

BIOGRAPHICAL SKETCH: Steven R. Archer

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PROFESSIONAL PREPARATION

Augustana College	Biology	BA, 1975
Colorado State University	Rangeland Ecosystem Science	MS, 1980
Colorado State University	Rangeland Ecosystem Science	PhD, 1983

APPOINTMENTS

1999-Present	Professor, School of Natural Resources, The University of Arizona
1993-1999	Professor and Associate Department Head (Research/Graduate Programs), Department of Rangeland Ecology & Management, Texas A&M University
1991-1992	Visiting Scientist, National Center for Atmospheric Research, Boulder
1988-1993	Associate Professor, Dept. Rangeland Ecology & Management, Texas A&M
1983-1988	Assistant Professor, Department of Range Science, Texas A&M University

- **Graduate Mentors:** MJ Trlica (MS) & JK Detling (PhD), Colorado State University
- **Total number of graduate students advised:** 27 completed (10 MS, 16 PhD); currently advising 4 graduate students
- **Total number of Post-Docs sponsored:** 12

PROFESSIONAL SOCIETIES

Certification: Certified Senior Ecologist, Ecological Society of America.

Membership: Ecological Society of America, American Institute of Biological Scientists, American Geophysical Union, International Association for Vegetation Science, International Association for Landscape Ecologists, Society for Range Management

HONORS AND DISTINCTIONS

- Fellow, American Association for the Advancement of Science (AAAS) (2009-Present)
- Plenary speaker, International workshop on “Abrupt grass-woodland transitions: Determinants and consequences for ecosystem services”, Punta del Este, Uruguay (2012)
- Plenary Speaker, 2nd National Congress on Silvopastoral Systems, Santiago del Estero, Argentina (2012)
- R.D. Watt Centenary Lecture, Faculty of Agriculture, Food and Natural Resources, University of Sydney (2011)
- Leaders in Agriculture Lecture, Sul Ross State University (2009)
- Davidson Lecture, Baylor University (2003)
- Leu Distinguished Lecture, University of Nebraska (1999)
- Distinguished Achievement Award, Alumni Council, Augustana College (1996)
- Publication Award (Technical Writing), Society for Range Management (1995)
- Outstanding Achievement Award, Society for Range Management (1995)
- Stobbs Lecture, James Cook University (1993)
- Keynote Paper, 7th Australian Rangelands Conference (1992)

- Elroy Rice Lecture, University of Oklahoma (1986)

SYNERGISTIC ACTIVITIES (selected)

- Editorial Board, *Journal of Arid Environments* (2006-present), *Ecosphere* (2011-2012)
- Grasslands Indicators Technical Team, US Global Change Research Program National Climate Assessment (2012-present)
- Invited participant, International workshop on “Abrupt grass-woodland transitions: determinants and consequences for ecosystem services”, Punta del Este, Uruguay (2012)
- Invited participant, 2nd National Congress on Silvopastoral Systems, Santiago del Estero, Argentina (2012)
- Writing Team, National CEAP (Conservation Evaluation Assessment Project), USDA-NRCS; lead writer on ‘Woody Plant Management’ section of the national report (2007-2009).
- Steering Committee, Challenges and Opportunities in Remote Sensing of Global Savannas: A Scoping Study for new NASA Terrestrial Ecology Field Campaign (2010-2011)
- Writing Team, US Climate Change Science Program Synthesis: “Effects of global change on agriculture, biodiversity, land, and water resources” (2006/2007)
- Writing Team, NEON Consortium for Connectivity at Continental Scales Invasive Species and Infectious Disease theme RFI.
- Writing Team, NEON Desert Southwest Domain RFI
- Invited participant, Earth System Partnership Global Carbon Project Workshop “Earth System Feedbacks: Vulnerability of the Carbon Cycle to Drought & Fire” (Canberra, Australia, 2006)
- SCOPE/FAO Global Biogeochemistry Consequences subgroup, “Livestock in a changing landscape” initiative (Rome, March 2006; Bangkok Nov 2006)
- Invited Participant, Wild Rangelands: Conservation in the World’s Grazing Ecosystems Workshop, The Zoological Society of London, Regents Park (January 2006)
- Invited participant, CUAHSI (Consortium of Universities for Advancement of Hydrologic Science, Inc.) Visioning Workshop: Ecohydrology of Arid/Semiarid Environs (2004-2005)
- Program Review Team, Joseph W. Jones Ecology Center (Feb 2003)
- Invited Speaker, Ecohydrology of Brush Encroachment, American Geophysical Union Annual Meetings (2002)
- Invited speaker, ‘Ecosystem Simplification’ symposium, Soc. Range Mgmt Ann Mtgs (2001)
- Invited speaker NASA/Land Cover Land Use Change Workshop “ Changing Landscapes of Rural America” (Sep. 2000, Mammoth Hot Springs, MT)
- Invited speaker ‘Land Use and Land Cover Change’ symposium, Ecological Society of America Annual Meetings (August 2000)
- National Science Foundation, Ecology Program Panel (1994-1999)
- Invited presentation, Symposium: Integrated Life and Earth Science Approaches to Understanding Global and Environmental Change, University of Texas (April 1999)
- Invited presentation, Sevilleta LTER workshop, University of New Mexico (Jan ‘99)
- Lecturer, USDA/NRCS Soil Science Institute short course 1998.
- Invited speaker, National Center for Atmospheric Research Summer Colloquium on ‘Terrestrial Ecosystems and the Atmosphere’ (1996)
- Lecturer, USDA/NRCS Rangeland Ecology short course (1989-1995)
- Co-Organizer of National Center for Ecological Analysis & Synthesis project on ‘Interactions in Mixed Tree-Grass Systems
- IGBP-Global Change in Terrestrial Ecosystems Task 3.1 (Impacts on Range and Pasture).

FEDERAL GRANTS RECEIVED (2001-present): \$14,000,000

- National Science Foundation (Ecology Program, Ecosystems Program, LTER Program, Research Experience for Undergraduates and Research Experience for Teachers Program)
- USDA (Managed Ecosystems Program)
- NASA (Carbon Cycle Science Program, Land Cover/Land Use Change Program)

PUBLICATIONS SUMMARY

Published Abstracts:	299	Invited Papers/Presentations:	166
Refereed Publications:	106	Official Reports:	41
Book Chapters:	27	Workshop/Symposium Proceedings:	25
Edited Volumes:	2	Popular Articles:	7

SELECTED PUBLICATIONS (student/post-doc underlined)

- Brown, JR, S. Archer. 1987. Woody plant seed dispersal and gap formation in a North American subtropical savanna woodland: the role of domestic herbivores. *Vegetatio* 73:73-80.
- Brown, JR, S Archer. 1989. Woody plant invasion of grasslands: establishment of mesquite *Prosopis glandulosa*) on sites differing in herbaceous biomass and grazing history. *Oecologia* 80:19-26.
- Brown, JR, S Archer. 1990. Water relations of a perennial grass and seedling versus adult woody plants in a subtropical savanna, Texas. *Oikos* 57:366-374.
- Owens, MK, RB Wallace, S Archer. 1995. Microsite influences on shrub recruitment in a disturbed semi-arid *Quercus-Juniperus* woodland. *Oikos* 74:493-502.
- Brown, JR, S Archer. 1999. Shrub invasion of grassland: recruitment is continuous and not regulated by herbaceous biomass or density. *Ecology* 80:2385-2396.
- Miller, D, SR Archer, SF Zitzer, MT Longnecker. 2001. Annual rainfall, topographic heterogeneity and growth of an arid land tree (*Prosopis glandulosa*) . *Journal of Arid Environments* 48:23-33.
- Jurena, PN, Archer, S. 2003. Woody plant establishment and spatial heterogeneity in grasslands. *Ecology* 84:907-919.
- Asner, GP, Archer, SR, Hughes, RF, Ansley, RJ, Wessman, CA. 2003. Net changes in regional woody vegetation cover and carbon storage in Texas drylands, 1937-1999. *Global Change Biology* 9:316-335.
- McCulley, RL, SR Archer, TW Boutton, FM Hons, DA Zuberer. 2004. Soil respiration and nutrient cycling in wooded communities developing in grassland. *Ecology* 85: 2804-2817.
- Dale, V, S Archer, M Chang, and DS Ojima. 2005. Ecological impacts and mitigation strategies for rural land management. *Ecological Applications* 15: 1879-1892.
- Fensham, RJ, RJ Fairfax, and S Archer. 2005. Rainfall, land use and woody vegetation cover change in semi-arid Australian savanna. *Journal of Ecology* 93:596-606.
- Herrick, JE, BT Bestelmeyer, S Archer, AJ Tugel, JR Brown. 2006. An integrated framework for science-based arid land management. *Journal of Arid Environments* 65:319-335.
- Hughes, RF, SR Archer, GP Asner, CA Wessman, C McMurtry, J. Nelson, RJ Ansley. 2006. Effects of woody encroachment on C and N pools of a Texas savanna ecosystem. *Global Change Biology* 12:1733-1747.
- McCulley, R., Boutton, TW, Archer, SR. 2007. Soil respiration in a subtropical savanna parkland: responses to water additions. *Soil Science Soc. America Journal* 71:820-828.
- Wheeler, CW, SR Archer, GP Asner, CR McMurtry. 2007. Climate and edaphic controls on soil carbon-nitrogen responses to woody plant encroachment in desert grassland. *Ecological Applications* 17:1911-1928
- McCulley, R., Boutton, TW, Archer, SR. 2007. Soil respiration in a subtropical savanna parkland: responses to water additions. *Soil Science Soc. America Journal* 71:820-828.

- Wheeler, CW, SR Archer, GP Asner, CR McMurtry. 2007. Climate and edaphic controls on soil carbon-nitrogen response to woody plant encroachment in desert grassland. *Ecological Applications* 17:1911-1928.
- Knapp AK, Briggs JM, Collins SL, Archer SR, et al.. 2008. Shrub encroachment in North American grasslands: Shifts in growth form dominance rapidly alters control of ecosystem carbon inputs. *Global Change Biology* 14:615-623.
- Throop, HL, SR Archer. 2008. Shrub (*Prosopis velutina*) encroachment in a semi-desert grassland: spatial-temporal changes in soil organic carbon and nitrogen pools. *Global Change Biology* 14: 2420-2431.
- Okin, GS, D'Odorico, P, Archer, SR. 2009. Impact of feedbacks on Chihuahuan desert grasslands: transience and metastability. *Journal of Geophysical Research – Biogeosciences*:114: G01004.
- Liu, F., X. Ben Wu, E Bai, TW Boutton, SR Archer. 2010. Spatial scaling of ecosystem C and N in a subtropical savanna landscape. *Global Change Biology* 16: 2213-2223.
- Woods, SR, SR Archer, S Schwinning. 2011. Early taproot development of a xeric shrub (*Larrea tridentata*) is optimized within a narrow range of soil moisture. *Plant Ecology* 212:507-517.
- Liu, F. XB Wu, E Bai, TW Boutton, SR Archer. 2011. Quantifying soil organic carbon in complex landscapes: an example of grassland undergoing encroachment of woody plants. *Global Change Biology* 17: 1119-1129
- Browning, DM, Archer, SR. 2011. Protection from livestock fails to deter shrub proliferation in a desert landscape with a history of heavy grazing. *Ecological Applications* 21:1629–1642.
- Barger, NN, SR Archer, et al. 2011. Woody plant proliferation in North American drylands: a synthesis of impacts on ecosystem carbon balance. *Journal Geophysical Research – Biogeosciences* 116, G00K07, doi:10.1029/2010JG001506.
- Throop, HL, LG Reichman, OE Sala, SR Archer. 2012. Response of dominant grass and shrub species to water manipulation: An ecophysiological basis for shrub invasion in a Chihuahuan Desert Grassland. *Oecologia* 169:373–383. DOI 10.1007/s00442-011-2217-4.
- Bai, E., T. W. Boutton, F. Liu, X. B. Wu, C. T. Hallmark, and S. R. Archer. 2012. Spatial variation of soil $\delta^{13}\text{C}$ and its relation to carbon input and soil texture in a subtropical lowland woodland. *Soil Biology and Biochemistry* 44:102-112.
- Bai, E., TW Boutton, F Liu, XB Wu, SR Archer. 2012. Spatial patterns of soil $\delta^{13}\text{C}$ reveal grassland-to-woodland successional processes. *Organic Geochemistry* 42: 1512-1518
doi:10.1016/j.orggeochem.2010.11.004
- Barnes, PB, HL Throop, ML Abbene[§], SR Archer. 2012. Soil coverage reduces photodegradation and promotes development of soil-microbial films on dryland leaf litter. *Ecosystems* 15:311-321. DOI: 10.1007/s10021-011-9511-1
- von Arx, G, SR Archer, Hughes, MK (2012). Long-term functional plasticity in plant hydraulic architecture in response to release from drought stress. *Annals of Botany* 109:1091-1100 doi: 10.1093/aob/mcs030.
- Hewins, DB, SR Archer, GS Okin, RL McCulley, HL Throop. 2012. Soil-litter mixing accelerates decomposition in a Chihuahuan Desert grassland. *Ecosystems* 16:183-195. doi: 10.1007/s10021-012-9604-5
- Bai, E., TW Boutton, F Liu, XB Wu, SR Archer. 2013. ^{15}N isoscapes in a subtropical savanna parkland: spatial-temporal perspectives. *Ecosphere* 4(1):4. <http://dx.doi.org/10.1890/ES12-00187.1>
- Liu, F., SR Archer, SR, F Gelwick, E Bai, TW Boutton, X Wu. 2013. Woody plant encroachment into grasslands: spatial patterns of functional group distribution and community development. *PLOS One* 8(12): e84364. doi:10.1371/journal.pone.0084364.
- Woods, SR, SR Archer, S Schwinning. 2014. Seedling responses to water pulses in shrubs with contrasting histories of grassland encroachment. *PLOS One* 9:e87278.doi:10.1371/journal.pone.0087278
- Lee, H., J Fitzgerald, DB Hewins, RL McCulley, SR Archer, T Rahn, HL Throop. 2014. Soil moisture and soil-litter mixing effects on surface litter decomposition: A controlled environment assessment. *Soil Biology & Biochemistry* 72:123-132.
- Browning, DM, J Franklin, SR Archer, JK Gillan, DP Guertin. 2014. Spatial patterns of grassland-shrubland state transitions: a 74 year record on grazed and protected areas. *Ecological Applications* In Press doi:10.1890/13-2033.1
- Barnes, PW, HL Throop, SR Archer, DD Breshears, RL McCulley, MA Tobler. 2014. Sunlight and soil-litter mixing: drivers of litter decomposition in drylands. *Progress in Botany* 76: 273-302. Doi: 10.1007/978-3-319-08807-5_11.

- Archer, SR, Predick, KI. 2014. An ecosystem services perspective on brush management: research priorities for competing land use objectives. *Journal of Ecology* 102:1394-1407. doi: 10.1111/1365-2745.12314
- Bestelmeyer, BT, GS Okin, MC Duniway, SR Archer, NF Sayre, JC Williamson, JE Herrick. 2014. Desertification, land use and the transformation of global drylands. *Frontiers in Ecology and the Environment* In Press.

SELECTED BOOK CHAPTERS (since 2001)

- Archer, S, TW Boutton, KA Hibbard. 2001. Trees in grasslands: biogeochemical consequences of woody plant expansion, pp. 115-137. In: *Global Biogeochemical Cycles in the Climate System* (E-D Schulze, SP Harrison, M Heimann, EA Holland, J Lloyd, IC Prentice, D Schimel, eds.). Academic Press, San Diego.
- Wessman, CA, Archer, S, Johnson, LC, Asner, GP. 2004. Woodland expansion in US grasslands: assessing land-cover change and biogeochemical impacts, pp 185-208. In: *Land Change Science: Observing, Monitoring and Understanding Trajectories of Change on the Earth's Surface* (G. Gutman, et al. eds.). Kluwer Academic Publishers.
- Fuhlendorf, SD, SR Archer, FE Smeins, DM Engle, CA Taylor. 2008. The Combined influence of grazing, fire and herbaceous productivity on tree-grass interactions, pp 219-238. IN: *Western North American Juniperus Communities*. Springer, New York.
- Ryan, M, Archer, S. & Contributors. 2008. Land Resources: Forests and Arid Lands, pp. 75-120. In: *The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity* (P. Backlund, A. Janetos, D. Schimel, eds.). Synthesis & Assessment Product 4.3, US Climate Change Program, Washington, DC. <http://www.sap43.ucar.edu/>
- Archer, SR. 2010. Rangeland conservation and shrub encroachment: new perspectives on an old problem, pp. 53-97. In: *Wild Rangelands: Conserving Wildlife While Maintaining Livestock in Semi-Arid Ecosystems* (Johan du Toit, R. Kock, J. Deutsch, eds.). Wiley-Blackwell, Oxford.
- Asner, GP, SR Archer. 2010. Livestock and the global carbon cycle, pp. 69-82. In: *Livestock in a Changing Landscape: Volume 1, Drivers, Consequences and Responses* (H Steinfeld, HA Mooney, F Schneider, LE Neville, eds.). Island Press, Washington, D.C.
- Archer, SR, KW Davies, TE Fulbright, KC McDaniel, BP Wilcox, KI Predick. 2011. Brush management as a rangeland conservation strategy: a critical evaluation, pp. 105-170. In: *Conservation Benefits of Rangeland Practices: Assessment, Recommendations, and Knowledge Gaps* (DD Briske, ed.). United States Department of Agriculture, Natural Resources Conservation Service, Washington, DC.
- Peters, DPC, Archer, SR, Bestelmeyer, BT, et al. 2013. Vulnerability of ecosystem services to cumulative threats that result in desertification, pp. In Press. In: *Vulnerability of Ecosystems to Climate* (TR Seastedt, KN Suding, eds). Vol. 4 in the *Climate vulnerability Series* (RA Pilke, Sr. lead editor). Elsevier

COURSES TAUGHT:

- Undergraduate
Classes:
- *Rangeland Ecology* (Colorado State University)
 - *Fundamentals of Ecology* (Texas A&M University)
 - *Foundations in Natural Resources History & Policy* (University of Arizona)
 - *Conservation of Natural Environments* (University of Arizona)
- Graduate
Classes:
- *Rangeland Ecosystem Structure & Function I* Laboratory (Colorado State University)
 - *Ecology of Shrubs and Shrublands* (Texas A&M Univ, Univ Arizona)
 - *Global Change Toolkit* (Univ Arizona)
 - *Range Ecology Graduate/Faculty Seminar* (Department of Environmental Science, Policy & Management, University of California-Berkeley, Spring 2012. "Evaluation of the USDA/NRCS Rangeland Conservation Effects Assessment Program")

- *Desert Ecology* Short Course, New Mexico State University and Jornada LTER. July 2012, 2013
- *Introduction to Natural Resources* (DVP 620), team-taught course in *Masters in Development Program*, University of Arizona, Spring 2013. I developed a 6 hour module on Rangeland Ecology & Management

OTHER TEACHING ACTIVITIES

"Field Studies in Range Management" a two week field trip across Texas and through New Mexico where students visit with ranchers, Forest Service and BLM personnel (1984)

Co-organizer of **Rangeland Ecology Short Course** for middle and upper management personnel of the **Natural Resources Conservation Service**. This course has been offered annually from 1991- Present. It is a 2 week overview designed to update federal agency administrators on current ecological concepts, principles and approaches.

Lecturer and group discussion leader in **Bureau of Land Management "Applied Biodiversity Conservation" short courses** offered to BLM personnel around the country. I participate in 3-4 days of this 5-day course. To date I have contributed to classes offered in Durango, CO, Boise, ID, Reno, NV and Las Cruces, NM (December 1997).

Lecturer in **Texas A&M Soil Science Institute Training Course** for soil scientists from NRCS, USFS and Corps of Engineering. My role in this month-long intensive class, it to provide a 4 hour block of lectures on plant-soil relationships in rangelands.

Guest lectures in the following classes at Texas A&M: Pedology, Systems Analysis, Rangeland Resources, Ecology and Land Use, Range Research Methods, Advanced Range Improvement Practices, Plant Response to Grazing, Ecosystem Management, Landscape Analysis, Agricultural Meteorology, Plant Geography, Global Change

Guest lectures in the following classes at the University of Arizona: Introduction to Wildland Fire (RNR 355); Global Biogeochemical Cycles (GC/HWR/GEOS 572), Perspectives on Conservation Biology (ECOL 195M), Global Change Toolkit (GC695G), Honors College Colloquium (HNRS Science 195i-008)