Association. $64,000 (with Craig Spencer).

1988 Forest response to disturbance. National Science Foundation through the University of Puerto Rico. $9800.

Exchanges of carbon between the atmosphere and terrestrial ecosystems as a result of land-use changes. U.S. Department of Energy. $34,000.

New Faculty Development Award. New York State/United University Professions. $750.

Long-term ecological research on the Luquillo Forest. National Science Foundation. $2,600,000 (my share = $120,000).

1989 Exchanges of carbon between the atmosphere and terrestrial ecosystems as a result of land-use changes. U.S. Department of Energy. $37,000.

Flathead Lake plankton dynamics model. Soap and Detergent Association. $15,216.

"Instructional supplement to system ecology" - Grant for improvement of teaching. State University of New York. $2400.

1990 Sources and sinks of carbon from tropical land use change. U.S. Department of Energy. $74,982.
Consolidating Luquillo Experimental Forest information using a GIS. U.S. Forest Service. $31,600.

1991 Spatial and temporal patterns of biotic exchanges of CO_2 between the atmosphere and tropical landscapes and their role in the global carbon cycle. U.S. Department of Energy. $449,000.

IBM RISC 600-350 Geographical modeling facility for SUNY-ESF. IBM and SUNY Graduate Research and Education Program. $50,000.

1992 Supplement to Developing software for combining simulation models of forest change and resultant exchange of the atmospheric CO_2 with geographic information systems. U.S. Forest Service. $10,700. Supplement to above $5000.

1994 Supplement to DOE grant. $27,000.
NSF LTER Grant for Luquillo Forest. $2,600,000 (my share = 120,000)

1995 U.S. Forest Service. Developing computer visualizations of Luquillo Forest for El Portal Visitor Center. $20,000.

U.S. Forest Service. Developing gradient analyses of eastwide datasets. $3000.

1996 National Science Foundation SBIR Program (with Marshall Taylor) $84,000.

1997 U. S. Sea Grant Small Stream models ($50,000) with Neil Ringler

1998 USDA Forest Service Hydrological model of Luquillo Mountains ($10,000)

1999 USDA Multicultural scholars program. (With M. Hall and others) ($100,000)

2000 USDA Multicultural scholars program. (With M. Hall and others) ($100,000)

2000 NSF LTER Grant for Luquillo Forest. $800,000 (my share = $40,000)

2000 Travel Grant to Malaysia, UNESCO $2,500

2001 US Forest Service. Measuring carbon exchange in Luquillo Mountain forests (With Ye Qi, Univ California, Berkeley ($50,000)

2002 U.S. Forest Service Grant for Modeling photosynthesis in Luquillo Forest $5,000

2003 NSF LTER Renewal Grant for Luquillo Forest. $1,500,000 (my share = $110,000)

2003 U.S. Forest Service Grant for Measuring photosynthesis in Luquillo Forest $9,000

2004 NASA Seed grant Developing models for ecological impacts of urbanization in tropics. $10,000

2004 Predicting Future Water Quality from Land Use Change Projections in the Catskill-Delaware Watersheds (Awarded $222,653 by NY State Department of Environmental Conservation, August 2004 to December 2007. To M. Hall, P.I., and Co-PI/s Charles Hall. Rene Germaine, Mary Terrell)

2004 U.S. Forest Service. Synthesizing photosynthetic measurements in Luquillo Forest. $18,000

2005 Santa Barbara Foundation Measuring long term energy return on investment for global petroleum. $10,000

2009 National Science Foundation Long Term Ecosystem Research in the Luquillo Forest $5,000,000 (my share $152,000) ($25,000 per year Grant period 2006-2012 Supported Lindsay Cray and David Murphy

2009 National Science Foundation : Positioning Rust-Belt Cities for a Sustainable Future: A Systems Approach to Enhancing Urban Quality of Life." NSF Urban Long-Term

Research Area Exploratory Award (ULTRA-EX), ($300,000, my research $37,596), David Nowak (PI), Myrna Hall, Charlie Hall, Rick Smardon, and E. Carter (co-PIs) September 2009 – December 2011.
Supports Steve Balogh

2009 National Science Foundation: Social-Ecological System Change, Vulnerability, and the Future of a Tropical City" Urban Long-Term Research Area Exploratory Award (ULTRA-EX), ($300,000, my research $30,000), Ariel Lugo (PI), Tischa Munoz (co-PI), March 2010 to March 2012.
Supports David Murphy

2009 An Environmental Basis for Rural Planning in the Province of Cordoba, Argentina." Argentine National Government Award, ($1,000,000, my research portion is for travel, per diem, and potentially tuition for an Argentine student to study some semesters at ESF), Oscar Giayetto and Juan-Jose Cantero (PIs). May 2010 to May 2013.

2009 US Forest Service Energy and economic analysis for the Caribbean . $20,000
Supports David Murphy

2009 Institute for Integrated Economic Research $10,000
Supports Steve Balogh and two undergraduates for summer)

2009 Various private sources: Multiple Sponsors $4000

2010 Social-Ecological System Change, Vulnerability, and the Future of a Tropical City" National Science Foundation Urban Long-Term Research Area Exploratory Award (ULTRA-EX),($300,000, my research $30,000), Ariel Lugo (PI), Tischa Munoz (co-PI), March 2010 to March 2012. Supports Bali Quintero [Administered in Puerto Rico]

2010 An Environmental Basis for Rural Planning in the Province of Cordoba, Argentina." Argentine National Government Award, ($1,000,000, my research portion (about $10,000) is for travel, per diem, and potentially tuition for an Argentine student to study some semesters at ESF), Oscar Giayetto and Juan-Jose Cantero (PIs).May 2010 to May 2013.

2010 United Kingdom Department of International Development $180,000 ## Consolidating and promulgating EROI Research Supports, Steven Balogh, Alex Poisson, Shelly Arnold, Jessica Lambert

2012 National Science Foundation $ 5,000,000 (my share $48,000) ($8 ,000 per year) Long Term Ecological Research Luquillo Forest