Keith L. Kline

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Overview: Keith worked with partners in developing nations for 24 years to improve rural livelihoods while conserving forests under programs supporting energy security, disaster relief and reconstruction, community-based forest concessions, land tenure, and conflict resolution. Keith is affiliated with ORNL since 1990, working to apply innovations and planning that improve the efficiency integrated systems involving energy, agriculture, and forestry. Keith has contributed to over 100 publications and international presentations related to the management of natural resources to support a resilient bioeconomy.

Keith currently supports DOE with the Biofuture Project, aiming to promote good practices for domestic biomass and biofuel production systems. Keith serves as an expert for the US on International Standards including ASTM Committee on Bioenergy and the Technical Advisory Group for a Circular Economy. Keith serves as an Adjunct Professor in the Department of Biosystems Engineering & Soil Science in the Institute of Agriculture, and advisor to the Bredesen Center for Interdisciplinary Research and Graduate Education and International Research Networks on Food-Energy-Water, at the University of Tennessee, Knoxville. In recognition of his work, Keith was inducted into the America Association for Advancement of Science (AAAS).

Degrees:

M.Ed., International Education Program, Framingham State College, Mass., 2000
B.S., Energy & Environment, School of Natural Resources, University of Michigan, 1979

Professional Experience

2018-present, Distinguished Scientist, Oak Ridge National Laboratory (ORNL), Environmental Science Division. Keith serves as the Principal Investigator (PI) for multiple DOE-funded projects at ORNL.

1990-2018, ORNL research scientist serving on intermittent assignments funded by the US Agency for International Development (USAID) focused on improved management of forests, water and agricultural landscapes.

2007-2009, Advisor to USAID Southern Africa Environmental Programs for the Okavango River Basin Project, and Research Staff, Environmental Sciences Division, ORNL.

2004-06, Regional Natural Resources Program Officer; U.S. Agency for International Development Regional Center for Southern Africa, based in Gaborone, Botswana, and working throughout Southern Africa Development Community (SADC) on planning to improve the management of limited freshwater resources.

2001-04, Research Staff supporting Federal Energy Management Program, combined heat-power systems, alternative financing for energy efficiency and renewable energy technologies; Engineering Science and Technology Division, ORNL.

1990-2000, Team Leader, USAID Environmental Strategic Objective, Guatemala (on loan from ORNL under a Participating Agency Service Agreement, DOE-USAID).

1984-1990, Project Manager, USAID Energy & Environmental Programs, in the Regional Office for Central American Programs (ROCAP) leading the Regional Natural Resource Management Project (RENARM) and design of the Maya Biosphere Project (Guatemala). Also advised on technology transfer with the Central American Research Institute for Industry & Technology; and disaster recovery and reconstruction following the 1983 extreme weather events associated with El Nino (Peru).

1980-1984: Appropriate Technology Advisor for Rural Development; US Peace Corps, USAID, and National Energy Institute of Ecuador.

Awards:

2024: Elected AAAS Fellow by the American Association for the Advancement of Science. See https://www.ornl.gov/news/three-ornl-scientists-elected-aaas-fellows-0 and Seven Faculty Members Elected AAAS Fellows

2021: Received the ORNL Environmental Sciences Division "Science Serving Society Distinguished Achievement Award" and made corresponding invited presentation to laboratory staff, "Research to serve society through more sustainable bioeconomies."

Selected Synergistic Activities and Appointments

2009-present, US liaison and technical collaborator with the International Energy Agency Bioenergy Inter-task and Sustainable Supply Task

2010-present, Expert and technical advisor for International Organization for Standardization (ISO) on ISO TC-323 Circular Economy (current). Expert and Lead for International Editing Committee, ISO 13065, Sustainability Criteria for Bioenergy (2010-15)

2012-present, contributor to American Society for Testing and Materials (ASTM) International Committee E48 on Bioenergy and Industrial Chemicals from Biomass and Committee E-60 Sustainability

2019-23, Science Advisor, NSF-funded UTK International Research Network on Transdisciplinary Nodes for Food-Energy-Water

2021-present, organize and facilitate global stakeholder outreach and engagement for the Clean Energy Ministerial Biofuture Initiative on sustainability and serve as liaison with other stakeholders and other organizations

2009-11, advisor serving by invitation of California Air Resource Board (CARB) on the Land-Use Change Expert Work Group for the Low-Carbon Fuel Standard

Periodic invitations to serve as Chair for international conferences and sessions including Coordinating Research Council on Life-Cycle Assessment (2021, 2019, 2017); AIChE Institute for Sustainability 2019 Conference; Institute for Food Policy Research

workshop on food security and bioenergy (2016)

Ongoing: Reviewer for IPCC Assessment Report chapters and scientific journals e.g.: Proceedings National Academy of Sciences (US PNAS); Frontiers in Ecology and the Environment; GCB-Bioenergy; Energy; Sustainability and Society; and others.

2023: appointed Adjunct Professor, Department of Biosystems Engineering and Soil Science, University of Tennessee Institute of Agriculture.

2021-2024: Contributed to sustainability analyses and international issues associated with the US Biomass Resource Assessment - Billion Ton 2023, and the Triennial Report to Congress on the Environmental Effects of the Renewable Fuel Standard.

Examples of publications:

CBES (Center for BioEnergy Sustainability, Oak Ridge National Laboratory). 2009. Land-Use Change and Bioenergy: Report from the 2009 workshop, ORNL/CBES-001, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy and Oak Ridge National Laboratory, Center for Bioenergy Sustainability. http://www.ornl.gov/sci/besd/cbes.shtml.

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Dale VH, KL Kline. 2013. Modeling for integrating science and management. Pages 209-240 In D.G. Brown, D. T. Robinson, N. H. F. French, and B.C. Reed (editors), **Land Use and the Carbon Cycle: Advances in Integrated Science, Management, and Policy**, Cambridge University Press.

Dale VH, KL Kline. 2013. Issues in using landscape indicators to assess land changes. ***Ecological Indicators*** 28:91-99 http://dx.doi.org/10.1016/j.ecolind.2012.10.007

Dale VH, K. Kline, J. Wiens, and J. Fargione. 2010. Biofuels: Implications for Land Use and Biodiversity. ***Ecological Society of America***. http://esa.org/biofuelsreports/ .

Dale VH, R Efroymson, and K Kline. 2010. Using a Broad-scale Perspective to Address Changes in Land, Climate, and Energy. The Climate-Energy Nexus: Proceedings of the 2009 China-US Joint Research for Ecosystem and Environmental Change, pages 52-55, published by the Institute for a Secure and Sustainable Environment, University of Tennessee.

Dale VH, KL Kline, LL Wright, RD Perlack, M Downing, RL Graham. 2011. Interactions among bioenergy feedstock choices, landscape dynamics and land use. ***Ecological Applications*** 21(4):1039-1054.

Dale VH, Efroymson RA and Kline KL. 2011. The land use – climate change – energy nexus. ***Landscape Ecology*** 26(6):755-773.

Dale VH, RA Efroymson, KL Kline, MH Langholtz, PN Leiby, GA Oladosu... and R Hilliard. 2013. Indicators for assessing socioeconomic sustainability of bioenergy systems: A short list of

practical measures. ***Ecological Indicators*** 26:87-102 http://dx.doi.org/10.1016/j.ecolind.2012.10.014

Dale VH, Kline KL, Kaffka SR, Langeveld JWA. 2013. A landscape perspective on sustainability of agricultural systems. ***Landscape Ecology*** 28:1111-1123

Dale VH, Kline KL, Perla D, Lucier A. 2013. Communicating about bioenergy sustainability. ***Environmental Management*** 51(2):279-290. DOI: 10.1007/s00267-012-0014-4.

Dale VH, Parish ES and Kline KL. 2014. Risks to global biodiversity from fossil-fuel production exceed those from biofuel production. ***Biofuels, Bioproducts and Biorefining*** 9(2):177-189.

Dale VH, RA Efroymson, KL Kline, and M Davitt. (2015) A framework for selecting indicators of bioenergy sustainability. ***Biofuels, Bioproducts & Biorefining*** 9(4): 435-446. DOI: 10.1002/bbb.1562

Dale VH, KL Kline, MA Buford, TA Volk, CT Smith, I Stupak. 2016. Incorporating bioenergy into sustainable landscape designs. ***Renewable & Sustainable Energy Reviews*** 56:1158-1171. http://authors.elsevier.com/sd/article/S1364032115014215

Dale VH, Kline KL, Richard TL, Karlen DL, Belden WW. 2018. Bridging biofuel sustainability indicators and ecosystem services through stakeholder engagement. ***Biomass and Bioenergy*** 114: 143-156. https://doi.org/10.1016/j.biombioe.2017.09.016

Dale VH, Kline KL, Parish ES, Eichler SE. 2019. Engaging stakeholders to assess landscape sustainability. ***Landscape Ecology***. DOI: 10.1007/s10980-019-00848-1. June 2019, Volume 34, Issue 6, pp 1199–1218. http://link.springer.com/article/10.1007/s10980-019-00848-1

Dale VH, Kline KL, Lopez-Ridaura S, Eichler SE, Ortiz-Monasterio I, Ramirez LF . 2020. Towards more sustainable agricultural landscapes: Lessons from Northwestern Mexico and the Western Highlands of Guatemala. ***Futures* 24**:2164 Special Issue 'Health, Climate Change, and Poverty' doi: 10.1016/j.futures.2020.102647 https://europepmc.org/article/med/33082598

Dale VH, Kline KL. 2022. Effects on the Sustainable Development Goals of Wood Pellet Production in the Southeastern United States. *World Biomass* 2021-2022, pages 45-49. http://www.dcm-productions.co.uk

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Dimitriou I, Berndes G, Englund O, Brown M, Busch G, Dale V, Devlin G, English B, Goss K, Jackson S, Kline KL, McDonnell K, McGrath J, Mola-Yudego B, Murphy F, Negri MC, Parish ES, Ssegane H, Tyler D. 2019. Lignocellulosic Crops in Agricultural Landscapes: Production systems for biomass and other environmental benefits – examples, incentives, and barrier. ***IEA Bioenergy***. https://www.ieabioenergy.com/wp-content/uploads/2019/01/TR2018-05.pdf

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Level Political Forum of the United Nations, New York, NY (July 2022) https://sdgs.un.org/sites/default/files/2022-06/2022-UN_SDG7 Brief-060122.pdf

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Eichler SE, Kline KL, Ortiz-Monasterio I, López-Ridaura S, Dale VH. (2020). Rapid appraisal of landscape sustainability indicators for Yaqui Valley, Mexico. *Environmental and Sustainability Indicators* 6: 100029. https://doi.org/10.1016/j.indic.2020.100029

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Kline KL, Dale VH, Lee R, Leiby P. 2009. In Defense of Biofuels, Done Right. ***Issues in Science and Technology*** 25(3): 75-84. http://www.issues.org/25.3/kline.html

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