

The Potential for Biotechnology to Address Forest Health

Committee

Susan E. Offutt

Chair

Dr. Susan E. Offutt is currently senior consultant to the Global Strategy to Improve Agricultural and Rural Statistics at the UN Food and Agriculture Organization. Until her retirement from federal service two years ago, she was chief economist at the U.S. Government Accountability Office (GAO) for eight years. Before joining GAO, she served as administrator of the U.S. Department of Agriculture's Economic Research Service for 10 years. Prior to that tour, she was executive director of the National Research Council's Board on Agriculture, which conducts studies on a range of topics in agricultural science. She was chief of the Agriculture Branch at the Office of Management and Budget (OMB). During her tenure at OMB, she coordinated budget and policy analysis of the farm bill and trade negotiations in addition to the operations of USDA. She began her career on the faculty at the University of Illinois, Urbana-Champaign, where she taught econometrics and public policy. She is a fellow of the American Applied Economics Association and the National Academy of Public Administration. She received an M.S. and Ph.D. in agricultural economics from Cornell University.

Vikram E. Chhatre

Member

Dr. Vikram Chhatre is currently a senior research scientist with the IDeA Networks for Biomedical Research Excellence (INBRE) Bioinformatics Core at the University of Wyoming, where he helps biologists incorporate high performance computing in their research. He is a forest population geneticist interested in understanding the demographic and evolutionary forces shaping the genetic structure of natural populations of tree species. Dr. Chhatre's research during the last 15 years has addressed issues in population, conservation, and quantitative genetics of long-lived and ecologically and economically important forest tree species such as spruce, pine, and poplar. Most recently he investigated the importance of range context and interspecific hybridization in understanding adaptation to climate in *Populus*, a model species and emerging bioenergy system. In the pursuit of these goals, he applies computational tools to genomic data obtained from next generation sequencing technologies. Dr. Chhatre received a Ph.D. in genetics from Texas A&M University and was a postdoctoral fellow with the U.S. Department of Agriculture's Forest Service and the University of Vermont.

Jason Delborne

Member

Dr. Jason A. Delborne is an associate professor of science, policy, and society in the Department of Forestry and Environmental Resources at North Carolina State University. Dr. Delborne joined the university in August 2013 as part of the Chancellor's Faculty Excellence Program in Genetic Engineering and Society. His research focuses on highly politicized scientific controversies, such as agricultural and forest biotechnology, gene drives, synthetic biology, and biofuels. Drawing upon the highly interdisciplinary field of Science, Technology, and Society (STS), he engages various qualitative research methodologies to ask questions about how policymakers and members of the public interface with controversial science. Dr. Delborne holds a bachelor's degree in human biology from Stanford University (1993) and a doctorate in environmental science, policy, and management from the University of California, Berkeley (2005). He completed postdoctoral training funded by the National Science Foundation at the University of Wisconsin-Madison (2006–2008) before beginning his faculty career as an assistant professor of liberal arts and international studies at the Colorado School of Mines (2008–2013). Dr. Delborne recently served on the National Academies of Sciences, Engineering, and Medicine committee on gene drive research, which released its report, *Gene Drives on the Horizon*, in June 2016.

Stephen DiFazio

Member

Dr. Stephen DiFazio is a professor in the Department of Biology and the director of the Genomics Core Facility at West Virginia University. His thesis research focused on gene flow and reproductive biology of conifers and cottonwoods. He then worked as a staff scientist at Oak Ridge National Laboratory, focusing on a variety of functional and structural genomics projects, most notably the sequencing of the *Populus* genome. He currently serves on many scientific advisory boards, including those of the National Science Foundation Plant Genome Project, Greenwood Resources, and the Forest Health Initiative. Dr. DiFazio received his B.S. in biology and English from Northeastern University and his M.S. in ecology and Ph.D. in forest genetics from Oregon State University.

Doria Gordon

Member

Dr. Doria Gordon is a lead senior scientist, with a focus on ecosystems, in the Office of the Chief Scientist at the Environmental Defense Fund (EDF). Prior to EDF, she spent 25 years working in science, conservation, and management for The Nature Conservancy in Florida. Dr. Gordon is also a courtesy professor of biology at the University of Florida and a research associate at Archbold Biological Station near Lake Placid, Florida. She has conducted substantial research on the restoration of forested ecosystems, from blue oak woodlands in California to longleaf pine systems in Florida. She has also developed and evaluated risk-assessment tools for predicting invasiveness in plant species and has co-authored two chapters in a U.S. Forest Service assessment of invasion and forest health (in preparation). Most recently Dr. Gordon has been reviewing the literature on biotechnology and gene editing to evaluate whether environmental risks are sufficiently addressed in existing approaches and regulations. Dr. Gordon completed an M.S. and Ph.D. in ecology at the University of California, Davis, following an undergraduate degree in biology and environmental studies at Oberlin College.

Ines Ibanez

Member

Dr. Inés Ibáñez is an associate professor in the School of Natural Resources and Environment Department of Ecology and Evolutionary Biology at the University of Michigan. Dr. Ibáñez's major research interests focus on the current challenges that plant communities are facing in the context of global change, that is, climate change, invasive species, and landscape fragmentation. She directs her research at the recruitment of dominant tree species, from seed production to the sapling stage, including seed dispersal, germination, establishment and survival during the first years. She received her B.S. in biology (botany) from Universidad Complutense de Madrid, an M.S. in range sciences from Utah State University, and a Ph.D. in ecology from Duke University.

Gregory Jaffe

Member

Gregory Jaffe is the director of the Project on Biotechnology for the Center for Science in the Public Interest (CSPI). Mr. Jaffe came to CSPI after serving as a trial attorney for the U.S. Department of Justice's Environmental and Natural Resources Division and as senior counsel with the U.S. Environmental Protection Agency's Air Enforcement Division. He is a recognized international expert on agricultural biotechnology and biosafety and has published numerous articles and reports on those topics. He has worked on biosafety regulatory issues in the United States and throughout the world, including the African countries of Kenya, Uganda, Tanzania, Mali, Ghana, Malawi, South Africa, Burkina Faso, and Nigeria. He was a member of the U.S. Secretary of Agriculture's Advisory Committee on Agricultural Biotechnology and 21st Century Agriculture from 2003 to 2008 and was reappointed to a new term from 2011 to 2016. He was also a member of the U.S. Food and Drug Administration's Veterinary Medicine Advisory Committee from 2004 to 2008. In addition, he has provided his biosafety expertise for projects involving the International Food Policy Research Institute, the World Bank, and the Biosafety Project of the UN Environment Programme-Global Environment Facility. Mr. Jaffe earned his B.A. with high honors from Wesleyan University in biology and government and then received a law degree from Harvard Law School.

Mark D. Needham

Member

Dr. Mark Needham is a professor in the Department of Forest Ecosystems and Society at Oregon State University (OSU); an adjunct professor in the College of Earth, Ocean, and Atmospheric Sciences at OSU; and an adjunct and affiliate professor in the Department of Geography at the University of Hawaii. He is a social scientist who focuses on understanding human experiences and behavior within the context of nature and uses this to inform land management and advance scientific thought. Dr. Needham's most recent work on forest-related issues includes studies of public attitudes toward using biotechnological (e.g., genetic modification) and nonbiotechnological (e.g., tree breeding, assisted migration) interventions to address forest health threats (e.g., diseases such as chestnut blight, pests such as pine beetle, climate change). He is also working on a study of public tradeoffs of ecosystem services associated with aerial herbicide spraying and other intensive management practices on private forestlands. He is editor-in-chief of the international journal *Human Dimensions of Wildlife* and director of the Natural Resources, Tourism, and Recreation (NATURE) Studies Lab at OSU. Dr. Needham received The Academy of Leisure Sciences Excellence in Teaching Award for 2016, Department of Forest Ecosystems and Society Graduate Students' Award for Outstanding Faculty for 2013, College of Forestry Dean's Award for Outstanding Teaching and Advising Professor for 2009, and the College of Forestry Dean's Award for Outstanding Research Professor for 2007. He received his B.A. and M.A. in geography and environmental studies from the University of Victoria in Canada and his Ph.D. in human dimensions of natural resources from Colorado State University.

Clare Palmer

Member

Dr. Clare Palmer is a professor of philosophy and a Cornerstone faculty fellow at Texas A&M University. She was awarded a B.A. with honors from Trinity College, Oxford, and a Ph.D. from The Queen's College, Oxford, and has since held academic positions at universities in the United Kingdom, Australia, and the United States. Her primary areas of research are environmental ethics, animal ethics, and the ethics of emerging technologies, in particular ethical questions raised by the use of biotechnology for conservation goals. She held the elected position of President of the International Society for Environmental Ethics from 2007 to 2010 and currently serves on the editorial board of interdisciplinary journals including *Environmental Values*, the *Journal of Agricultural and Environmental Ethics*, and *Environmental Humanities*. She is the author or co-author of four books, including *Animal Ethics in Context* (Columbia University Press, 2010) and has edited or co-edited seven other volumes, including in 2014 *Linking Ecology and Ethics for a Changing World*, a collaboration between philosophers and ecologists. She has more than 100 other publications. She was the founding editor of the journal *Worldviews: Environment, Culture, Religion* (Brill Academic Press), and was co-PI on the National Science Foundation-funded project *Genomics and Society* from 2012 to 2016.

Jeanne Romero-Severson

Member

Dr. Jeanne Romero-Severson is a professor of quantitative genetics and genomics at the University of Notre Dame. She studies the population genetics and genomics of adaptive variation for stress resistance in temperate forest trees and insects, including insect vectors of human disease. In her first career in the private sector, she identified genetic determinants of regenerative capacity from tissue culture, resistance to two major potyviruses, and resistance to European corn borer in maize. She led the final effort to produce agronomically acceptable maize inbreds from the first successful Bt transformant in maize. In her academic career, she has contributed to the whole genome sequencing projects for the jewel wasp, a parasite of flies, and the human body louse. Her specialization in statistical genetics and genetic mapping in nonmodel organisms led to the identification of genetic determinants for salt water tolerance in sibling species of *Anopheles* (malaria vector) mosquitoes. Her group generated the first genetic map for northern red oak, identified the extent of natural hybridization between the native nut tree butternut with Japanese heartnut, identified genetically unique populations of butternut in Atlantic Canada, discovered that the rate of regeneration in northern red oak influences estimates of population differentiation, and generated full sib resource populations for black walnut and northern red oak. Dr. Romero-Severson is currently working on identifying genetic determinants of emerald ash borer resistance in green ash and the functional genomics of multifactor artemisinin resistance in the malaria parasite. She is a member of the governing board of the American Chestnut Foundation, the governing board of the Northern Nut Growers Association, and the advisory group for the Center for Tree Science at the Morton Arboretum. She is also a member of the American Society of Plant Biologists, the Society of American Foresters, and the American Association for the Advancement of Science. Dr. Romero-Severson is the author or co-author of more than 70 refereed publications. She holds two issued patents and one provisional patent involving plant breeding and analytical chemistry. She received her B.S. in molecular biology and Ph.D. in plant breeding and plant genetics from the University of Wisconsin–Madison.

Ronald R. Sederoff

Member

Dr. Ronald Sederoff was a distinguished university professor of forestry, Edwin F. Conger Professor of Forestry and Environmental Resources, and co-director of the Forest Biotechnology Group at North Carolina State University. After a stint as a U.S. Forest Service scientist in California, he joined NC State's forestry and environmental resources department in 1987. Dr. Sederoff, one of the first scientists to study molecular genetics of forest trees, established the Forest Biotechnology Group at NC State in 1988. His work focuses on gaining a better understanding of forest tree biology and using that knowledge to accelerate tree breeding. In 1995, Sederoff was elected to the National Academy of Sciences. He is also a fellow of the American Association for the Advancement of Science and a member of the International Academy of Wood Science. In 2004, he received an honorary doctorate in forest science from the Swedish Agricultural University. He was named the Institute of Forest Biotechnology's 2011 Forest Biotechnologist of the Year, and in 2017 he was awarded the Marcus Wallenberg Foundation Prize, an international award for scientific achievements in fields important to forestry. He received his B.S. in zoology and M.S. and Ph.D. in zoology genetics from the University of California, Los Angeles.

Diana L. Six

Member

Dr. Diana L. Six is a professor of forest entomology/pathology in the Department of Ecosystem and Conservation Sciences in the W.A. Franke College of Forestry and Conservation at the University of Montana. Her primary research focuses on the evolution and maintenance of symbioses, particularly those occurring among bark beetles, ambrosia beetles, and fungi. This work includes collaborative efforts with scientists in the United States, South Africa, Sweden, and Mexico. Dr. Six also conducts research on various aspects of bark beetle ecology and management, including investigations into how bark beetles may affect the ability of forests to adapt to climate change. She is an associate editor for the journals *Insects*, *Journal of Economic Entomology*, and *Agricultural and Forest Entomology*. Dr. Six is a member of several scientific societies including the Entomological Society of America and the International Symbiosis Society. She received her B.S. in agricultural biology from California State Polytechnic University and M.S. and Ph.D. in entomology from the University of California, Riverside.

Richard Snieszko

Member

Dr. Richard Snieszko has worked in forest genetics and tree improvement since 1977. Since 1991, he has been Center Geneticist with the USDA Forest Service, Pacific Northwest Region's Dorena Genetic Resource Center in Cottage Grove, Oregon. His work focuses on development of genetic resistance to non-native forest tree diseases as well as genetic variation and genetic conservation in forest trees. His Bachelor of Science degree in forest science is from Humboldt State University, and his Ph.D. in forest genetics is from North Carolina State University. Prior to joining the Forest Service in 1991, he worked in Zimbabwe (3 years) and at Oregon State University (in conjunction with Pacific Northwest Research Station). He is coordinator of International Union of Forest Research Organizations 2.02.15 Working Group (Breeding and genetic resources of five-needle pines) and a member of the IUFRO Task Force on Biological Invasions in Forests. Dr. Snieszko is also initiator and ad hoc coordinator/facilitator for the Genetics of Host-Parasite Interactions in Forestry working group that met in 2011 and 2015 and is scheduled to meet in 2018. He oversees programs that have developed genetic resistance to the non-native pathogens *Cronartium ribicola* and *Phytophthora lateralis* and has been technical adviser to the program to develop resistance to koa wilt (caused by *Fusarium oxysporum*) in Hawaii. The programs he oversees are world leaders in the applied development of resistance for reforestation and restoration, and the products from these programs are now used widely across the Pacific Northwest. Since 2001, Dr. Snieszko has organized or co-organized eight international conferences and workshops on genetic resistance, genetic conservation, and white pine genetics/breeding. He has been Principal Investigator (PI), Co-PI, or Cooperator on numerous funded grant proposals and published numerous papers and has been an invited speaker on the development and application of disease resistance in forest trees.