

VITA**DUNCAN T. PATTEN**

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Director, Montana Water Center, Montana State University, Bozeman, MT
 Research Professor, Land Resources and Environmental Sciences, Montana State University,
 Bozeman, MT
 Professor Emeritus, School of Life Sciences, Arizona State University, Tempe, AZ
 Certified Senior Ecologist, Ecological Society of America

DEGREES

A.B., Biology-Chemistry, Amherst College, 1956
 M.S., Botany, University of Massachusetts, Amherst, 1959
 Ph.D., Botany-Ecology, Duke University, 1962

ACADEMIC EXPERIENCE

Instructor (part-time) 1957-59, University of Massachusetts
 Assistant Professor 1962-65, Virginia Polytechnic Institute
 Assistant Professor 1965-67, Arizona State University
 Associate Professor 1967-73, Arizona State University
 Professor 1973-1995, Arizona State University
 Professor Emeritus 1995 -- present, Arizona State University
 Research Professor (adjunct) 1995-1999, Montana State University
 Research Professor 1999 -- present, Montana State University

ADMINISTRATIVE EXPERIENCE

Chairman, Faculty Assembly, President, Faculty Senate, Arizona State University (elected position), 1971-72.

Plant Process Coordinator, US/IBP Desert Biome, 1971-76.

Chairman, US/IBP Interbiome Primary Production Committee, 1971-75.

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ADMINISTRATIVE EXPERIENCE (CONT.)

Co-director, Rocky Mountain Environmental Research Grant (NSF-RANN \$100,00), 1973-74.

Assistant Academic Vice President, Arizona State University, 1972-76.

Chairman, Department of Botany and Microbiology, Arizona State University, January 1977-July 1981.

Director, Center for Environmental Studies, Arizona State University, 1980-1995.

Business Manager, Ecological Society of America, 1979-1995.

President, Arizona Riparian Council, 1985-89.

President, Society of Wetland Scientists, 1996-97

Director, Montana University System Water Center, Montana State University, 2012--

OTHER PROFESSIONAL EXPERIENCEBureau of Reclamation - Department of the Interior.

Senior Scientist, Department of the Interior, Bureau of Reclamation, Glen Canyon Environmental Studies 1989-1996.

National Research Council/National Academy of Sciences:
Committees, Boards, and Commissions.

Member, Environmental Assessment Committee, Environmental Studies Board, Commission on Natural Resources, 1975-76. Chairman: Panel on Environmental Impacts of Resource Management.

Chair, Mono Basin Ecosystem Study, Board on Environmental Studies and Toxicology, 1985-87.

Member, Glen Canyon Environmental Studies Committee, Water Science and Technology Board, 1986-89, ex officio 1989-1996.

Member, Board on Environmental Studies and Toxicology, 1987-90.

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Member, Committee on Opportunities in Applied Environmental Research and Development, Board on Environmental Studies and Toxicology, 1988-91.

Member, Committee on Western Water Management Change, Water Science and Technology Board, 1989-91.

Member, Committee on Science in the National Parks, Board on Environmental Studies and Toxicology, 1989-92.

Member, Commission on Geoscience, Environment and Resources, 1990-93.

Member, Planning Committee for Managing Water Resources and Water Quality Along the U.S./Mexico Border. Water Science and Technology Board. 1993.

Member, Committee to Review Specific Scientific and Technical Safety Issues Related to the Ward Valley, California Low-Level Radioactive Waste Site. Board on Radioactive Waste Management. 1994-1995.

Chair, Committee to Evaluate Navy's Extreme Low Frequency Antenna Ecological Monitoring Program, Board on Environmental Studies and Toxicology. 1995-97.

Member, Committee on Ungulate Management in Yellowstone National Park, Board on Environmental Studies and Toxicology, 1998-2001.

Member, Committee on Hardrock Mining on Federal Lands, Board on Earth Sciences and Resources, 1999

Member, GAO Funded Workshop on Environmental Indicator Sets (organized by NAS)

National Science Foundation:

Scientific Consultant to the National Science Foundation, 1973-75.

Panel Member -- National Science Foundation: Environmental Biology 1975-76 and Ecological Sciences, 1976-78.

Environmental Protection Agency:

Member: Scientific Advisory Committee Panel to Review 2007 Report on the Environment, 2007.

Member: Chartered Science Advisory Board, 2008-present

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Member: Science Advisory Board Environmental Engineering Committee (supplemented) reviewing EPA ORD Report on Hydraulic Fracturing research program. Spring 2010.

Chair: Science Advisory Board ad hoc Panel reviewing ORD reports on Mountain Top Mining and Benchmark for Conductivity. Summer 2010 – Winter 2011.

Member: Science Advisory Board ad hoc Panel reviewing ORD Study Plan on Effects of Hydraulic Fracturing on Drinking Water Resources. Spring 2011 – Fall 2011.

Member: Science Advisory Board ad hoc Panel reviewing EPA/ORD 2012 and 2013 budget request. Spring 2011 and Winter 2012.

Advisory Activities:

District Advisor (Environmental Protection) Bureau of Land Management, Arizona Strip Multiple-Use Advisory Board, 1977.

Member, Man and the Biosphere-4 Directorate: Arid and Semi-Arid Lands, 1988-90.

Science Advisory Council, Greater Yellowstone Coalition, 1988-present.

Chair, Technical Advisory Committee, National Institute for Global Environmental Change, 1994-96; member, 1990-96.

Chair, Technical Advisory Committee, Southwest Center for Environmental Research and Policy. 1993-1995.

Scientific and Technical Advisory Committee member. American Rivers, 1993-present.

Chair, Technical Advisory Committee, Yellowstone River Cumulative Effects Task Force, 1999-2005.

Chair, Status of U.S. Ecosystems: Grass/Shrubland Committee. Heinz Center, Washington, DC, 2000-2001.

Member, Design Committee, State of the Nation's Ecosystems, Heinz Center, Washington, DC, 2000-2007.

Consulting Activities:

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Consultant to the Public Land Review Commission on the environmental impact of open-pit mining in the Southwest, 1969.

Consultant to ASARCO on the ecological impact of open-pit molybdenum mining in Idaho and on the impact of SO₂ on natural vegetation near Winkelman, Arizona, 1970.

Consultant to the Bureau of Reclamation on ecological impacts of the CAP dams, 1971.

Consulting on environmental impact problems with Salt River Project, ABI Corporation, Arizona Public Service, 1971-1995.

Consultant to Environmental Protection Agency on environmental effects of increased coal burning, 1977-78.

Consultant to the U.S. Army Corps of Engineers on reclamation projects, 1978-1995.

Consultant to Arizona Environmental Consultants for ecological impacts of a refinery at Mobile, Arizona, 1978-80.

Advisor and Consultant to Pacific Gas and Electric Company and Southern California Edison Company on effects of management of instream flow in Sierra streams on riparian communities, 1984-1985.

Consulting to EBASCO on riparian restoration of streams in the Mono Basin, California. 1992-1993.

Science Board, CALFED, Bay-Delta Watershed Ecosystem Restoration Program. December 1999 to 2005.

Independent Science Board, California Bay-Delta Authority. October 2003 to 2008.

Consulting to U.S. Forest Service. Pacific SW. San Bernardino Inland Feeder Tunnel project. 2000-2003.

Consulting with Advocates for Community and Environment. Relative to Southern Nevada Water Authority plans to develop groundwater pumping and pipe lines in eastern Nevada.

Other Activities:

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OTHER EXPERIENCE (CONT.)

Participant (Invited) -- ERDA (Department of Energy) Ecology-Meteorology Workshop on effects of increased atmospheric CO₂. University of Michigan Biological Station, August 1977.

Organizer and Chairman -- Department of Energy Workshop: Ecological impacts of solar energy conservation, Arizona State University, 11-12 May 1978.

Member: Washington State Academy of Sciences Committee to conduct an independent review of the Puget Sound Partnership's (PSP) progress in ecosystem recovery and the PSP Science Panel's development of a comprehensive science program including development of indicators of Puget Sound health . 2011-2012.

AWARDS AND HONORS

Phi Sigma 1963

Sigma Xi 1959 (Associate), 1962 (Full)

Arizona State University Chapter:

Treasurer, 1966-68

President-Elect, 1968-69

President, 1969-70

American Association for the Advancement of Science, Fellow 1979

Arizona/Nevada Academy of Sciences, Fellow 1976.

Ecological Society of America, Distinguished Service Award 1994, Fellow 2012.

Bureau of Reclamation, Citizens Award 1996.

RECOGNITION

Who's Who in the West

Who's Who in America

ACADEMIC COMMITTEES

(Arizona State University, excluding period when Assistant Academic Vice President.)

University (ASU):

Academic Affairs Committee, Secretary 1969-70, Chair 1970-71

Faculty Senate 1962-72, Vice Chair 1970-71, Chair 1971-72

Code of Conduct Committee (ad hoc), 1970-71

Sabbatical Leave Committee (ad hoc), 1971

Salary and Wage Review Board, Chair, 1971

University Research Council, 1976-82

Research Park Committee, 1982-84

Safety Committee, 1985-86

Intellectual Property Committee, 1992-1995.

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College:

Liberal Arts Honors Council, 1967-70

Liberal Arts Curriculum Council, 1969-71

RESEARCH GRANTS AND CONTRACTS

A study of vegetation-environmental relations in northwest Yellowstone National Park.
National Science Foundation Grant BG-2205, 1964. \$32,000

Vegetation-environmental relations. National Science Foundation
Grant BG-4683, 1966. \$13,600

Altitudinal influence of succulent distribution. Arizona State University Faculty Grant-in-
Aid, 1968. \$1,500

Ecological and taxonomic studies. Arizona State University Faculty Grant-in-Aid, 1969.
\$2,284

Productivity and water stress in cacti. IBP Desert Biome (National Science Foundation),
1970, \$7,958; 1971, \$10,200; 1972, \$4,077. Total: \$22,235

Factors influencing stream quality. Arizona State University, Faculty Grant-in-aid, 1971.
\$1,400

Phenology and function of Sonoran Desert Annuals in relation to environmental changes.
IBP Desert Biome (National Science Foundation),
1972, \$8,200; 1973, \$8,200; 1974, \$10,321; 1975, \$7,627. Total: \$34,348

A vegetation management study for the enhancement of wildlife along the lower
Colorado River (with R. D. Ohmart). Bureau of Reclamation, 1973-75. \$150,000

Rocky Mountain Environmental Research. Co-Director through the Eisenhower
Consortium and The Institute of Ecology. National Science Foundation-RANN Grant, 1973-74.
\$100,000

Solar energy conversion: analysis of impacts on desert ecosystems.
ERDA (DOE), 1977-78 \$43,000
University of California-Los Angeles, 1978 \$30,000
University of California-Los Angeles, January-September 1979 \$42,812,
University of California (DOE), 1979-80 \$35,800
Total: \$151,612

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Department of Energy Traineeship Grant (with T. H. Nash), 1978-79.	\$14,600
Seed mix and establishment in Indian Bend Wash. U.S. Army Corps of Engineers, 29 November 1978-29 March 1979.	\$4,731
Ecology of mesquite bosque communities. U.S. Army Corps of Engineers, 29 November 1978-29 March 1979.	\$2,960
Ecology of a riparian forest community. Faculty Grant-in-Aid, 1979.	\$3,300
A study of revegetation and revegetation potential on Cave Buttes Dam Site, U.S. Army Corps of Engineers, 1979.	\$5,744
Silvics of Arizona walnut (<i>Juglans major</i>). U.S. Forest Service Cooperative Agreement,	
	1981. \$17,000
	1984. \$5,000
	Total: \$22,000
A study of revegetation methods on Adobe Dam. U.S. Army Corps of Engineers, 1981.	\$4,000
Response of riparian species to recreational impact. U.S. Forest Service Cooperative Agreement, 1982-84.	\$19,632
Environmental assessment in Nepal. 1983.	
	National Science Foundation \$1,250
	National Geographic Society \$2,098
	Rolex Corporation \$1,300
	Explorers Club \$ 600
	Total: \$5,248
Fire effects following prescribed burning in a selected desert ecosystem. U.S. Forest Service, 1983-87.	\$18,000
Riparian vegetation response model. Southern California Edison, 1986.	\$15,454
Inventory and evaluation of riparian vegetation along lower Rush Creek, Mono County, California. Los Angeles Department of Water and Power, 1987.	\$9,008
Riparian vegetational changes along Bishop Creek: an historical photo interpretation. Desert Research Institute/Southern California Edison, 1988.	\$7,150

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Evaluation sensitivity to disturbance of high-elevation ecosystems in the Pinaleno Mountain. Research Corporation, 1988.		\$25,000
Dynamics of riparian species along Rush Creek. Los Angeles Department of Water and Power, 1988. (With J. Stromberg.)		\$30,015
Restoration of riparian herbaceous understory. Arizona Nature Conservancy, 1989. (With J. Stromberg.)		\$3,000
Cone production by conifers at high elevation sites in the Pinaleno Mountains. Research Corporation, 1989-91. (With J. Stromberg.)		\$22,300
IGPA. Department of the Interior, Bureau of Reclamation, 1989-91.		\$102,580
	1991-93	\$84,501
Instream flow requirements for riparian vegetation at Bishop Creek, Inyo County, California. Southern California Edison, 1989-92. (With J. Stromberg.)		\$64,310
Effective management of water resources: a function of geomorphology and instream flow requirements. U.S. Geological Survey, 1990-92. (With J. Stromberg.)		\$36,740
Instream flow needs of riparian trees. Los Angeles Department of Water and Power (Jones and Stokes, Prime). (With J. Stromberg).	1990.	\$9,020
	1991.	\$43,588
Development of best management practices for water and riparian resources along the Santa Cruz watershed, U.S./Mexico border. EPA (Southwest Center for Envir. Research and Policy) (with J. Stromberg, M. Sommerfeld and D. Green). 1992.		\$104,000
Science Advisory Committee: Glen Canyon Environmental Studies, Dept. of the Interior (Bureau of Reclamation).	1993.	\$134,000
	1994.	\$141,000
	1995	\$175,000
Integration and Evaluation	1996	\$98,750
	1997-98	\$42,000
Effects of modified groundwater and surface water on riparian and wetland ecosystems in Nevada. UNLV (National Park Service prime). (with J.C. Stromberg). 1992-93.		\$50,835.
	1994-1997	\$76,000.

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Water and riparian resources of the Santa Cruz River basin: best management practices for water and resource quality. EPA (SW Center for Env. Res. and Policy) (with J. Stromberg and M. Sommerfeld). 1993-94. \$173,658.

Water quality and discharge issues at Ambos Nogales: use of a border environmental action team to assist in information analysis, problem solving, and action plan development. EPA (Southwest Center for Envir. Res. and Policy). 1993-1995. \$31,520

Groundwater recharge and riparian habitat enhancement. Arizona Department of Water Resources (with J. Stromberg) 1995-96. \$30,910

Functional assessment of effluent dominated riparian ecosystems. University of Arizona (USGS) (with J. Stromberg) 1995-96. \$23,020

Long-term research and monitoring of cottonwood and other riparian woody plants in the Bill Williams Wildlife Refuge. USFWS. (with J. Stromberg) 1995-97. \$25,622

Dam management and riparian ecosystems. Univ. Of Ariz. (with J. Stromberg) 1995-96. \$10,240

Assessment of the role of effluent dominated rivers in supporting riparian functions. Arizona Water Protection Fund. (with J. Stromberg). 1996-97. \$46,750

Riparian vegetation restoration for the Provo River Restoration Project. Utah Reclamation Mitigation and Conservation Commission (with J. Stromberg). 1997-99. \$42,000

Developing effective ecological indicators for watershed analysis. Environmental Protection Agency. Through Yellowstone Ecosystem Studies, Bozeman, MT. (Principal Investigator with Co-PIs A. Marcus, R. Lawrence, W. Minshall) 1999-2002. \$868,242

Developing effective ecological indicators for watershed analysis. EPA Grant transferred to Montana State University. 2001-2003 \$455,000

Complexities Across Boundaries: Coupled human and natural systems across the Yellowstone National Park northern winter elk range. National Science Foundation Biocomplexity program. (Co-PI with D. McGinnis (senior PI at Idaho State U.), D. Bennett (Iowa), W. Travis (Colorado), J. Shogren (Wyoming). 2002-2005 \$660,000

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Developing Conceptual Models for the Yellowstone Network. NPS Cooperative Agreement		
	2002-2003	\$24,000
	2003-2004	\$21,000

Seeps and Springs Monitoring Plan for Big Horn Canyon. NPS Cooperative Agreement. (with Brian McGlynn).	2004-2006	\$57,500
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Land use/land cover change governing nitrogen thresholds and transport in mountain watersheds. EPA Star Grant (with Brian McGlynn). 2004-2007		\$278,000
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MEMBERSHIP IN PROFESSIONAL SOCIETIES

American Association for the Advancement of Science (Fellow)
 American Geophysical Union
 American Institute of Biological Sciences
 American Water Resources Association
 Arizona-Nevada Academy of Sciences (Fellow)
 Arizona Riparian Council (President 1985-89)
 British Ecological Society
 Ecological Society of America (Business Manager 1979-1995, elected)
 Society of Range Management
 Society of Wetland Scientists (Vice President 1995-96, President 1996-97)

ABSTRACTS AND PRESENTATIONS

- 1962 Patten, D. T. Vegetation patterns in relation to environments in the Madison Range of Montana. *Bulletin of the Ecological Society of America* 43(3):53-54. A.I.B.S., Oregon State University, Corvallis, OR.
- 1964 Patten, D. T. The influences of over-browsing on willow survival along a northern Rocky Mountain river. *Bulletin of the Ecological Society of America* 44(33):77. A.I.B.S., University of Colorado, Boulder, CO.
- 1968 Patten, D. T. Succession from sagebrush to mixed conifer forest in the northern Rocky Mountains. *Bulletin of the Ecological Society of America* 49(3):111. A.I.B.S., Ohio State University, Columbus, OH.

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ABSTRACTS AND PRESENTATIONS (CONT.)

- 1968 Patten, D. T. Ecology of the non-forested areas of northwest Yellowstone National Park. *Bulletin of the Ecological Society of America* 49(3):112. A.I.B.S., Ohio State University, Columbus, OH.
- 1968 Patten, D. T., and B. E. Dinger. CO₂ exchange patterns and endogenous rhythms of cacti from different environments. *Bulletin of the Ecological Society of America* 49(3):107. A.I.B.S., Ohio State University, Columbus, OH.
- 1968 Patten, D. T., and J. C. O'Toole. Ecology of Douglas fir near its upper altitudinal limits. *Journal of the Arizona Academy of Science* 5:15. A.A.S., Northern Arizona University, Flagstaff, AZ.
- 1970 Patten, D. T. Dry matter accumulation. U.S./IBP. Analysis of Ecosystems, Desert Biome Plant Meeting Report. Las Vegas, NV. Pages 30-32.
- 1970 Patten, D. T. Vegetation history of the Upper Gallatin Region. AMQUA Meeting, 29 August-1 September, Montana State University and Yellowstone National Park.
- 1971 Patten, D. T. Temperature and heat flux of desert plants. American Association for the Advancement of Science and Arizona Academy of Science, Arizona State University, Tempe, AZ.
- 1972 Patten, D. T. Growth and productivity of cacti in relation to environments in the Sonoran Desert, North America. International Symposium on Ecophysiological Foundations of Ecosystem Productivity in Arid Lands. June, Leningrad and Dushanbe, USSR.
- 1972 Patten, D. T. Seasonal temperature adaptation of cacti. *Journal of the Arizona Academy of Sciences* 7:14. Arizona Academy of Science, Prescott College, Prescott, AZ.
- 1972 Nisbet, R. A., and D. T. Patten. Temperature acclimation in prickly pear cactus. 15 June, Ecological Society of America and American Association for the Advancement of Science, Eugene, OR.
- 1973 Nisbet, R. A., and D. T. Patten. Temperature acclimation in prickly pear cactus in south central Arizona. *Bulletin of the Ecological Society of America* 54:15-16. A.I.B.S., University of Massachusetts.
- 1973 Patten, D. T. Winter: a major determinant of desert vegetation patterns. *Journal of the Arizona Academy of Science*, Tucson, AZ.

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ABSTRACTS AND PRESENTATIONS (CONT.)

- 1973 Patten, D. T., and E. M. Smith. Early annual plant development in relation to environmental variables in the Sonoran Desert. *Bulletin of the Ecological Society of America* 54:26. A.I.B.S., University of Massachusetts.
- 1974 Patten, D. T. Ecological consequences of current use patterns. *Proceedings of the American Association for the Advancement of Science, University of Arizona Energy Inquiry, Tucson, AZ, 17-18 January.* Pages 37-39.
- 1974 Patten, D. T. Carbon allocation in desert plants. U.S./IBP Desert Biome Third Annual Synthesis Meeting, Salt Lake City, UT.
- 1974 Patten, D. T. Carbon flow through desert ecosystems. *Symposium on Metabolism of Biomes.* Invited paper, A.I.B.S., Arizona State University, Tempe, AZ.
- 1974 Patten, D. T., and E. M. Smith. Energy flux and the thermal regime of desert plants. *Symposium on Environmental Physiology of Desert Organisms.* A.I.B.S., Arizona State University, Tempe, AZ.
- 1974 Smith, E. M., and D. T. Patten. Primary production of annual plants as related to microenvironment in a Sonoran Desert shrub community. *Bulletin of the Ecological Society of America* 55(2):28. A.I.B.S., Arizona State University, Tempe, AZ.
- 1976 Patten, D. T. Phenology and function of Sonoran Desert annuals in relation to environmental changes: a synthesis. U.S./IBP Desert Biome Fifth Annual Conference, Alta, UT.
- 1979 Barstad, J., and D. T. Patten. Factors controlling vegetational patterns in a riparian forest community in southeastern Arizona. *Bulletin of the Ecological Society of America* 60(2):130. A.I.B.S., Oklahoma State University, Stillwater, OK.
- 1979 Smith, S. D., and D. T. Patten. Impacts of a simulated solar collecting array on a Sonoran Desert ecosystem. *Journal of the Arizona Academy of Science* 14(Suppl.):23-24.
- 1979 Smith, S. D., and D. T. Patten. Effects of a simulated solar collector array on abiotic and biotic parameters in a Sonoran Desert ecosystem. *Bulletin of the Ecological Society of America* 60(2):81. A.I.B.S., Oklahoma State University, Stillwater, OK.
- 1980 Barstad, J., and D. T. Patten. Methods of studying riparian ecosystems: how effective are they? *Bulletin of the Ecological Society of America* 61:77. A.I.B.S., University of Arizona, Tucson, AZ.

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ABSTRACTS AND PRESENTATIONS (CONT.)

- 1980 Patten, D. T. Ecological aspects of an expanding development and use of plants. A.I.B.S./ESA Symposium: The economic development of desert plants. Bulletin of the Ecological Society of America 61:57. A.I.B.S., University of Arizona, Tucson, AZ.
- 1980 Smith, S. D., and D. T. Patten. Effects of shading on gas exchange patterns and morphology of two Sonoran Desert shrubs. Bulletin of the Ecological Society of America 61:59. A.I.B.S., University of Arizona, Tucson, AZ.
- 1980 Smith, S. D., and D. T. Patten. Comparative productivity of winter annuals under natural and artificial shade conditions in the Sonoran Desert. Bulletin of the Ecological Society of America 61:123. A.I.B.S., University of Arizona, Tucson, AZ.
- 1982 Cave, G., and D. T. Patten. Vegetation response to fire and the resulting nutrient changes in the Sonoran Desert. Bulletin of the Ecological Society of America 62:180. A.I.B.S., Pennsylvania State University, College Park, PA.
- 1982 Patten, D. T., and G. Cave. Fire temperatures and physical characteristics of a controlled burn in the Upper Sonoran Desert. Bulletin of the Ecological Society of America 63:163. A.I.B.S., Pennsylvania State University, College Park, PA.
- 1983 Conrad, B., and D. T. Patten. Community dynamics of old fields in the Sonoran Desert. Bulletin of the Ecological Society of America 64:150. A.I.B.S., North Dakota State University, Grand Fork, ND.
- 1984 Patten, D. T. Timberline and forest gradients in the upper Marsyandi River Valley, Nepal. Bulletin of the Ecological Society of America 65:83. A.I.B.S., Colorado State University, Fort Collins, CO.
- 1984 Stromberg-Wilkins, J., and D. T. Patten. Reproductive output and seedling establishment of *Juglans major* along riparian moisture gradients. Bulletin of the Ecological Society of America 65:119. A.I.B.S., Colorado State University, Fort Collins, CO.
- 1984 Turner, B., and D. T. Patten. Recreational impacts on riparian woodlands in central Arizona. Bulletin of the Ecological Society of America 65:249. A.I.B.S., Colorado State University, Fort Collins, CO.
- 1986 Loftin, S., and D. T. Patten. Nitrogen dynamics following fire in a Sonoran Desert ecosystem. Abstract, IVth International Congress of Ecology, Syracuse, NY. Page 219.

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ABSTRACTS AND PRESENTATIONS (CONT.)

- 1986 Patten, D. T., C. Fox, and R. Risser. Effects of stream diversion and instream flow requirements in the riparian ecosystems of the Sierra Nevada. Abstract, First Annual Arizona Riparian Council Meeting, Flagstaff, AZ. Page 11.
- 1986 Stromberg-Wilkins, J., and D. T. Patten. Patterns of reproduction in *Juglans major* as related to yearly moisture stress. Abstract, IVth International Congress of Ecology, Syracuse, NY. Page 324.
- 1986 Stromberg-Wilkins, J., and D. T. Patten. *Juglans major*: reproduction and establishment in terrace and streamside habitat. Abstract, First Annual Arizona Riparian Council Meeting, Flagstaff, AZ. Page 12.
- 1987 Jackson, J., and D. T. Patten. Plant-soil-water relationships in Las Vegas Wash. Abstract, Second Annual Arizona Riparian Council Meeting, Wickenburg, AZ. Page 12.
- 1987 Larkin, G., and D. T. Patten. Regeneration and distribution of riparian species along four streams in the Sierra Anchas, Arizona. Abstract, Second Annual Arizona Riparian Council Meeting, Wickenburg, AZ. Page 16.
- 1987 Larkin, G., and D. T. Patten. Riparian vegetation patterns: a result of recruitment strategies. Abstract, Society of Wetland Scientists, 8th Annual Meeting, "Wetland and Riparian Ecosystems of the West," Seattle, WA. Page 62.
- 1987 Larkin, G., and D. T. Patten. Microsite requirements for successful riparian vegetation regeneration. Abstract, 72nd Annual Meeting, Ecological Society of America, Columbus, OH. Pages 346-347.
- 1987 Patten, D. T., and S. Loftin. Nitrogen flux and allocation in a Sonoran Desert ecosystem following fire. Abstract, 72nd Annual Meeting, Ecological Society of America, Columbus, OH. Page 385.
- 1987 Stromberg-Wilkins, J., and D. T. Patten. Mast cropping in Arizona walnut (*Juglans major*). Abstract, Society of Wetland Scientists, 8th Annual Meeting, "Wetland and Riparian Ecosystems of the West," Seattle, WA. Page 45.
- 1987 Valenciano, D., and D. T. Patten. Gradients within riparian forests of the southwestern U.S. Abstract, Society of Wetland Scientists, 8th Annual Meeting, "Wetland and Riparian Ecosystems of the West," Seattle, WA. Page 48.

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ABSTRACTS AND PRESENTATIONS (CONT.)

- 1987 Valenciano, D., and D. T. Patten. Riparian forests: elevational gradient and relationships to adjacent upland vegetation in the southwestern U.S. Abstract, 72nd Annual Meeting, Ecological Society of America, Columbus, OH. Pages 435-436.
- 1987 Valenciano, D., and D. T. Patten. Montane riparian forests and their relationship to adjacent upland vegetation. Abstract, Second Annual Arizona Riparian Council Meeting, Wickenburg, AZ. Page 18.
- 1988 Patten, D. T. Response of a mountain riparian system to the interaction of phased highway improvements and elk browsing. Bulletin of the Ecological Society of America 69(Supple.):256.
- 1988 Patten, D. T., and J. C. Stromberg. Riparian vegetation response to stream diversion: clues for instream flow requirements. Abstract, Third Annual Arizona Riparian Council Meeting, Casa Grande, AZ.
- 1988 Randall, K. E. and D. T. Patten. Revegetation of the Tempe Rio Salado with native riparian plants -- a land-use plan. Abstract, Third Annual Arizona Riparian Council, Casa Grande, AZ.
- 1988 Stromberg, J. C., and D. T. Patten. A season at the Hassayampa River. Abstract, Third Annual Arizona Riparian Council Meeting, Casa Grande, AZ.
- 1988 Stromberg, J. C., and D. T. Patten. Total protection: one management option. Proceedings of the Symposium, on Restoration, Creation and Management of Wetland and Riparian Ecosystems in the American West, Society of Wetland Scientists, Denver, CO.
- 1989 Patten, D. T. Ecosystem risk assessment: case studies of natural resource perturbation. National Research Council Workshop on Ecosystem Risk Assessment and Monitoring, 2-3 March, Airlie House, VA.
- 1989 Gabriel, I. E., and D. T. Patten. The impacts of industrial air pollutants on a semi-arid ecosystem. Bulletin of the Ecological Society of America 70(2)Supple.:118-119.
- 1989 Richter, B. D., J. C. Stromberg, and D. T. Patten. The influences of flooding in a Southwestern riparian system. Abstract, Fourth Annual Arizona Riparian Council Meeting, Sunrise Ski Resort, McNary, AZ.
- 1989 Stromberg, J. C., and D. T. Patten. Long-term effects of stream diversion on riparian tree growth. Bulletin of the Ecological Society of America 70(2)Supple.:275.

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ABSTRACTS AND PRESENTATIONS (CONT.)

- 1989 Stromberg, J. C., and D. T. Patten. Spruce-fir dynamics. Paper presented at Workshop on Biology of Mt. Graham, 19-21 October, University of Arizona, Tucson, AZ.
- 1989 Stromberg, J. C., and D. T. Patten. Flow needs for growth and maintenance of woody riparian vegetation. Abstract, Fourth Annual Arizona Riparian Council Meeting, Sunrise Ski Resort, McNary, AZ.
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- 1991 Stromberg, J. C., L.G. Wolden, B.A. Rogers, D. T. Patten. Recovery and restoration of the understory flora in mesquite bosques. Natural Areas Society 18th Annual Meeting, Estes Park, Colorado, October 15-18.
- 1992 Patten, D.T. Grand Canyon interim flows: the decision and the consequences. Program and Abstracts, 6th Annual Meeting of the Arizona Riparian Council, Cottonwood, AZ. pg 10.
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- 1992 Patten, D.T. Determination of interim flows from Glen Canyon Dam to protect downstream ecosystems in Grand Canyon. 13th Annual Meeting of the Society of Wetland Scientists, New Orleans, LA May 31-June 1, 1992.
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- 1997 Patten, D.T. Riparian ecosystems of semi-arid North America. Society of Wetland Scientists 18th Annual Meeting Abstracts pg 97. June 1-6, 1997, Bozeman, MT. (Invited).
- 1997 Rouse, L., D.T. Patten and J.C. Stromberg. Factors influencing bird use of desert springs. Society of Wetland Scientists 18th Annual Meeting Abstracts pg 107. June 1-6, 1997, Bozeman, MT.
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- 1997 Patten, D.T. and J.C. Stromberg. The role of groundwater and other hydrologic and geomorphologic parameters in maintenance of riparian vegetational diversity. Assoc. of Ground Water Scientists and Engineers, 1997 AGWSE National Education Program ----
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- 1997 Patten, D.T. Restoration of sustainable riparian ecosystems. U.S.G.S. Forum on Environmental Sustainability. November 12, 1997. Reston, VA. (Invited).
- 1998 Patten, D.T. Restoration: where did we come from, and where are we going. Keynote address: Conference on Practical Approaches to Riparian and Wetland Restoration: from the Mountains to the Plains. The University of Montana, Missoula, MT. April 7-9, 1998. (Invited).
- 1998 Marler, R.J. and D.T. Patten. Response of riverine ecosystems to wastewater inputs. 12th Meeting of the Arizona Riparian Council, Yuma, AZ. April 17-18, 1998. Pg 16 in Abstracts.
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- 1998 Patten, D.T., L. Rouse, and J.C. Stromberg. Vegetation dynamics of Great Basin springs: potential effects of groundwater withdrawal. p.98-99 *in* abstracts of the Society of Wetland Scientists annual meeting, Anchorage, AK. June 7-12, 1998.
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- 1998 Patten, D.T. Great Basin and southwest desert riparian ecology. Society of Wetland Scientists, Western and Rocky Mountain Chapters annual meeting. Ecology and Management of Southwestern Riparian Systems. Reno, NV. October 8-9, 1998.(Invited).
- 1998 Stromberg, J.C. and D.T. Patten. Functional equivalency of saltcedar (*Tamarix chinensis*) and Fremont cottonwood (*Populus fremontii*) along a free-flowing river. Society of Wetland Scientists, Western and Rocky Mountain Chapters annual meeting. Ecology and Management of Southwestern Riparian Systems. Reno, NV. October 8-9, 1998. (Invited).

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- 1999 Patten, D.T. and J.C. Stromberg. Riparian restoration decisions: lessons from two dewatered eastern Sierra streams. Society of Wetland Scientists. June 6-12, 1999. Norfolk, VA.
- 1999 Patten, D.T., L. Rouse, and J.C. Stromberg. Great Basin springs: vegetation response to potential groundwater withdrawal. Ecological Society of America. Annual Meeting, Spokane, WA. August 8-12, 1999.
- 1999 Patten, D.T. Riparian challenges in the United States. Riparian Restoration Conference, Red Deer, Alberta, Canada. October 20-21, 1999. (Invited)
- 1999 Patten, D.T. Riverine restoration in the West and dam constraints. River Restoration Conference, Utah Riparian and Wetland Center, Salt Lake City, UT November 18, 1999. (Invited).
- 2000 Patten, D.T. The need for passive restoration of natural riparian functions: an ecologist's view. Southwest River Management Restoration Conference. Arizona Floodplain Management Association. Phoenix, AZ. April 3-5, 2000. (Invited).
- 2000 Patten, D.T. Importance of riparian zones and their ecological services. Southwest River Management Restoration Conference. Arizona Floodplain Management Association. Phoenix, AZ. April 3-5, 2000. (Invited).
- 2000 Patten, D.T. and J.C. Stromberg. Ecological consequences of groundwater withdrawal and aquifer protection in the arid-West. Geological Society of America Abstracts with Program Vol 32 (7): A140. GSA. Annual Meeting Reno, NV. Nov. 13-16, 2000. (Invited).
- 2000 Patten, D.T. and J.C. Stromberg. Riparian tree growth-streamflow models may reflect climate-induced hydrologic changes. Eos, Transactions, American Geophysical Union (Supplement) 81 (no. 48):517. AGU Fall Meeting, December 15-19, 2000, San Francisco, CA. (Invited).
- 2000 Patten, D.T. Developing effective ecological indicators of watershed analysis. USGS, Yellowstone River National Water Quality Assessment meeting. Sheridan, WY. Feb. 29-Mar.1, 2000.

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- 2002 Patten, D.T. Linkages between rangeland indicator efforts: Sustainable Rangeland Roundtable and Heinz Center Programs. Society of Rangeland Management, Kansas City, MO, February 14-18, 2002.
- 2002 Patten, D.T. Development of rangeland /grassland -shrubland indicators within the context of the "State of the Nation's Ecosystems" Project. Symposium on Rangeland Indicators from the State of the Nation=s Ecosystem Report, Heinz Center Report. Society of Rangeland Management, Kansas City, MO, February 14-18, 2002
- 2003 Patten, D.T. What is "Historic Range of Variability" and how can it be applied to ecosystem management? An Introduction and Overview. Society of Rangeland Management. Casper, WY.
- 2003 Patten, D.T. and D. Schmitz. Riparian processes and management of large and small rivers in the northern Rocky Mountains. Society of Wetland Scientist. New Orleans, LA
- 2003 Schmitz, D. and D.T. Patten. Riparian herbaceous vegetation: an indicator of floodplain-stream connectivity. Society of Wetland Scientists. New Orleans, LA. May 2003.
- 2003 Schmitz, D. and D.T. Patten. Riparian patch types as indicators of watershed hydrologic complexity. Ecological Society of America. Savannah, GA. August 2003.
- 2003 Patten, D.T. and K. Boyd. Science and Watershed Management. Montana Watershed Coordinating Council Conference. Great Falls, MT. December 2003.
- 2003 Bennett, D.A., McGinnis, D.L., Patten, D., Shogren, J.F., Travis, W.R. 2003. Modeling Yellowstone's Northern Elk Winter Range as a Complex Adaptive System. Annual meeting of the Association of American Geographers. New Orleans, LA.
- 2004 Patten, D.T. and K. Meador. Seasonal Changes in Water Sources for Clonal Aspen and Willow in the Greater Yellowstone Area. Society of Wetland Scientists. Seattle, WA. July 2004.
- 2005 Patten, D.T. Restoration Goals: The Role of Science, Policy, Historic Perspectives and Adaptive Management. Invited Keynote. UCOWR Annual Meeting. Portland, ME. July 13-15, 2005.

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- 2005 Patten, D.T. and K. Cary. Willow and Aspen Response to Browse and Water Sources in Yellowstone's Northern Range. Contributed Paper. Yellowstone National Park, Bicentennial Conference. October 17-19, 2005.
- 2005 Patten, D.T. Western Water and Wetlands: On the Edge. Western Wetlands Conference. Denver, CO. October 25-26, 2005. (Invited Plenary Talk.)
- 2005 Patten, D.T., R. Marler, J. Stromberg. Effluent, A "New" Water Source: Asset or Problem. Contributed Paper. Western Wetlands Conference. Denver, CO. October 25-26, 2005.
- 2005 Ammond, S., D. Schmitz, and D. Patten. Studying the effects of small dam removal on woody riparian species in Montana using aerial photo interpretation and field surveys. Floodplains and rivers: connections and reconnections. Center for Riverine Science and Stream Re-naturalization. September 22 and 23, 2005. Missoula, Montana.
- 2005 Schmitz, D., S. Ammond, M. Blank, and D. Patten. Long-term hydrogeomorphic effects of dam failure/removal a pilot study. Surface Water/Groundwater: One resource. Montana American Water Resources Association. October 2005. Bozeman, Montana.
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- 2006 Patten, D.T. Vegetation of Great Basin Isolated Spring Wetlands: Hydrogeochemical Controls. Nevada Water Resources Association annual meeting. Mesquite, NV. February 22-23, 2006. (invited).
- 2006 Heikes-Knapton, S. and D.T. Patten. Subalpine Wetlands: Environmental Drivers and Response to Human Perturbation and Restoration. Montana AWRA, Polson, MT. October 12-13, 2006
- 2006 Schmitz, D., B. McGlynn and D.T. Patten. Spring Characterization in Bighorn Canyon NRA. Montana AWRA, Polson, MT. October 12-13, 2006
- 2007 Patten, D.T. Vegetation of isolated spring wetlands in the Great Basin and Mojave Deserts: Potential response to groundwater withdrawal for urban expansion. Society of Wetland Scientists, Sacramento, CA. June 10-15, 2007.
- 2007 Heikes-Knapton and D.T. Patten. Subalpine wetlands: Environmental drivers and response to human perturbation and restoration. Society of Wetland Scientists, Sacramento, CA. June 10-15, 2007.

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- 2007 Gardner, K.G, B.L. McGlynn, D.T. Patten, L.J. Graumlich, R.L. Lawrence, and J. Shanley. Impact of land use change on nitrogen export in mountain watersheds: the importance of spatial location, American Geophysical Union Annual Fall Meeting.
- 2008 Heikes-Knapton, S. and D.T. Patten. Subalpine wetlands: Environmental drivers and response to human perturbation and restoration. Montana AWRA, Big Sky, MT. October 2008.
- 2009 Bunn, V. and D. T. Patten. Effects of Riparian Exclosures on Adjacent Riverine Ecosystems (poster). Montana AWRA, Missoula, MT. October 1-2, 2009.
- 2009 Patten, D.T. and J. Stromberg. Riparian ecology and restoration in the arid and semiarid west: lessons learned. Restoring the West Conference. Logan, Utah. October 27-28, 2009 (invited).
- 2010 Patten, D.T. Vegetation dynamics of isolated Mojave and Great Basin springs: Response to potential hydrologic changes. Society of Wetland Scientists, Pacific Northwest Chapter, Annual Meeting. Bellingham, WA. April 28-29, 2010.
- 2010 Heikes-Knapton, S. and D.T. Patten. Subalpine wetlands: Characterization, environmental drivers, and response to human perturbation and restoration. Society of Wetland Scientists, Pacific Northwest Chapter, Annual Meeting. Bellingham, WA. April 28-29, 2010.
- 2010 Patten, D.T. Wetland and Riparian Ecosystems, Small but Important Landscape Components in the Intermountain West. Society of Wetland Scientists, Annual Meeting, Salt Lake City, June 28-July 1, 2010. (Invited plenary speaker).
- 2012 Patten, D.T. Hydraulic Fracturing: Progress or Problems? Boom or Bust? (Invited lecture to Wonderlust Lecture Series, Montana State University, April 9, 2012).
- 2012 Patten, D.T. Wetland and Riparian Ecosystems and the Effects of Energy Development and Associated Rural Expansion on Regional Water Resources in NE Montana. Montana Wetland Council, Lewistown, MT May 30, 2012 (Invited speaker).

PUBLICATIONS IN PEER REVIEWED JOURNALS

- 1963 Patten, D. T. Vegetation patterns in relation to environments in the Madison Range, Montana. Ecological Monographs 33:375-406.

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- 1963 Patten, D. T. Light and temperature influence on Engelmann spruce seed germination and forest advance. *Ecology* 44:817-818.
- 1968 Patten, D. T. Dynamics of the shrub continuum along the Gallatin River in Yellowstone National Park. *Ecology* 49:1107-1112.
- 1969 Patten, D. T. Succession from sagebrush to mixed conifer forest in the northern Rocky Mountains. *American Midland Naturalist* 82:229-240.
- 1969 Patten, D. T. Forest succession in Yellowstone National Park. *National Park Magazine* 43:21-22.
- 1969 Patten, D. T., and B. E. Dinger. Carbon dioxide exchange patterns of cacti from different environments. *Ecology* 50:686-688.
- 1970 Gibbs, J. G., and D. T. Patten. Heat flux and plant temperatures in a Sonoran Desert ecosystem. *Oecologia* 5:165-184.
- 1972 Dinger, B. E., and D. T. Patten. Carbon dioxide in selected species of *Echinocereus* (Cactaceae). *Photosynthetica* 6:345-353.
- 1974 Dinger, B. E., and D. T. Patten. Carbon dioxide exchange and transpiration in species of *Echinocereus* (Cactaceae), as related to their distributions within the Pinaleno Mountains, Arizona. *Oecologia* 14:389-411.
- 1974 Halvorson, W. L., and D. T. Patten. Moisture stress in Upper Sonoran Desert shrubs in relation to soil moisture and topography. *Ecology* 55:173-177.
- 1974 Nisbet, R. A., and D. T. Patten. Seasonal temperature acclimation of a prickly pear cactus in south central Arizona. *Oecologia* 15:345-352.
- 1975 Halvorson, W. L., and D. T. Patten. Productivity and flowering of winter ephemerals in relation to Upper Sonoran Desert shrubs. *American Midland Naturalist* 93:311-319.
- 1975 Longstreth, D. J., and D. T. Patten. Conversion of chaparral to grass in central Arizona: effects on selected ions in watershed runoff. *American Midland Naturalist* 93:25-34.
- 1978 Patten, D. T. Productivity and production efficiency of an Upper Sonoran Desert ephemeral community. *American Journal of Botany* 65:891-895.
- 1984 Cave, G. H., and D. T. Patten. Short-term vegetation responses to fire in the Upper Sonoran Desert. *Journal of Range Management* 37:491-496.

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- 1984 Patten, D. T., and G. H. Cave. Fire temperatures and physical characteristics of a controlled burn in the Upper Sonoran Desert. *Journal of Range Management* 37:277-280.
- 1987 Smith, S. D., R. Monson, and D. T. Patten. Effects of artificially imposed shade on a Sonoran Desert ecosystem: microclimate and vegetation. *Journal of Arid Environments* 13:65-82.
- 1987 Smith, S. D., W. E. Smith, and D. T. Patten. Effects of artificially imposed shade on a Sonoran Desert ecosystem: arthropod and soil chemistry responses. *Journal of Arid Environments* 13:245-257.
- 1990 Stromberg, J. C., and D. T. Patten. Riparian vegetation instream flow requirements: a case study from a diverted stream in the eastern Sierra Nevada, California. *Environmental Management* 14:185-194.
- 1990 Stromberg, J. C., and D. T. Patten. Seed production and seedling establishment of a southwest riparian tree, Arizona walnut (*Juglans major*). *Great Basin Naturalist* 50(1):47-56.
- 1990 Stromberg, J. C., and D. T. Patten. Variation in seed size of a Southwestern riparian tree, Arizona walnut (*Juglans major*). *American Midland Naturalist* 124(2):269-277.
- 1990 Stromberg, J. C., and D. T. Patten. Flower production and floral ratios of a Southwestern riparian tree, Arizona walnut (*Juglans major*). *American Midland Naturalist* 124(2):278-288.
- 1991 Patten, D. T. Human impacts in the greater Yellowstone ecosystem: evaluating sustainability goals and eco-redevelopment. *Conservation Biology* 5 (3): 405-411.
- 1991 Stromberg, J. C., and D. T. Patten. Dynamics of the spruce-fir forest on the Pinaleno Mountains, Graham County, Arizona. *Southwestern Naturalist* 36(1):37-48.
- 1991 Stromberg, J. C., and D. T. Patten. Instream flow requirements for cottonwoods at Bishop Creek, Inyo County, California. *Rivers* 2(1):1-11.
- 1991 Stromberg, J.C., D. T. Patten, and B. D. Richter. Flood flows and dynamics of Sonoran riparian forests. *Rivers* 2(3): 221-235.
- 1991 Wolden, L., J. Stromberg, D. Patten, and H. Richter. Understory restoration in three riparian forest types (Arizona). *Restoration and Management Notes* 8(2):116-117.

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- 1992 Stromberg, J.C. and D.T. Patten. Mortality and age of black cottonwood stands along diverted and undiverted streams in the eastern Sierra Nevada, California. *Madrono* 39:205-223.
- 1992 Stromberg, J.C. and D.T. Patten. Response of *Salix lasiolepis* to augmented stream flows in the upper Owens River. *Madrono* 39:224-235.
- 1993 Patten, D.T. Herbivore optimization and overcompensation, does response of western rangelands to native herbivory support these theories? *Ecological Applications* 3:35-36.
- 1993 Stromberg, J.C., B.D. Richter, D.T. Patten, and L.G. Wolden. Response of a Sonoran riparian forest to a 10-year return flood. *Great Basin Naturalist* 53(2):118-130.
- 1993 Stromberg, J.C. and D.T. Patten. Seed and cone production by Engelmann spruce in the Pinaleno Mountains, Arizona. *J. Arizona-Nevada Academy of Sciences*. 27(1): 79-88.
- 1993 Wiens, J.A., D.T. Patten, D.B. Botkin. Assessing ecological impact assessment: lessons from Mono Lake, California. *Ecological Applications* 3:595-609.
- 1994 Gabriel, I.E. and D.T. Patten. Distribution of copper smelter emissions in southeastern Arizona - using honey mesquite as a bioindicator. *Water, Air and Soil Pollution* 72:67-87.
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- 1994 Gabriel, I.E. and D.T. Patten. Changes in the inorganic element concentration spectrum of mesquite foliage during operational and non-operational periods of a copper smelter. *Water, Air and Soil Pollution* 81:207-217.
- 1994 Averitt, E., F. Steiner, R.A. Yabes, and D. Patten. An assessment of the Verde River Corridor Project in Arizona. *Landscape and Urban Planning* 28:161-178.
- 1995 Gabriel, I.E. and D.T. Patten. Establishing a "Sonoran Reference Plant" as standard for monitoring industrial and urban pollution throughout the Sonoran Desert. *Environmental Monitoring and Assessment* 36:27-43.
- 1995 Wolden, L.C., J.C. Stromberg, and D.T. Patten. Flora and vegetation of the Hassayampa River Preserve, Maricopa County, Arizona. *J. Arizona-Nevada Academy of Sciences* 28:76-111.

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- 1996 Jacquez, G.M. and D.T. Patten. *Chesneya nubigena* on a Himalayan glacial moraine: a case of facilitation in primary succession. *Mountain Research and Development* 16: 265-273.
- 1996 Stromberg, J.C., and D.T. Patten. Instream flow and cottonwood growth in the Eastern Sierra Nevada of California, USA. *Regulated Rivers: Research and Management* 12:1-12.
- 1997 Stromberg, J.C., J. Fry, and D.T. Patten. Marsh development after large floods in an alluvial, arid-land river. *Wetlands* 17:292-300.
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- 1985 Stromberg-Wilkins, J. C., and D. T. Patten. Silvics of Arizona walnut (*Juglans major*). Report prepared for Forestry Sciences Laboratory, Rocky Mountain Forest and Range Experiment Station, U.S. Forest Service, Arizona State University.
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- 1988 Patten, D. T., and J. Stromberg-Wilkins. Inventory, mapping, and evaluation of the riparian vegetation along Rush Creek, Mono County, California. Report to Los Angeles Department of Water and Power. 50 pages.
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- 1991 Stromberg, J. C., and D. T. Patten. Cottonwood age structure and mortality at Bishop and Pine Creeks. Report prepared for Southern California Edison Co., Rosemead, CA.
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- 1994 Patten, D.T., J.C. Stromberg, M.R. Sommerfeld. Water and riparian resources of the Santa Cruz River Basin: best management practices for water and resource quality. Final Report to Southwest Center for Environmental Research and Policy. University of Utah, Civil Engineering, Salt Lake City, UT.
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- 1998 Patten, D.T. Integration and evaluation of Glen Canyon Environmental Studies research findings: the Grand Canyon riverine ecosystem functions, processes and relationships among biotic and abiotic driving and response variables. Final Report to the Department of the Interior Grand Canyon Monitoring and Research Center, Flagstaff, AZ

GRADUATE STUDENT PROGRAM

M.S. in Botany, M.S. in Natural Sciences, MS in Land Rehabilitation, MS in Land Resources -- 35 students completed (through 2011), one student in progress.

Ph.D. in Botany and Ecology and Environmental Sciences -- Sixteen students completed (through 2011).

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REPORTS (CONT.)**COURSES TAUGHT**

Ecological Methods
 Plant Ecology
 Ecology and Conservation
 Plant Geography
 Fundamentals of Biology
 General Botany (directed program 1964-70)
 Graduate Seminars in various aspects of botany and ecology
 Morphology of Nonvascular Green Plants
 Introduction to Water Resources

PRINCIPAL AREAS OF RESEARCH INTEREST

Plant Ecology
 Conservation
 Applied Ecology (Man's impact)
 Physiological Ecology of Desert Plants
 Environment-Vegetation Relations
 Structure and Function of Desert and Mountain Subalpine Ecosystems
 Restoration Ecology
 Riparian Ecosystems
 Isolated Spring Wetlands
 Watershed Landscapes and Ecosystems

COMMUNITY SERVICE

Arizona Conservation Education Advisory Council, 1969-71.
 Comprehensive Health Planning Council: Air Pollution Committee, 1970-71.
 Valley Forward Association: Environmental Quality Control Committee, 1971-73.
 Planning and Zoning Commission, City of Tempe, 1971-76.
 United Fund, Chairman, Arizona State University, 1971.
 Board of Trustees, Desert Botanical Garden, Phoenix, AZ, 1979-85; President, 1981-83.
 Governor's Commission on Arizona Environment, 1980-83.
 Board of Trustees, Research Ranch, Elgin, AZ, 1982-88.
 Board of Trustees, Museum of Northern Arizona, Flagstaff, AZ, 1983-91.
 Board of Trustees, Arizona Nature Conservancy, Tucson, AZ, 1987-96.
 Board of Directors, Southwest Center for Education in the Natural Environment. 1992-1995.
 Board of Trustees, Southwest Rivers. 2002-2003
 Science and Technical Advisory Committee, American Rivers. 1995-present.
 Board of Trustees, Future West. 2011-present.

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