Approved by the Regents
May 16, 2013

Promotion Recommendation
The University of Michigan
School of Natural Resources and Environment

Shelie Miller, assistant professor of natural resources and environment, School of Natural Resources and Environment, and assistant professor of civil and environmental engineering, Department of Civil and Environmental Engineering, College of Engineering, is recommended for promotion to associate professor of natural resources and environment, with tenure, School of Natural Resources, and Environment and associate professor of civil and environmental engineering, without tenure, Department of Civil and Environmental Engineering, College of Engineering.

Academic Degrees:

Ph.D.	2006	University of Illinois at Chicago, Civil and Materials Engineering
M.E.	2001	Clarkson University, Civil and Environmental Engineering
B.S.	2000	Denison University, Chemistry

Professional Record:

2010-present	Assistant Professor, School of Natural Resources and Environment (SNRE), University of Michigan Assistant Professor, Department of Civil and Environmental Engineering, College of Engineering, University of Michigan
2006-2010	Assistant Professor, Department of Environmental Engineering and Earth Sciences, Clemson University
2001-2006	Doctoral Resident, Environmental Health and Safety, Alcoa, Inc.

Summary of Evaluation:

Teaching: Professor Miller's undergraduate and graduate courses are all core curriculum courses, with consistently large student enrollments. Professor Miller emphasizes innovative teaching methods to create an active learning environment for students. For example, Environmental Systems Analysis uses group problem solving exercises in covering quantitative tools for environmental decision making. To accommodate the diverse mathematics backgrounds of students, Professor Miller also offers a series of special tutorials outside normal class time. As another example, her undergraduate course includes a service-learning component that results in over 1100 volunteer hours of environmentally relevant community service each fall.

Professor Miller has also been successful in graduate advising. She has advised one SNRE group Master's project. The study was of high technical quality and well received by the industrial client. In addition, she graduated one Ph.D. student from her time at Clemson, as well as three M.S. students. She currently is advisor to three Ph.D. students in progress. She worked closely with her students to achieve highly competitive fellowships, including a prestigious EPA STAR Fellowship and an NSF Graduate Fellowship. She currently serves or has served as a member of six Ph.D. committees and six M.S. committees.

Research: Shelie Miller's scholarly activities span multiple professional communities, with significant impact on two fields: Industrial Ecology and Environmental Engineering. Professor Miller is the recipient of two highly competitive national honors: 1) the Presidential Early Career Award for Scientists and Engineers (2009), the highest honor bestowed on young researchers by the U.S. government; and 2) an NSF CAREER Award (2009-2013), another high profile award.

Professor Miller's research is advancing life cycle analysis (LCA), which is a set of systems based methods and standards for evaluating the sustainability performance of products and technologies. She has established two important research lines: 1) development of new dynamic LCA methods for investigating emerging energy systems; and 2) assessment of key tradeoffs that exist between climate and non-climate impacts of bioenergy systems. Her research integrates stochastic modeling into LCA. Most previous life cycle modeling approaches have been deterministic and lacked the capability to address complex emerging systems.

As an example of the importance of her science, Professor Miller has done considerable work on improving the analysis of nutrient emissions and land use change for bioenergy systems. Most environmental analyses of energy systems focus on carbon dioxide emissions. In tackling nutrient emissions, Professor Miller has taken on a much more complicated system to analyze and one that is likely more important from a global change perspective in evaluating the environmental tradeoffs of bioenergy systems.

Professor Miller's peer-reviewed publications include 13 articles, two peer-reviewed book chapters, and four peer-reviewed conference proceedings. Her articles have been published in the top journals of the environmental engineering and industrial ecology fields (*Environmental Science and Technology,* and *Journal of Industrial Ecology)*, and her conference proceedings in the highly respected *IEEE International Symposium on Sustainable Systems and Technology*. Of her papers, she is first author of seven, and Professor Miller or one of her students is first author of all but two. Thus Professor Miller has established a strong record of scholarly productivity, and she is including her students in her published work. Professor Miller's record (as assessed by number of publications, quality of journals, and citation indices) compares favorably with peers promoted over a year ago at other highly ranked universities.

Professor Miller has been highly successful in obtaining research funding, assuring full funding for all of her graduate students. Her extramural support totals over $750,000 (three awards as PI, five as co-PI), out of > $1.75 million in total project funding at both Clemson and UM. Professor Miller has also successfully pursued internal UM funding, totaling ~$225,000. She is a highly sought after collaborator because of her intellectual strengths, her ability to work well in team-based environments, her professionalism, and her research creativity.

Recent and Significant Publications:

Miller, S.A., Moysey, S., Sharp, B., Alfaro, J.A., "A Stochastic Approach to Model Dynamic Systems in LCA," *Journal of Industrial Ecology,* 2012 (in press).

Sarkar, S., Miller, S.A., Frederick, J.R., Chamberlain, J.F., "Modeling Nitrogen Loss from Switchgrass Agricultural Systems," *Biomass and Bioenergy*, 2011, 35(10), 4381-4389.

Miller, S.A., "Minimizing Land Use and Nitrogen Intensity of Bioenergy," *Environmental Science & Technology,* 2010, 44(10), 3932-3939.

Miller, S.A., Landis, A.E., Theis, T.L., "Environmental Tradeoffs of Bio-based Production," *Environmental Science and Technology*, 2007, 41(15), 5176-5182.

Landis, A.E., Miller, S.A., Theis, T.L., "Life Cycle of the Corn-Soybean Agroecosystem for Bio-based Production," *Environmental Science and Technology* 2007, 41(4), 1457-1464.

Miller, S.A., Landis, A.E., Theis, T.L., "Using Monte Carlo Simulation to Characterize Nitrogen Flows in Agroecosystems," *Environmental Science and Technology* 2006, 40, 2324-2332.

Service: Professor Miller has made substantial contributions in service externally to industrial ecology and environmental engineering professional communities and internally to SNRE, the

College of Engineering, the Program in the Environment, the Center for Sustainable Systems, and the Engineering Sustainable Systems dual degree program. She has been asked to provide input relevant to national policy on nitrogen management by the USEPA, on a national bioenergy database by the USDA, and on strategies to reduce greenhouse gas emissions by the State of South Carolina. Professor Miller actively participates in a variety of STEM mentoring activities at UM. Her service record is exceptionally strong, especially given her career stage.

External Reviewers:
Reviewer A: "Shelie has done exceptionally well in her professional activities so far. I would rate her to be among the top in the fields of sustainability engineering and life cycle assessment."

Reviewer B: "...the receipt of NSF CAREER and PECASE awards are certainly marks of both quality and potential from a highly accomplished panel of peers. No greater measure or notation is available to pre-tenure professors."

Reviewer C: "In my opinion, Shelie is in an elite group of perhaps the best five or ten [junior] researchers in the field of environmental science and engineering in the country."

Reviewer D: "I give Dr. Miller my highest recommendation for promotion to associate professor with tenure. She is already a credit to her chosen field and to your university. In the future she will become even more so."

Reviewer E: "...Shelie loves her role as an educator as much as she values her role as a researcher...the University of Michigan is already benefiting from an individual who values *quality* in all aspects of the work she does."

Reviewer F: "Miller has developed a substantial research portfolio; that she has achieved this in the six years since finishing her PhD shows remarkable productivity and focus...Miller's work to date indicates substantial promise for continued scholarly productivity and meaningful future contributions."

Summary of Recommendation: Based on Professor Miller's past and current accomplishments, professional recognition, and demonstrated ability to form productive collaborations, we believe her career exhibits a strong, accelerating trajectory with promise of continued significant success. We enthusiastically recommend Shelie Miller for promotion to associate professor of natural resources and environment, with tenure, School of Natural Resources and Environment, and associate professor of civil and environmental engineering, without tenure, Department of Civil and Environmental Engineering, College of Engineering.

Marie Lynn Miranda, Ph.D.
Professor and Dean
School of Natural Resources and Environment

David C. Munson, Jr.
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