



ONE WORLD,

ONE MEDICINE,

ONE HEALTH

One Health Intellectual Exchange

Weekly Discussions / Course: Philosophy to Practical Integration of Human, Animal and Environmental Health

A weekly discussion series, sponsored by the **North Carolina One Health Collaborative** within the NCBC IEG Program to enhance collaborations between physicians, veterinarians, researchers and other local/global/environmental health professionals by increasing public awareness of the interconnectedness of people, animals and the environment.

(Available each spring for credit if desired)

3rd 2013 Weekly Session - Tuesday, January 8

5:30 – 7:30 p.m.

Ecological and Human Health Impacts of Mountaintop Mining

Richard T. Di Giulio, PhD, Duke University

And

Gold mining in Peru: ecosystem and health impacts of uncontrolled mercury use

Jennifer J. Swenson, PhD, Duke University

Meets Tuesdays, 5:30 – 7:30 p.m. at the North Carolina Biotechnology Center
15 T.W. Alexander Drive Research Triangle Park, NC 27709

Directions: www.ncbiotech.org/directions/

Suggestions? Ideas? Contact Cheryl Stroud, Steering Comm. Chair cms7earth@gmail.com

Add yourself to the listserv with Listserv Manager Liz Selisker, liz_selisker@ncsu.edu

For Speaker Bio's, Suggested Readings, Cancellation notices and additional background

<http://nconehealthcollaborative.weebly.com/index.htm>

<http://triangleglobalhealth.ning.com/group/tghconehealth>

<http://onehealtheducation.blogspot.com/>

For more information on the course option contact: Course TA Anne Stine anne.stine@duke.edu

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Chris Woods at Duke chris.woods@duke.edu

At NCSU Barrett Slenning barrett_slenning@ncsu.edu or Suzanne Kennedy-Stoskopf

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Richard T. Di Giulio is Professor of Environmental Toxicology in the Nicholas School of the Environment at Duke University. At Duke, he also serves as Director of the Integrated Toxicology and Environmental Health Program, Director of the Superfund Research Center, and Co-Principal Investigator for the Center for the Environmental Implications of Nanotechnology.

Dr. Di Giulio has published extensively on subjects including biochemical and molecular mechanisms of adaptation and toxicity, biomarkers for chemical exposure and toxicity, and effects of chemical mixtures and multiple stressors. His current work focuses on

mechanisms by which polycyclic aromatic hydrocarbons (PAHs) and nanomaterials perturb embryonic development in fish models (zebrafish and killifish), the evolutionary consequences of hydrocarbon pollution on fish populations, and the ecological and human health impacts of mountaintop coal mining in Appalachia. Additionally, he has organized symposia and workshops, and written on, the broader subject of interconnections between human health and ecological integrity.

Dr. Di Giulio serves as an advisor for the Scientific Advisory Board of the U.S. EPA, is a member of the Scientific Advisory Board, U.S. Department of Defense, Strategic Environmental Research and Development Program, is associate editor for *Environmental Health Perspectives*, and recently served on the National Academy of Science Committee on Exposure Assessment in the 21st Century.

Dr. Di Giulio received a B.A. in comparative literature from the University of Texas at Austin, the M.S. in wildlife biology from Louisiana State University and the Ph.D. in environmental toxicology from Virginia Polytechnic Institute and State University. He is an active member of the Society of Environmental Toxicology and Chemistry (SETAC), where he previously served on the Board of Directors, and the Society of Toxicology (SOT).

Major points:

- Mountaintop coal mining and associated valley fills are the dominant forces of landscape change in southern Appalachia.
- These activities have resulted in degraded water quality including exceedences of state and federal criteria for selenium and conductivity.
- Within a watershed, the degree of water quality impacts is correlated with the proportion of the watershed mined.
- Key ecological impacts include decreases in diversity of invertebrate communities (associated with elevated conductivity) and fish deformities (associated with elevated selenium).
- Epidemiological evidence suggests positive correlations among mountaintop mining activity, ecological integrity and some human diseases in West Virginia counties.
- Elucidating cause-effect relations for human health impacts is significantly more complex than for ecological impacts, and merits substantial attention.



Jennifer J. Swenson is Assistant Professor of the Practice of Geospatial Analysis at the Nicholas School of the Environment at Duke University. She also is Director of Professional Studies for the Masters of Environmental Management Program.

During her career she's worked with geospatial and satellite remote sensing technologies in different US government agencies (US Forest Service, National Park Service) and has spent years working with environmental non profits in Latin America (NatureServe, EcoCiencia) on a range of conservation and land use planning projects.

Jennifer received her Ph.D. degree in Forest Ecology from Oregon State University in 2004. She received her Master's in Geography emphasizing spatial technologies and biogeography from San Diego State University in 1995. Her undergraduate studies were in Geography and International Relations at the University of California, Santa Barbara.

Her research focuses on mapping land cover change, modeling patterns of species and ecosystems, and examining their links with other environmental indicators. Recent research has covered deforestation dynamics and species diversity patterns in the Andes-Amazon region. She is currently involved characterizing more subtle changes in land cover and carbon content with remote sensing, that of natural reforestation in the Argentinian pampa, as well as drought induced canopy loss across Texas.

Major points:

- Gold mining is rapidly deforesting many parts of the world; in Peru it is outpacing typical 'settlement' deforestation in some regions and is pushing into pristine forests near protected and community areas.
- Gold mining in these areas is often artisanal/illegal in nature, difficult to control, and is more responsive to outside economic forces such as global gold price.
- Non industrial gold mining largely depends on the unregulated use of mercury by miners, uneducated on health repercussions.
- Mercury is being released into waterways and into the atmosphere. High levels have been detected in wildlife and humans.
- Human populations are being exposed to mercury via multiple pathways.

Suggested Readings for the Session:

Hitt NP, Hendryx M, Ecological Integrity of Streams Related to Human Cancer Mortality Rates, EcoHealth, Published online April 2, 2010, DOI: 10.1007/s10393-010-0297-y

Lindberg T Ty, Bernhardt ED, Bier R, Helton AM, Merola B, Vengosh A, Di Giulio T, Cumulative impacts of mountaintop mining on an Appalachian watershed, PNAS, December 27, 2011, vol. 108, no. 52
www.pnas.org/cgi/doi/10.1073/pnas.1112381108

Swenson, J J, Carter C E, Domec J-C, Delgado C I, Gold Mining in the Peruvian Amazon: Global Prices, Deforestation, and Mercury Imports, PLoS ONE, April 2011, Volume 6, Issue 4, e18875

Uryu Y, Malm O, Thornton I, Payne I, Cleary D, Mercury Contamination of Fish and Its Implications for Other Wildlife of the Tapajós Basin, Brazilian Amazon, *Conservation Biology*, April 2001, Volume 15, No. 2, PP 438–446