



CARBON SEQUESTRATION IN URBAN ECOSYSTEMS

**The Ohio State University
Carbon Management & Sequestration Center
April 14, 2010 - Columbus, Ohio**

Attendees of the Symposium April 14, 2010



COLUMBUS, Ohio (By Candace Pollock) – Americans covet urban green spaces. We manicure golf courses, tend lawns, work the soil for home gardens, create landscaping masterpieces, and turn parks into playgrounds. Yet little is known of the carbon footprint impacts that come with heavy use and intense management. Ohio State University’s Fawcett Center was the site of a one-day carbon management and sequestration symposium to bring together leading world experts, key academic researchers, public opinion and thought leaders, carbon offset programmers, and elected officials to lay the research groundwork for terrestrial carbon sequestration in urban ecosystems. “Carbon Sequestration in Urban Ecosystems” took place on April 14 from 8 a.m. until 5 p.m. The event is sponsored by the Carbon Management and Sequestration Center of the Ohio Agricultural Research and Development Center and Scotts Miracle-Gro Company. “The thought is that urban green spaces can mitigate global warming by off-setting anthropogenic (manmade) emissions. They are relatively small spaces, and have potential high biomass productivity,” said Rattan Lal, an Ohio State University soil scientist and director of the Carbon Management and Sequestration Center. “Plus the soil depth is very shallow – 6 to 10 inches of ground worked and trafficked. The question is what is that carbon footprint? That is what we want to find out.” The strategy, said Lal, is to make these intensively managed lands a net sink of atmospheric carbon dioxide through judicious management of inputs. Speakers at the symposium will share information on what carbon sequestration is, the current knowledge on carbon sequestration in urban soils, the view of governmental policy and position, the role of carbon exchange from an economic perspective, green space contributions to the climate debate, the role of sustainable landscapes in urban environments, and the effects of capturing carbon dioxide within the urban ecosystems. Some agenda topics include: The Changing Face of Urban Land Use; Assessment of U.S. Urban Soil Carbon Stocks; Influence of Soil Carbon on Soil Properties; Dynamics of Carbon Cycling in Lawn Ecosystems; Urban Tree Species for Carbon Sequestration; Impact of Terrestrial Carbon Management on Water Quality; Carbon Offsets and Credits; The Value of Carbon Sequestration in Backyard Habitats; and Carbon Policy and Global Warming. Full agenda and Power Point presentations can be found on C-MASC website: <http://senr.osu.edu/cmasc/events.html>

Carbon Sequestration in Urban Ecosystems Symposium, April 14, 2010 Columbus, Ohio, OSU Fawcett Center

TIME	TOPIC	PRESENTER
BENCHMARKING SOIL CARBON SEQUESTRATION		
8:00-8:15	Introduction and Welcome	Dean B. Moser (OSU), B. Augustin (Scotts)
8:30-8:50	Carbon Sequestration in Urban Ecosystems	R. Lal (OSU)
8:50-9:10	Soil Carbon Sequestration Potential in Urban Soils	C. Cogger (Washington State University)
9:10-9:30	Indicators of Soil Quality in Urban Landscapes	B. Schindelbeck (Cornell University)
9:30-9:45	Discussion	
9:45-10:00	Break	
URBAN LAWNS		
10:00-10:20	Soil Carbon in Southern Turfgrass Systems	E. Guertal (Auburn University)
10:20-10:40	Microbial interactions with organic matter buildup in turfgrass soils	W. Shi & D. Bowman (NCSU)
10:40-11:00	Dynamics of Carbon Cycling in Lawn Ecosystems	Y. Qian (CSU)
11:00-11:15	Discussion	
URBAN FORESTS		
11:15-11:35	Soil carbon pools and fluxes in urban forest patches	I. Yesilonis (USDA Forest Service)
11:35-11:55	Urban tree Species for Carbon Sequestration	B. Scharenbroch (Morton Arboretum)
11:55-12:15	Impact of Terrestrial Carbon Management on Water Quality	K. Lorenz (OSU)
12:15-12:30	Discussion	
12:30-1:30	Lunch Break	
ECONOMICS		
1:30-1:50	Restoration or Urban Degraded Land in Calumet, IL by Using Biosolids, Biochar, and Other Soil Amendments	N. Basta (OSU)
1:50-2:10	Land Use and Climate Change: Designing Policy that Works	T. Koontz (OSU)
2:10-2:30	Potential Urban Carbon Sequestration by Landscapes	F. Rossi (Cornell), B. Augustin (Scotts)
2:30-2:45	Discussion	
2:45-3:00	Break	
POLITICAL AND SOCIAL ATTRIBUTES		
3:00-3:20	The Value of Carbon Sequestration In Backyard Habitats	K. Coyle (NWF)
3:20-3:40	Designing Sustainable Landscapes to Sequester Carbon and Address Climate Change	N. Sommerville (ASLA)
3:40-4:00	Forest and Other Land Based Carbon Offsets: Costs and Benefits	B. Sohngen (OSU)
4:00-4:15	Discussion	
4:15-4:35	Role of Urban Green Space in the Congressional Climate Video	J. Wieder (U.S. Senator Sherrod Brown)
4:35-5:00	General Conclusions	R. Lal (OSU), B. Augustin (Scotts)

POSTER Presenters

Carbon Lab Proposals

K. Kelpsch (OSU)

Carbon Sequestration in golf course turfgrass systems

A. Selhorst (OSU)

Carbon Storage in Urban Forest Soils in Columbus, Ohio

K. Lorenz (OSU)

Improving Soil Quality for Vegetable Production in Degraded Urban Soils

J. Beniston(OSU)

Lawn Carbon Sequestration

G. Zirkle (OSU)

Legacy effects of highway construction disturbance and vegetation management on soil carbon in forested urban verges

T. Trammell (Kentucky)

Urban Forests and Climate Change

E. Aguaron (UC-Davies)



8:00-8:15 Introduction and Welcome

Bobby D. Moser, Vice President for Agricultural Administration and Dean

As Vice President for Agricultural Administration and Dean at The Ohio State University, Bobby Moser oversees one of the largest and most comprehensive research and extension programs in nation. Bobby Moser became the head administrator of Ohio State's College of Food, Agricultural, and Environmental Sciences in 1991. Dr. Moser heads the College's resident instruction



program, Ohio State University Extension, the Ohio Agricultural Research and Developmental Center, and the Agricultural Technical Institute at Wooster. He oversees 2,200 faculty and staff statewide and 3,200 agricultural and natural resource students in the undergraduate, graduate, and two-year programs within the College of Food, Agricultural, and Environmental Sciences.

Moser is nationally recognized and is credited with the development of scientifically sound and sustainable programs, while incorporating ecological ethics and technological innovations. His developments in the field continue to influence and drive the future of agriculture in the United States and around the world.

Prior to becoming Vice President, Moser was director of OSU Extension from 1988-1991. He came to Ohio after seven years at the University of Missouri, where he served as chair of the Department of Animal Sciences and later as the associate dean of Agriculture, and Agriculture Extension program director. Prior to that, he chaired the Department of Animal Science at Missouri and was on the animal science faculty at the University of Nebraska.

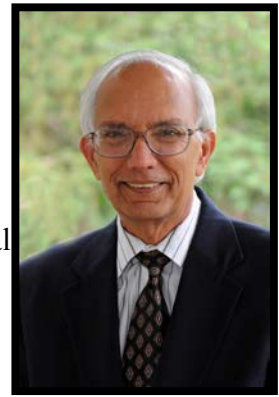
Born in Cyril, Oklahoma, Bobby Moser earned his B.S. and M.S. degrees in Animal Science and Nutrition at Oklahoma State University in 1965 and 1969, respectively. He earned a Ph.D. in Animal Nutrition at the University of Nebraska in 1972. He and his wife, Pat, live in Dublin, Ohio.

Dr. Bruce J. Augustin is currently the Chief Agronomist for The Scotts Miracle-Gro Company. He joined Scotts in 1998 as Director of Product Development in the Research and Development Division. He is the technical leader for Global Gardens product innovation and development. His team develops science-based assessments and recommendations for product development, product stewardship and strategic direction for Scotts.

Prior to joining Scotts, Dr. Augustin was a turfgrass professor at the University of Florida and conducted research in plant nutrients and water relations. He has also worked for major agrochemical and fertilizer suppliers to the professional and homeowner turf and ornamental industries. Dr. Augustin received a Ph.D. in turfgrass physiology from The Ohio State University, a M.S. in grass seed production from the University of Idaho, and a B.S. in urban horticulture from the University of Delaware. He is an expert in the plant and soil sciences and has authored of over 120 popular and scientific articles on turfgrass and landscape management. Dr. Augustin has spoken to numerous professional, homeowner, and governmental groups at seminars and conferences throughout the United States.

8:30-8:50 Carbon Sequestration in Urban Ecosystems

Rattan Lal, Ph.D., is a professor of soil physics in the School of Environment and Natural Resources, and Director of the Carbon Management and Sequestration Center, FAES/OARDC at The Ohio State University. He is a native of Punjab, India. He earned his B.Sc (Agric.) from Punjab Agricultural University, M.Sc (Soils) from Indian Agricultural Institute, and PhD. (Soils) from the Ohio State University. He worked at the University of Sydney, Australia as Sr. Research Fellow from 1969-1970, at the International Institute of Tropical Agriculture, Ibadan, Nigeria as Soil Scientist from 1970-1987, and joined the Ohio State University as Professor of Soil Science in 1987.



His research interests are: sustainable management of soil resources, global food security, soils and climate change, carbon sequestration in soil to mitigate climate change, soil erosion control and management, and restoration of degradation and desertified soils. He is a fellow of the American Society of Agronomy, Soil Science Society of America, Third World Academy of Sciences, American Association for the Advancement of Sciences, Soil and Water Conservation Society (SWCS), and Indian Academy of Agricultural Sciences. He is the recipient of the 1998 Hugh Hammond Bennett Award of the Soil Water Conservation Society, 2005 Borlaug Award, 2006 Liebig Award of the International Union of Soil Science, 2009 M.S. Swaminathan Award (India), and 2009 COMLAND Award (Germany).

He received an honorary degree of Doctor of Science from Punjab Agricultural University in 2000, India and from the Norwegian University of Life Sciences, Aas, Norway in 2005. He is past president of the World Association of Soil and Water Conservation, the International Soil Tillage Research Organization, and the Soil Science Society of America (2005-2007).

He has been a member of the U.S. National Committee on Soil Science of the National Academy of Sciences (1998-2002, and 2007-), a lead author of IPCC (1998-2000), lead author of the U.N. Millennium Assessment, and received the Nobel Peace Prize Certificate by IPCC in 2007.

He has authored and co-authored more than 1400 research publications, and has written 13 and edited or co-edited 45 books. He has mentored thesis research of about 100 graduate students, and has received about 90 visiting scholars in his laboratory from around the world. Lal.1@osu.edu

8:50-9:10 Soil Carbon Sequestration Potential in Urban Soils

Craig Cogger has been a Soil Scientist at WSU Puyallup since 1984. His current research is focused on organic nutrient management (composts, manures, biosolids etc.), organic amendment effects on agricultural and urban soil quality, cover crops, organic farming systems, and organic production and food safety. He teaches extension soils classes to Master Gardeners and makes presentations on soils, biosolids, nutrient management, soil amendments, water quality, and food safety to many professional, volunteer, and student groups. He received a PhD in soils from Cornell University in 1979, and did research and education on on-site wastewater treatment at North Carolina State University from 1979-1984.



9:10-9:30

Indicators of Soil Quality in Urban Landscapes

Bob Schindelbeck

Email: rrs3@cornell.edu

CURRENT JOB RESPONSIBILITIES

Extension (50%), research (30%) and teaching (20%) on issues related to soil and water management. Research and extension activities focus on soil hydrology, chemical fate and transport, tillage, soil compaction and soil health. Teaching activities include supporting an undergraduate course in Introductory Soils (CSS 260), Water Status in Plants and Soils (CSS 608), and delivering lectures on Soil Health for soils and horticultural classes across campus.

AREAS OF INTEREST / SPECIALIZATION

Working in Dr. Harold van Es' research program for 20 years has enabled me to plan, develop and implement field experiments studying soil physical behavior under different management regimes.

Typical projects:

Measuring soil and crop response to various conservation tillage strategies- deep ripping, strip till, zone till, ridge till, frost chisel tillage. Managed long-term (15+ year) soil tillage studies at multiple locations.

Studying fate of Nitrogen across varied timing of manure application on sand versus clay soil. Determined N fate in response to cropping history and tillage on the same soil.

Developed Cornell Sprinkle Infiltrometer to study water infiltration and runoff. This unit is also used in the field or lab to quantify soil structural integrity via the aggregate stability test.

Developed laboratory procedures and oversees operation of the Cornell Soil Health Laboratory. Produce Soil Health Test Reports to growers. Delivered over 50 Soil Health related presentations at farmer twilight meetings and professional conferences.



9:30-9:45 Discussion

9:45-10:00 Break

10:00-10:20

Soil Carbon in Southern Turfgrass Systems

Beth Guertal is a Professor of Turfgrass Management and Soil Fertility at Auburn University, in Auburn, AL. She conducts research in the area of turfgrass management, with an emphasis on the fate of turfgrass fertilizers in the environment. She also teaches Introductory Turfgrass Management and advises all undergraduates in the turfgrass management program. She has BS and MS degrees from The Ohio State University, and a PhD from Oklahoma State University. In addition to her teaching and research she serves as a Technical Editor for Division C-5 (Turfgrass Management) for the journal Crop Science. She is a past Chair of Division C-5 (Turfgrass) for the Crop Science Society of America and is a Fellow of the American Society of Agronomy. In 2010 she will start a 6 month Fulbright appointment in Mauritius, South Africa, where she will teach and conduct research in turfgrass management.



10:20-10:40

Microbial interactions with organic matter buildup in turfgrass soils

W. Shi & D. Bowman (NCSU)

Wei Shi is an Associate Professor in the Department of Soil Science, North Carolina State University, with responsibilities for teaching graduate-level course of soil microbiology, advising graduate and undergraduate students, and conducting research relevant to soil microbial community structure and function in natural and managed ecosystems. Through years of training and work experience, she has developed broad interests in soil microbiology and ecology. Her research goal is to obtain fundamental knowledge on soil microorganisms that may have profound impacts on soil processes and ecosystem services, including but not limited to carbon sequestration, nutrient cycling, and fate of environmentally important chemicals.



Being supported by the turfgrass program at North Carolina State University, Dr. Shi launched investigations into belowground biology and biochemistry in urban and suburban ecosystems when she was appointed the position of Assistant Professor in the Department of Soil Science in 2002. Over the past few years, her research team examined multifaceted aspects of soil microorganisms under turfgrass. Her pioneering efforts have led to new information on how turfgrass establishment and subsequent management practices affect soil microbial community composition, biomass, and activity. It is her work that assesses the significant role of microbial processing in soil organic matter accumulation and stabilization under turfgrass environment.

Her research specialty areas include carbon and nitrogen transformations with stable and radioactive isotopes as tracers, microbial biomass and activity with various biochemical and physiological methods, and microbial community composition and structure with molecular biology techniques. Wei Shi holds the Bachelor of Science Degree in Biology from Liaoning University, the Master of Science degree in Agroecology from Shenyang Agricultural University, and the Doctorate Degree in Soil Microbiology from Utah State University. When not working, she likes hiking and sightseeing tours. She lives in Raleigh and has enjoyed the good weather and beautiful landscapes.

Dan Bowman, Professor of Turfgrass Science, is a plant physiologist interested in the impact of turfgrass culture on environmental quality. Current research is designed to characterize aspects of the nitrogen cycle in turfgrass soils, reduce soil-based stresses, and to evaluate new and emerging technologies in turfgrass management. He also teaches Introduction to Turfgrass Management.



10:40-11:00

Dynamics of Carbon Cycling in Lawn Ecosystems

Yaling Qian is a professor of turfgrass science in the Department of Horticulture and Landscape Architecture at Colorado State University. She obtained her BS and MS degrees in China and her Ph.D. (1996) at Kansas State University. Dr. Qian has engaged in research, teaching, and outreach at the university level for the past 12 years. Her research program has been focused on turfgrass environmental stress tolerance, turfgrass carbon sequestration, the use/effects of recycled wastewater in urban landscapes, as



well as characterization/development of native grasses for both turf and reclamation uses. She has made fundamental contribution to our understanding of carbon dynamics and sequestration in turfgrass systems. She has written numerous refereed scientific publications (54), book chapters (2), trade journal articles, and abstracts. She teaches courses in “Turfgrass Science” and “Soil-Plant-Water Relations” at Colorado State University. She has given over 120 presentations at the international, national, regional, and local conferences and symposiums. She has been active in both local and national professional organizations.

11:00-11:15 Discussion

11:15-11:35

Soil carbon pools and fluxes in urban forest patches

Ian Yesilonis is a soil scientist who works for the U.S. Forest Service in the unit of Urban Forests, Human Health, and Environmental Quality in the Northern Research Station. He participates in the Baltimore Ecosystem Study which one of the first National Science Foundation funded urban long-term Ecosystem research projects. On this project in

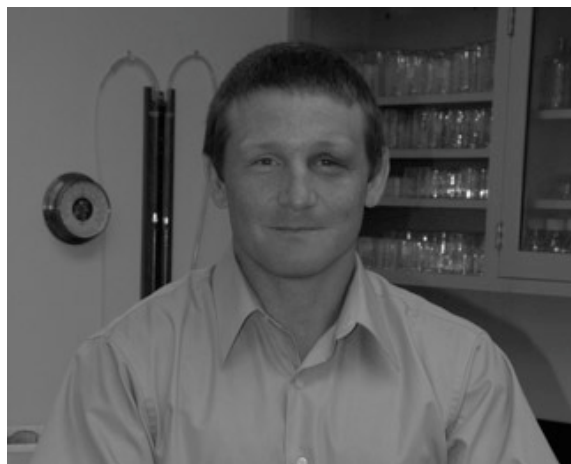


Baltimore, a team of researchers investigates carbon dioxide flux, soils, water flows and vegetation in Baltimore to help understand the effect of urbanization on environmental quality and human health. Some questions we are studying are related to soil quality and nutrient cycling such as how do urban soils vary across urban areas; how does urbanization and vegetation management affect soil properties and nutrient cycling; and how these soil properties affect tree health. Future research interests include using Pb isotope ratios in urban environments to determine sources; development of soil quality or soil suitability indicators for urban environments; and quantifying black carbon concentrations and determining sources in riparian zone soils of the Gwynns Falls watershed of Baltimore. To contact Ian Yesilonis go to <http://nrs.fs.fed.us/people/iyesilonis>

11:35-11:55

Urban tree Species for Carbon Sequestration

Bryant Scharenbroch is a Soil Scientist at the Morton Arboretum. Bryant has a Ph.D. in Soil Science from the U. Wisconsin-Madison, a M.S. in Plant Science from U. Idaho, and B.S. degrees from U. Wisconsin-Stevens Point in Urban Forestry and Forest Management. He is the primary investigator of the Morton Arboretum Soil Science (MASS) laboratory, which has three primary



focus areas: 1) improvement of urban soils for landscape trees; 2) urban ecosystem biogeochemical cycling; 3) urban soil genesis and classification. He is published in numerous peer-reviewed scientific journals and has presented at many international and regional meetings. Bryant is an Associate Editor for *Arboriculture and Urban Forestry*. Bryant is the current Research Chair for the Illinois Arborist Association. Bryant's research has been funded by the International Society of Arboriculture TREE Fund, Illinois Department of Natural Resources, United States Department of Agriculture, and National Science Foundation. He is a member of the Soil Science Society of America, Ecological Society of America, Illinois Soil Classifiers Association, International Society of Arboriculture, Chicago Wilderness, Midwest Ecological Landscape Association, and International Committee on Anthropogenic Soils. To contact Bryant: bscharenbroch@mortonarb.org

11:55-12:15

Impact of Terrestrial Carbon Management on Water Quality

Klaus Lorenz is Research Scientist at the Carbon Management and Sequestration Center, The Ohio State University. He received his Ph.D. in Agricultural Sciences from the University of Hohenheim, Germany, and holds a M.S. in Biology from the University of Freiburg, Germany. His main interests are biogeochemistry and the management of soil organic carbon stabilization processes in agricultural, forest and urban soils. He participated in a rural-to-urban land use transect study in Stuttgart,



Germany. The biological, chemical and physical properties of 27 soil profiles among 11 land use types were studied to assess the soil functions. Currently, he studies the soil organic carbon storage in urban forests in Columbus, Ohio. Future studies include the characterization of black carbon in urban forest soil profiles, and the soil organic carbon storage in other urban land uses in Columbus. He has published papers related to soil organic carbon in *Advances in Agronomy*, *Biology and Fertility of Soils*, *Environment International*, *Geoderma*, *Journal of Environmental Quality*, *Journal of Plant Nutrition and Soil Science*, and *Soil Biology and Biochemistry*, and has written a book (Co-Author Rattan Lal) 'Carbon Sequestration in Forest Ecosystems'. He is a member of the German Soil Science Society, Soil Science Society of America, American Geophysical Union, and the International Biochar Initiative.

12:15-12:30 Discussion

12:30-1:30 Lunch Break

1:30-1:50

Restoration of Urban Degraded Land in Calumet, IL by Using Biosolids, Biochar, and Other Soil Amendments

Nick Basta is Professor of Soil and Environmental Chemistry in the School of Environment and Natural Resources at The Ohio State University. His soil environmental chemistry program uses novel methodology to study the beneficial use of agricultural, industrial, and municipal by-products through land application and the fate of by-products in agronomic/environmental systems with emphasis on their risk and environmental impact. Dr. Basta is an active member of several international and national scientific committees focused on bioavailability and environmental fate of soil contaminants.



Dawn Busalacchi is an Environmental Science Graduate (Ph.D.) student at The Ohio State University. Her Ph.D. research is focused on the evaluation of biosolids, water treatment residuals and biochar for use in ecological restoration.



Dr. Lakhwinder Hundal and Dr. Kuldip Kumar are Senior Environmental Research Soil Scientists at the Metropolitan Water Reclamation District of Greater Chicago. Their research focuses on use of biosolids and other byproducts for environmental remediation and ecological restoration.

1:50-2:10

Land Use and Climate Change: Designing Policy that Works

Tom Koontz is associate professor of environmental and natural resource policy in the Ohio State University's School of Environment and Natural Resources. He also holds a faculty appointment in the John Glenn School of Public Affairs at Ohio State. Previously he served as a post-doctoral researcher at the Center for the Study of Institutions, Population, and Environmental Change at Indiana University. Dr. Koontz's primary research areas include collaborative environmental management, citizen participation, land use policy, and institutional analysis. With graduate students and colleagues, he examines questions about who participates in collaborative partnerships, how government personnel and institutions can foster better collaborative results, what factors affect the kinds of policies that state and local governments are likely to adopt, and how government agencies can measure their environmental performance. He is the author of two books about environmental policy, *Collaborative Environmental Management* and *Federalism in the Forest: National versus State Natural Resource Policy*, as well as articles in numerous public policy, public administration, political science, and natural resource journals. Tom is currently working on a funded project through the OSU Climate, Water, and Carbon program, and he serves on the editorial board of the *Journal of Public Administration Research and Theory*. EMAIL: koontz.31@osu.edu



2:10-2:30 Potential Urban Carbon Sequestration by Landscapes

Dr. Frank Rossi is the New York Extension Turfgrass Specialist and Associate Professor of Turfgrass Science in the Department of Horticulture at Cornell University. Prior to joining the faculty at Cornell, Frank served on the faculties of Michigan State University and the University of Wisconsin-Madison. He received his Ph.D. from Cornell University



Frank is a native New Yorker who has spent more than 30 years in the turfgrass industry and was a Golf Course Superintendent before returning to graduate school in 1986. In 2001, Frank was recognized by Golfweek Magazine as one of the 40 most influential people in the game of golf under the age of 40, an honor he shared with Tiger Woods and Jack Nicklaus III.

Frank is an international expert in golf and sports turf management, publishing hundreds of articles and traveling around the world lecturing on environmentally responsible and sustainable turfgrass management, less reliant on fertilizer and pesticides.

He has appeared on CNN, ESPN, PBS, the Golf Channel, and in print in US News and World Report, Time Magazine, USA Weekend, New York Times, Wall Street Journal, TurfNet.com, and Golfweek. His weekly Sustainable Lawn Care podcasts on iTunes are among the most popular lawn care downloads available.

Frank is a Visiting Professor at the Swedish Agricultural University at Alnarp, an advisor to both the Swedish Golf Federation and the European PGA Tour. Additionally, he serves on the Board of Directors of the International Sustainability Council and Audubon International.

Frank has served as lead turf consultant for the New York Yankees, Green Bay Packers, Lincoln Center for Performing Arts, the Randall's Island Sports Foundation, and for the 2002 and 2009 US Open Golf Championships at Bethpage Black.

In addition to his career in turf, Frank is married and the father of three children, a triathlete, member of his local school board, Hospice volunteer, little league coach and alpaca farmer.

Dr. Bruce J. Augustin is currently the Chief Agronomist for The Scotts Miracle-Gro Company. He joined Scotts in 1998 as Director of Product Development in the Research and Development Division. He is the technical leader for Global Gardens product innovation and development. His team develops science-based assessments and recommendations for product development, product stewardship and strategic direction for Scotts.

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He is an expert in the plant and soil sciences and has authored of over 120 popular and scientific articles on turfgrass and landscape management. Dr. Augustin has spoken to numerous professional, homeowner, and governmental groups at seminars and conferences throughout the United States.

2:45-3:00 Break

3:00-3:20 The Value of Carbon Sequestration In Backyard Habitats

Kevin J. Coyle, JD

Vice President for Education

Kevin Coyle has committed thirty-five years to improving America's education and environmental education fields. He joined the National Wildlife Federation as Vice President for Education in March 2005. He came to NWF following 10 years as President of the National Environmental Education & Training Foundation (NEETF), where he led this award-winning NGO chartered by Congress to strengthen U.S. environmental



learning for personal stewardship, science education, management, watershed management and natural resource management. He has also led and founded several other educational and environmental organizations, including River Network, Inc. (Washington, DC and Portland), American Rivers, and the American Land Resource Association. Mr. Coyle is Trustee and Immediate Past Chair of the Potomac Conservancy, Trustee of the Alice Ferguson Foundation, and has served two terms as the Chairman of the Natural Resources Council of America. He holds a BA in Sociology from LaSalle University, a JD in Environmental Law from Temple University, and the Conservation Leadership Institute Certificate from the Wharton School of Business.

3:20-3:40

Designing Sustainable Landscapes to Sequester Carbon and Address Climate Change

Nancy C. Somerville, Hon. ASLA, Executive Vice President and CEO, Amer. Society of Landscape Architects

Nancy C. Somerville is the Executive Vice President and CEO of the American Society of Landscape Architects (ASLA). Since joining the Society in August 2000, Somerville has expanded ASLA's public relations programs, increased ASLA's presence on Capitol Hill, and enabled the Society to become a more effective advocate on sustainability, community planning, transportation, and land use issues. Somerville directs the Society's ongoing green roof education and advocacy programs, as well as ASLA's participation as a Founding Sites Initiative™.



Somerville joined ASLA after 18 years with the American Institute of Architects, where she served as managing director and vice

president of program areas including membership, government affairs, chapter relations, community development, and continuing education. In 2004, Somerville was elected to membership in Lambda Alpha International, the honorary land economics fraternity, in recognition of her longtime advocacy for the design professions. She received the Civic Award of Excellence from Green Roofs for Healthy Cities in 2008 and is an honorary member of ASLA and the American Institute of Architects. A native of the Washington, D.C., area, she holds a B.A. from Princeton University and an M.A. from Stanford University.

3:40-4:00

Forest and Other Land Based Carbon Offsets: Costs and Benefits

B. Sohngen (OSU)

Email: Sohngen.1@osu.edu

Brent Sohngen is a professor of environmental and natural resource economics in the Department of Agricultural, Environmental, and Development Economics at the Ohio State University. His primary research interests lie in modeling land use change, assessing the economic efficiency of alternative policy instruments for non point source water pollution control, and estimating the economic benefits of improving environmental resources. Sohngen has utilized market models to examine the implications of ecological change for timber markets, and to assess the costs of carbon sequestration in forests and agricultural soils. He leads an extension program in environmental and resource economics that provides resources on benefit cost analysis to Ohio policy-makers. Sohngen teaches a graduate and undergraduate course in micro-economic theory, and environmental and resource economics.



4:00-4:15 Discussion

4:15-4:35 Role of Urban Green Space in the Congressional Climate (Video)

U.S. Senator Sherrod Brown (J. Wieder)

4:35-5:00

General Conclusions, Summary of event

R. Lal (OSU), B. Augustin (Scotts)

**PowerPoint presentations
can be found as links from
the C-MASC website:
<http://senr.osu.edu/cmasc/events.html>**

POSTER PRESENTERS

Carbon Sequestration in golf course turfgrass systems

A. Selhorst (OSU)

Adam Selhorst completed his B.A. in Biology from Kenyon College in 2004 and his M.S. in Environmental Science from The Ohio State University in 2007. He is currently a student in both the John Glenn School of Public Affairs and the Environmental Science Graduate Program at The Ohio State University expecting to complete an M.A. in 2010 and a PhD in 2011. Past research has focused on the ability of golf course turfgrass systems to sequester carbon over time. Currently, his work focuses on assessing the ability of U.S. home lawn systems to sequester carbon in various climatic regions.

Lawn Carbon Sequestration G. Zirkle (OSU)

Gina Zirkle graduated from OSU in 2004 with a Bachelor of Science in Plant Health Management. Following graduation, she was hired by The Scotts Miracle-Gro Company as a research specialist working on new product development for R&D. In 2008, she continued her education sponsored by The Scotts Miracle-Gro Company and graduated in 2010 with a Masters of Science degree in Environment and Natural Resources. Her research focused on carbon sequestration in home lawns. Gina completed her graduate degree in March 2010 and has continued her employment at Scotts.



Improving Soil Quality for Vegetable Production in Degraded Urban Soils, J. Beniston (OSU)

Josh Beniston is currently pursuing a PhD, with a focus on ecosystem science and soil quality, in the School of Environment and Natural Resources at the Ohio State University. In 2009, he completed his MS in Soil Science under Prof Rattan Lal at the Carbon Management and Sequestration Center. During his MS program, Josh completed two independent research projects. He completed a study on the ability of tallgrass prairie plantings to sequester soil C and improve soil quality on croplands. He also established a collaborative project with the Land



Institute in Salina, KS, looking at differences in soil C cycling and storage between annually cropped wheat fields and adjacent tallgrass prairies which have been harvested for biomass for close to a century. He also participated in CMASC's study of C dynamics in croplands across a seven state region around Ohio. Josh's current research interest is in studying methods of improving soil quality for food production in the formerly industrial cities of the northern Midwest.

A trained horticulturalist and landscape designer, Josh has been a principal of Habitats Ecological Design for the past 6 years. Habitats specializes in the design of unique ecological landscapes with a focus on food production and ecological restoration. A committed educator, Josh has given over two dozen invited presentations on soil science and landscape design, at venues including universities, conservatories, and public events, across the region in the last three years.

Legacy effects of highway construction disturbance and vegetation management on soil carbon in forested urban verges

Tara L.E. Trammell is a doctoral candidate in the Dept. of Biology at the University of Louisville, where she received a University Fellowship and a Doctoral Dissertation Completion Award from the graduate school. During her graduate career, she received a research assistantship from the USDA Forest Service, Northern Global Change Program to conduct research on CENTURY modeling for the Baltimore Ecosystem Study, Long-Term Ecological



Research Station. For her dissertation research, Tara studied an urban forest type that has not been studied by urban ecologists, forest verges along urban interstates. This research documented how multiple ecosystem drivers of urban interstates may alter ecosystem structure, function, and services of these forests along urban interstates. Tara received a M.S. in Biology from the University of Louisville and conducted research on prescribed fire effects on soil biogeochemical responses in glade openings in oak-hickory forests. She earned a B.A. in Mathematics from Berea College and was inducted into the Phi Mu Epsilon Math Honor Society. She has received several awards and grants for her doctoral research: Garden Club of America Zone VI Urban Forestry Fellowship, U.S. Int'l Association for Landscape Ecology Student Travel Award, Kentucky Soc. of Nat. History Woody Boebinger Memorial Scholarship and Research Grant, Kentucky Academy of Sciences Botany Fund Research Award, and Biology Grad. Student Assoc. Research Publication and Presentation Awards. Tara has seven publications *in prep* and will be coauthor on several more publications for her work on Louisville urban forests. Her research interests include mathematical modeling, ecosystem ecology, and urban ecology.

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ELENA AGUARON is currently a PhD candidate at the University of California at Davis. She was born in Spain in 1980. Elena earned her Bachelor degree in Forestry and Environmental Engineering at the Technical University of Madrid. Upon her graduation, she pursued graduate studies at the University of California at Davis. In 2005, she received her M.S. degree in Forestry and was awarded a fellowship from the European Commission to complete a M.S. in European Forestry in Finland, Sweden, and Austria. During her studies, she also completed an internship at the European Forest Institute headquarters in Joensuu, Finland. In 2006, Elena started her doctoral program at the University of California in collaboration with the U.S. Forest Service, where she performs her research. Her doctoral dissertation compares different methods to calculate carbon storage and sequestration by Sacramento's urban forest. She is co-author in the "Urban Forests and Climate Change" website of the Forest Service and participated in the Center for Urban Forest Research Tree Carbon Calculator.

