NICHOLAS T. BASTA
PROFESSOR OF SOIL AND ENVIRONMENTAL CHEMISTRY
https://senr.osu.edu/

PERSONAL PROFILE

School of Environment and Natural Resources
The Ohio State University
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Columbus, OH 43210
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EDUCATION

Ph.D.	1989	Iowa State University, Soil Chemistry Minor in Analytical Chemistry
M.S.	1984	Iowa State University, Soil Science
B.S.	1981	The Pennsylvania State University, Chemistry

PROFESSIONAL EXPERIENCE

7/13-present	Director, Environmental Science Graduate Program, The Ohio State University, Columbus, OH.
7/03–present	Professor of Soil and Environmental Science, School of Environment and Natural Resources, The Ohio State University, Columbus, OH.
8/91-6/03	Professor of Soil Chemistry, Dept. of Plant and Soil Sciences, Oklahoma State University, Stillwater, OK
6/90-7/91	Research Soil Scientist, USDA ARS, North Central Soil Conservation Research Laboratory, Morris, MN

RECOGNITION AND AWARDS

Awards

International

North American Colleges and Teachers of Agriculture (NACTA) Educator Award. 2018.

National

Fellow, Soil Science Society of America, 2004.

Fellow, American Society of Agronomy, 2003.

Interstate Technology Regulatory Council 2016 Team of the Year. Bioavailability in Contaminated Soil Member. March 28, 2017.

Excellence in Review Award. 2010. Environmental Science and Technology Journal, American Chemical Society.

U.S. Environmental Protection Agency, Friend of Office of Solid Waste Award, 2008. In recognition of the “pathbreaking work on the Foundry Sand Risk Assessment” conducted by Drs. N. Basta and E. Dayton of OSU and Drs. R. Chaney and R. Dungan of USDA ARS.

University

College of Food, Agricultural, and Environmental Sciences, Pomerene Departmental Teaching Excellence Award, The Ohio State University, 2006.

James A. Whatley Award for Meritorious Research in Agricultural Science, Oklahoma State Univ., 1998

Outstanding Teaching Award, Dept. of Agronomy, Oklahoma State Univ., 1996

Research Excellence Award, Iowa State Univ. 1989,

Recognition

The National Academies of Sciences, Engineering and Medicine U.S. National Committee for Soil Science, May 2020-2023.

Professor Courtesy Appointment, Division of Environmental Health Sciences, College of Public Health, The Ohio State University. March 1, 2015.

Chair, Soil Chemistry (Division S-2), Soil Science Society of America, 2008-2011

Technical Editor, *Journal of Environmental Quality*, 2002-2007 (reappointed for 2005-2007)

Associate Editor, *Journal of Environmental Quality*, 1997-1999 (reappointed for 2000-2002)

Board Representative, Environmental Soil Science (Division S-11), Soil Science Society of America, 2001-2004

SOCIETY MEMBERSHIP

American Association for the Advancement of Science (AAAS) (member 2004-present)
American Chemical Society (ACS) (member 1989-present)
American Society of Agronomy (ASA) (member 1980-present)
International Union of Soil Sciences (IUSS)
Society for Environmental Toxicology and Chemistry (SETAC) (member 1996-present)
Society for Ecological Restoration (SER) (member 2017-present)
Soil Science Society of America (SSSA) (member 1982-present)

RESEARCH

Focus

My research program focuses on soil and environmental chemistry / science and its application for soil and environmental remediation:

- Environmental chemistry of organic and inorganic pollutants in contaminated soils with emphasis on human (e.g., public health), agronomic (e.g., crop, animal), and ecological bioavailability, contaminant fate and transport, and human health and ecological risk assessment

- Development and evaluation of new technologies used for in situ remediation of contaminated soils (e.g., soil amendments).
- Development of innovative *in vitro* laboratory methods to predict (1) contaminant and nutrient bioavailability and (2) the ability of remediation methods to reduce contaminant bioavailability and human and ecological exposure.
- Beneficial use of agricultural, industrial, and municipal by-products through land application; soil and environmental chemistries of by-products in agronomic/environmental systems with emphasis on their risk and environmental impact
- Fundamental biogeochemical processes that affect heavy metal and trace element bioavailability, human and ecological health in soil-water systems

GRANTS AND CONTRACTS

Source	Number	Project Total ($)
Extramural Sources	40	26,768,575
Intramural Sources, Oklahoma State Univ.	8	201,265
Intramural Sources, Ohio State Univ.	9	672,751
All	57	27,642,591

SELECT ACTIVE

Source: Ohio Department of Higher Education
Title: Effect of Soil Properties on Leaching Potential and Crop Uptake of Microcystin in Land Applied Drinking Water Treatment Residuals
Investigator(s): E. Dayton (PI), N. T. Basta (PI), Jiyoung Li (Co-PI),
Project Total: $192,577
Grant Duration: 1/20 to 6/21

Source: Ohio Department of Higher Education
Title: Environmental Fate and Persistence of Microcystin in Land Applied Drinking Water Treatment Residuals
UCR Soil Amendment Technology Evaluation Study
Investigator(s): N. T. Basta (PI), Jiyoung Li (Co-PI), E. Dayton (Co-PI)
Project Total: $160,780
Grant Duration: 1/18 to 12/21 (extended)

Source: Rambol Environ, Inc
Title: Soil Amendment Technology Evaluation Study (SATES)
Investigator(s): N. T. Basta (PI)
Project Total: $ 426,843
Grant Duration: 10/17 to 12//22

Source: CFAES OARDC SEEDS
Title: A Community-Driven Approach for Remediation of Urban Pb-Contaminated Soil to Improve Public and Ecological Health *Investigator(s):* N. T. Basta (PI), Mary Rodriguez, Mary Gardiner, Roman Lanno
Project Total: $ 79,412
Grant Duration: 3/1/19 to 5/31/2021

CURRENT USDA-NIFA PROJECTS

The Ohio State University
Project Number: OHO01336;
Managing for Improved Soil Health and Ecosystem Services
Start Date: 10/01/2019 Termination Date: 09/30/2024
Culman, Steven; Davies, G; Demyan, M; Hattey, Jeffory; Lower, Brian; Lower, Steven; Sprunger, Christine; Slater, Brian

Project Number: (OHO01361-MRF); MRF project W-4170, Beneficial Use of Residuals to Improve Soil Health and Protect Public and Ecosystem Health.
Start Date: 10/01/2019 Termination Date: 09/30/2024

Project Number: OHO01336;
Development of an Assessment Framework to evaluate Restoration of Ecosystem Services and Resilience of Degraded Soils
Start Date: 10/01/2014 Termination Date: 09/30/2019

Project Number: (OHO01361-MRF); MRF project W-3170, Reuse of Residuals and Reclaimed Water: Impact on Soil Ecosystem and Human Health
Start Date: 10/01/2014 Termination Date: 09/30/2019

PUBLICATIONS

Publication	Total	In review
Refereed journal manuscripts	116	3
Books / Book chapters	14	
Abstracts and proceedings	304	
Final Technical Reports	22	
Other		
Non refereed journal manuscripts	2	
Research bulletins	4	
Extension Publications	4	
New Releases	15	
Total	**481**	

Publication Scholar Metrics for Refereed Science Journal Manuscripts

Citations	9399
h-index	45
i10-index	106
Publications with >100 citations	28
Five highest cited	734, 539, 516, 488, 447

SELECT REFEREED JOURNAL PUBLICATIONS

Zhang, Xiaoqin, Elizabeth A. Dayton, Nicholas T. Basta. 2020. Predicting the modifying effect of soils on arsenic phytotoxicity and phytoaccumulation using soil properties or soil extraction methods. Environ. Pollut. 263:1-10.

Brown, Sally, James A. Ippolito, Lakhwinder Hundal, and Nicholas T. Basta. 2020. Municipal biosolids – A resource for sustainable communities. Current Opinion in Environmental Science & Health. 14:56-62.

Brooke N. Stevens, Aaron R. Betts, Bradley W. Miller, Kirk G. Scheckel, Richard H. Anderson, Karen D. Bradham, Stan W. Casteel, David J. Thomas, and Nicholas T. Basta. 2018. Arsenic Speciation of Contaminated Soils/Solid Wastes and Relative Oral Bioavailability in Swine and Mice. Soil Syst. 2:1-13.

Obrycki, John F., Darryl B. Hood, Tyler Serafini, Chris Alexander, Pam Blais, Nicholas T. Basta. Public health data contextualizes soil Pb hazard management in Ohio. 2018. Journal of Public Health Manag Pract 24(2): e18-e24.

Whitacre, Shane D., Nicholas T. Basta, Brooke N. Stevens, Valerie Hanley, Richard H. Anderson, and Kirk G. Scheckel. 2017. Modification of an Existing In vitro Method to Predict Relative Bioavailable Arsenic in Soils. Chemosphere 180:545-552.

Obrycki, John F, Nicholas T. Basta, Robyn S. Wilson. 2017. Evaluating public and regulatory acceptance for urban soil management approaches. J. Environ. Qual. 46: *20-26.* doi:10.2134/jeq2016.06.0230.

Obrycki, John F, Kirk G. Scheckel, and Nicholas T. Basta. 2017. Soil solution interactions may limit Pb remediation using P amendments in an urban soil. Environ Pollut. 220:549-556.

Obrycki, John F., Nicholas T. Basta, Steven W. Culman. 2016. Management Options for Contaminated Urban Soils to Reduce Public Exposure and Maintain Soil Health. J. Environ. Qual. Doi.2134/jeq2016.07.0275

Beyer, Nelson, W., Nicholas T. Basta, Rufus Chaney, Paula F. P. Henry, Thomas May, David Mosby, Barnett A. Rattner, Kirk G. Scheckel, Daniel Sprague. Bioaccessibility tests accurately estimate bioavailability of lead to quail. Environ. Toxicol. Chem**.** 35: 2311–2319, 2016.

Basta, N.T., D.M. Busalacchi, L.S. Hundal, K. Kumar, R.P. Dick, R.P. Lanno, J. Carlson, A.E. Cox, and T.C. Granato. 2016. Restoring ecosystem function in degraded urban soil using biosolids, biosolids blend and compost. Special Issue: Soil in the City. J. Environ. Qual. 45(1): 74-83.

Obrycki, John F., Nicholas T. Basta, Kirk Scheckel, Albert Juhasz, Brooke N. Stevens, and Kristen K. Minca. 2016. Phosphorus amendment efficacy on soil Pb depends upon bioaccessible method conditions. Special Issue: Soil in the City J. Environ. Qual. 45(1): 37-44.

Heather Henry , Marisa F. Naujokas , Chammi Attanayake , Nicholas T. Basta , Zhongqi Cheng, Ganga M. Hettiarachchi , Mark Maddaloni , Christopher Schadt , and Kirk G. Scheckel. 2015. Bioavailability-based in situ remediation to meet future lead (Pb) standards in urban soils and gardens. Environ. Sci. Technol. 49 (15), pp 8948–8958.

Venteris, E.R., N.T. Basta, J.M. Bigham, and R. Rea, 2014. Modeling spatial patterns in soil As to estimate natural baseline concentration. J. Environ. Qual. 43:936-946.

Minca, K.K., N.T. Basta, and K.G. Scheckel. 2013. Using the Mehlich-3 soil test as an inexpensive screening tool to estimate total and bioaccessible Pb in urban soils. J. Environ. Qual. 42(5):1518-1526.

Scheckel, K.G., R.L. Chaney, N.T. Basta and J.A. Ryan. 2009. Advances in Assessing Bioavailability of metal(loid)s in Contaminated Soils. Adv. Agron. 107:10-52.

Basta, N.T., J. N. Foster, E.A. Dayton, R. R. Rodriguez, and S.W. Casteel. 2007. The effect of dosing vehicle on arsenic bioaccessibility in smelter-contaminated soils. Invited manuscript for the special JEHS publication “Bioaccessibility and human bioavailability of soil contaminants” J. Environ. Health Sci. Part A. 42:1275-1281.

Brown, S.L., H. Compton, and N.T. Basta. 2007. Field Test of *In Situ* Soil Amendments at the Tar Creek National Priorities List Superfund Site. J. Environ. Qual. 36:1627-1634.

Dayton, E.A, N.T. Basta, M.E. Payton, K.D. Bradham, J.L. Schroder, and R.P. Lanno. 2006. Evaluating the contribution of soil properties to modifying lead phytoavailability and phytotoxicity. Environ. Toxicol. Chem. 25(3):719-725. *Invited manuscript for the special ET&C publication “Assessing Risks of Metals added to Soils in Europe and North America.*

Beak, D.G., N.T. Basta, K.G. Scheckel, and S.J. Traina. 2006. Bioaccessibility of lead sequestered to corundum and ferrihydrite in a simulated gastrointestinal system. J. Environ. Qual. 35:2075-2083.

Beak, D.G., N.T. Basta, K.G. Scheckel, and S.J. Traina. 2006. Bioaccessibility of arsenic bound to corundum using a simulated gastrointestinal system. Environ. Chem. 3:208-214.

Beak, D.G., N.T. Basta, K.G. Scheckel, and S.J. Traina. 2006. Bioaccessibility of arsenic (V) bound to ferrihydrite using a simulated gastrointestinal system. Environ. Sci. Technol. 40:1364-1370.

Dayton, E.A, N.T. Basta. 2005. Using Drinking Water Treatment Residuals as a Best Management Practice to Reduce Phosphorus Risk Index Scores. J. Environ. Qual. 2005 34: 2112-1117. Invited manuscript for the special JEQ publication “Phosphorus Workshop: 4th International Phosphorus Workshop:Critical Evaluation of Options for Reducing Phosphorus Loss from Agriculture, Waginenen, The Netherlands, August, 2004.”

Basta, N.T., J.A. Ryan, and R. L. Chaney. 2005. Trace element chemistry in residual-treated soil: Key concepts and metal bioavailability. J. Environ. Qual. 34: 49-63.

Basta, N.T., and S.L. McGowen. 2004. Evaluation of chemical immobilization treatments for reducing heavy metal transport in a smelter-contaminated soil. Environ. Pollut. 127(1):73-

herbicides. Talanta. 57:383-391.

Frost, M.D., J.C. Cole, J.M. Dole, and N.T. Basta. 2002. Media constituents, micronutrient fertilizer source, and calcium applications influence iron, manganese, and zinc leaching. J. Plant Nutr. 25:315-326.

Soochong, K., E.L. Stair, R.L. Lochmiller, D.P. Rafferty, J.L. Schroder, N.T. Basta, J.W. Lish, and C.W. Qualls. 2001. Widespread risks of dental fluorosis in cotton rats (*Sigmodon hispidus*) residing on petroleum waste sites. J. Toxicol. Environ. Health 62:107-125.

Dayton, E.A., and N.T. Basta. 2001. Characterization of drinking water treatment residuals for

Rodriguez, R.R., N.T. Basta, S.W. Casteel, and L.W. Pace. 1999. An *in vitro* gastrointestinal method to estimate bioavailable arsenic in contaminated soils and solid media. Environ. Sci. Technol. 33:642-649.

Sloan, J.J., N.T. Basta, and R.L. Westerman. 1995. Aluminum transformations and soil solution equilibria induced by banded P fertilizer in acid soil. Soil Sci. Soc. Am. J. 59:357-364.

Basta, N.T., D.J. Pantone, and M.A. Tabatabai. 1993. Path analysis of heavy metal adsorption by soil. Agron. J. 85:1054-1057.

BOOKS / BOOK CHAPTERS (2013-PRESENT) FOR A COMPLETE LIST PLEASE SEE APPENDIX A

Basta,N.T., Alyssa M. Zearley, Jeffory A. Hattey, and Douglas L. Karlen. 2021. A Risk-Based Soil Health Approach to Management of Soil Lead. In: D.L. Karlen, D.E. Stott, and M.M. Mikha (eds). Soil Health: Vol. 1: Approaches to Soil Health Analysis, Chapter 7, Soil Science Society of America (SSSA) & Wiley International, SSSA, Madison, WI.

Obrycki J.F., K.K. Minca, and N.T. Basta. 2016. Screening for Soil Lead Contamination Using a Common Soil Test Method. In Sowing Seeds in the City: Municipal and Ecological Considerations (S. Brown, K. McIvor and E. Snyder (eds.), Springer, NY.

Basta, N.T. and A. Juhasz. 2014. Chapter 9: Using In Vivo Bioavailability and/or In Vitro Gastrointestinal Bioaccessibility Testing to Adjust Human Exposure from Soil Ingestion. In : R.J.Bowell, J. Majzlan and C.Alpers (eds.) Geochemistry, Mineralogy and Microbiology of Arsenic in Environment, Reviews in Mineralogy and Geochemistry, Mineralogical Society of America.

Whitacre, S.D., N.T. Basta, C.J. Everett, K. Minca, and W.L. Daniels. 2013. Identification of toxic agents and potential exposure routes to Appalachian coal mining communities. In: J.R. Craynon (ed.) Environmental considerations in energy production. Soc. Mining Met. & Explor., Englewood, CO.

Active Course Offerings

ENVIRONMENT AND NATURAL RESOURCES 5262:
ENVIRONMENTAL SOIL CHEMISTRY AND REMEDIATION

ENR 5262 (3 semester hr) has two 1-hr lectures and a 2-hr wet/computer laboratory.
A comprehensive study of soil biogeochemical processes relevant to soil and chemical contaminant remediation. Emphasis is placed on soil and environmental chemical processes on human and ecological health, ecosystem function, and soil remediation. Water and soil solution

chemistry; soil carbon/organic matter, soil minerals, precipitation/dissolution, adsorption reactions and models, redox chemistry, soil acidity. Restoration / remediation topics include human and ecological contaminant exposure in soil-water systems; environmental fate of fertilizer, pesticides in agricultural soil; remediation of severely degraded coal mineland soils and water (acidity, other); remediation of salt degraded soil (i.e. surface impact from subsurface shale fracturing); remediation of contaminated (heavy metals, toxic organics) soil; restoration of urban soils. Socioeconomic considerations for environmental remediation methods, including cost and community / regulatory agency acceptance, will be studied. Laboratory component focuses on soil investigation and remediation of contaminated sites including experience using environmental soil chemistry computer models.

ENVIRONMENT AND NATURAL RESOURCES 5273:
ENVIRONMENTAL FATE AND IMPACT OF POLLUTANTS IN SOIL AND WATER

ENR 5273 (3 semester hr) has two 1 hr 20 m lecture classes. (offered every Spring Semester). An overview of pollutant sources, pollutant transport through soil and water, and environmental fate of pollutants. Soil and environmental chemistry or organic and inorganic contaminants. Pollutant transport through human and ecosystem exposure pathways.

Course Objectives: After completion of this course:
You should have an understanding of:
1. sources of major environmental pollutants,
2. the relationship between soil / environmental chemistry and contaminant transport,
3. and pollutant transport through human and ecosystem pathways.

ENVIRONMENT AND NATURAL RESOURCES 5279:
URBAN SOILS AND ECOSYSTEM SERVICES: ASSESSMENT AND RESTORATION

3 semester hrs (one 2-hr class; one 3-hr lab). A comprehensive study focused on assessment and restoration of urban soil to provide essential ecosystem services. Urban soil laboratory provides hands-on experience with soil assessment and restoration

Course Objectives:

COURSE DESCRIPTION:
A comprehensive study focused on assessment and restoration of urban soil to provide essential ecosystem services. Urban soil laboratory provides hands-on experience with soil assessment and restoration.

COURSE OBJECTIVES:
The aim of the proposed class is to provide knowledge to assess and restore the ability of urban soil to provide essential ecosystem services. Topics covered will include:

(i) assessment of environmental contaminants, physical, chemical, and biological properties and
(ii) the use of pragmatic methods to restore and/or remediate soils.

Develop a working knowledge of field and laboratory soil assessment methods required by professionals to:

(i) conduct field soil investigation,
(ii) collect and preserve field soil / water samples,

(iii) request soil analyses,
(iv) perform laboratory analyses,
(v) interpret analytical results, and
(vi) summarize findings and recommendations in a professional report.

EDITORIAL BOARDS

Guest Editorial, Environ. Pollution. Special Issue on Bioavailability, 2019-2020.
Editorial Board, Soil Systems, 2018-present.
Editorial Board, Current Pollution Reports; 2015-present
Editorial Board, *J. Soil and Sediment Contamination*; 2003-2015
Editorial Board, J. Environmental Quality,
Technical Editor, 2002-2007
Associate Editor, 1997-2002
Editorial Board, *Critical Reviews in Environmental Science and Technology* (2004-2006).

International Committees

Interrnational Conference for Heavy Metals in the Environment (2016-present)
International Committee, International Conference on Biogeochemistry of Trace Elements (2001-present)
Bioavailability Research Group of Europe, 2004-present.
Bioavailability Research Group of Canada, 2007-present.
Executive Committee, International Society of Trace Element Biogeochemistry, ISTEB (2003-2007). ISTEB Nomination Committee, Chair

National Committees

The National Academies of Sciences, Engineering and Medicine U.S. National Committee for Soil Science, May 2020-2023.

USDA National Institute of Food and Agriculture (NIFA) MulitState Project W-4170 (OHO01361-MRF), Beneficial Use of Residuals to Improve Soil Health and Protect Public and Ecosystem Health, 1992-present.
Soil Science Society of America, Methods of Soil; Analysis Committee, 2017-2020.
Interstate Technology and Regulatory Council (ITRCweb.org). Bioavailability in Contaminated Soil Workgroup, 2014-2017.
Soil Science Society of America, Chair Division S-2 , Soil Chemistry, 2009-2012.
Global Contaminated Soil Advisory Group, Society for Environmental Toxicology and Chemistry, 1997-present
Board Representative, Environmental Soil Science (Division S-11), Soil Science Society of America, 2001-2004

UNIVERSITY SERVICE

Environmental Science Graduate Program, (2013-present)
Co-Director (2013-2019); Director (2019-2022)

Committees

<u>The Ohio State University, *active committees</u>
University Commiittees
Faculty Senate, 2013-2016; re-elected 2017-2020

Faculty Compensation and Benefits Committee (2017-2020)

School of Environment and Natural Resources
Research Committee (2020-present)