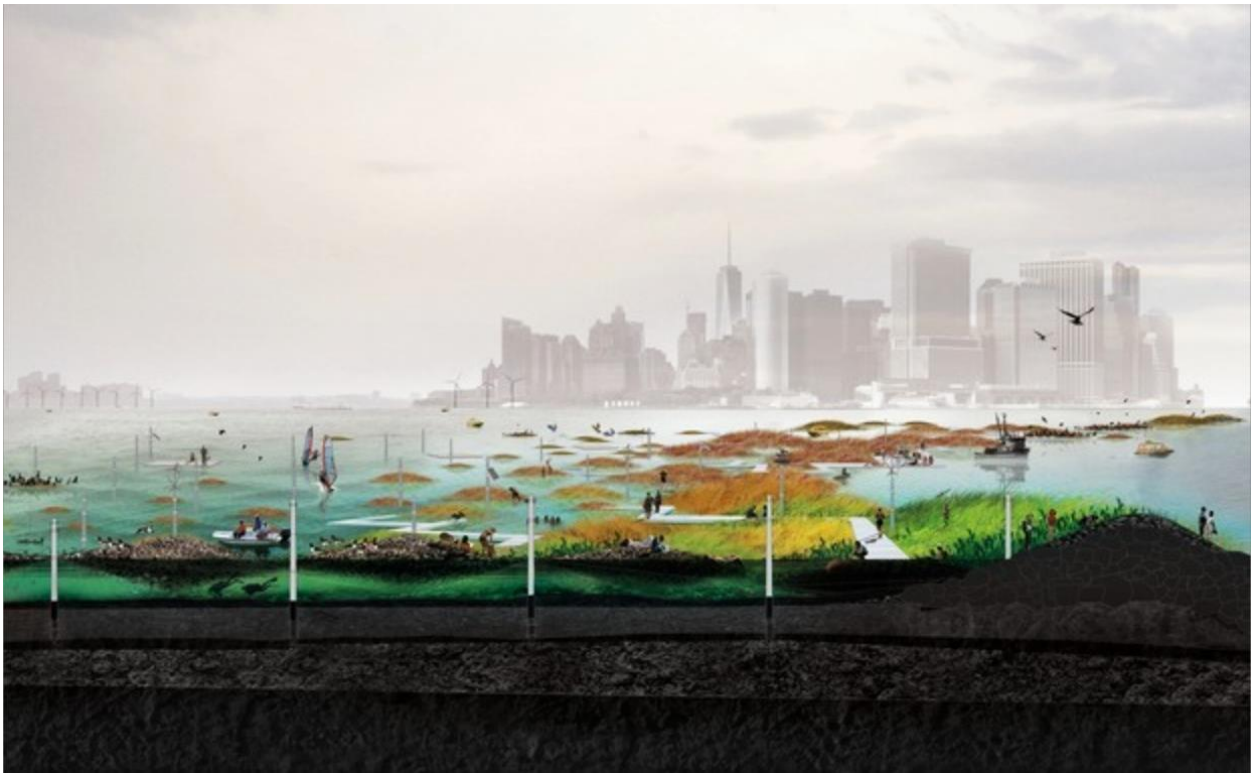
URBAN ECOLOGY AND DESIGN

Spring 2018
Fridays, 9am – 11am
E3B + GSAPP, 3 credits

Instructors: Matthew Palmer, Senior Lecturer E3B,
Gena Wirth, Lecturer GSAPP, Design Principal, SCAPE



Synopsis

Urban Ecology and Design will explore and evaluate the ecological potential of the designed urban environment. Students will work in interdisciplinary groups to study and evaluate the relationships between urban design and ecological performance through a series of case studies, field explorations, and studio visits. New York City will be used as a test site for analysis and students will work together to evaluate urban systems with regards to vegetation, wildlife, sediment management, water, energy, and pollution using techniques of visual mapping and the application of quantitative scientific criteria over multiple scales. The course offers a deeper understanding of the relationships that drive urban ecosystems, a critical evaluation of commonly used urban design techniques, and insights into how to better design functional ecosystems within the urban context.

Course description and rationale

This course is designed to bring students from a science background (primarily advanced undergraduates and graduate students from E3B and other science departments in Arts and Sciences) together with students from a design background (primarily from GSAPP) in order to better understand urban ecosystems. Urban ecology is a rapidly developing subfield in ecology, with contributions from population, community, landscape, and ecosystem ecology. The discipline also has connections to applied natural sciences like forestry, wildlife management, and conservation biology. Many urban projects are designed

with specific goals for ecosystem services, but the rigor of the science underlying these designs is quite variable. Conversely, many potential projects involving urban ecosystems do not consider the full range of potential users and impacts and would benefit from a more sophisticated planning and design process.

This course will be offered through both E3B (EEEB 4135) and the Graduate School of Architecture, Planning, and Preservation (ARCH 6812). Class sessions take place on Fridays from 9am-11am, a standard offering time for seminars in GSAPP. For three of the Fridays, the class session will be combined with a field trip with exact times to be established at the beginning of the semester with the members of the course. There will also be a longer field trip on a Saturday in the latter half of the term. Interdisciplinary groups of students will work together on a series of projects, including the evaluation of current projects and proposing potential areas for research. The two classes will meet together, the instructors will collaborate closely, and students from both classes will work jointly on the assignments. However, GSAPP and CC/GS/GSAS students will receive credit for only the course in which they are registered. This parallel course model allows for the exchange of ideas and perspectives between students with different backgrounds and skill sets.

Organization of the course

Format: The class will meet for two hours each Friday from 9am – 11am, with four sessions being extended additional time to accommodate field trips. During these trips, the students will meet scientists and design professionals at various project sites or studios. Before each class meeting, students will be expected to complete a set of assigned readings and to respond to those readings with a short written assignment (500-800 words). Class meetings will generally consist of short presentations by the course instructor(s) and/or guest speaker(s), and will be followed with an active discussion facilitated by a small group of students.

Students will work in interdisciplinary teams of four to six students on two related term projects.

- The first project will use New York City as a case site to study an ecological system (sediment, water, vegetation), the influences of urbanization on that system, and how these influences can be measured. The first project should identify the course of study for the team's second term project.
- In the second term project students will focus in on a particular urban environmental condition identified within their regional research, and offer a short proposal for improving urban ecological function within a particular site or set of sites with basic design elements and an accompanying research agenda.

Term projects will consist of a written paper accompanied by analysis drawings and design diagrams created and curated by the interdisciplinary student team. All term projects will be presented in class for peer discussion.

Assignments: Weekly written responses to the assigned readings, leading one literature discussion, and a two-part term project.

Basis for grading: Grading will be based on participation in all class discussions (10%), facilitation of one discussion (10%), weekly reading responses (20%), analysis of regional urban ecological systems (25%), and proposal for a new urban ecological design and research program (35%).

Statement on Academic Integrity: Academic dishonesty is a serious offense and will not be tolerated in this class. Violation of the rules of academic integrity (e.g., plagiarizing materials) will result in automatic failure of this course. Rules and consequences are outlined in Columbia College's Faculty Statement on Academic Integrity:
http://www.college.columbia.edu/faculty/resourcesforinstructors/academicintegrity/statement

Students with Disabilities: During the first three weeks of class, students should inform the instructors if they are registered with the Office of Disability Services and require special accommodations related to class sessions or writing assignments.

Readings

Readings will be drawn from primary scientific literature and design literature. No textbook is required for the course, however the following textbook is recommended as a supplemental resource in addition to the weekly readings.

Forman, R.T.T. 2014. *Urban Ecology: Science of Cities*. Cambridge University Press, New York, USA.

SYLLABUS

WEEK 1 / Jan 19

Urban Ecology and Design: Foundations and Spatial Pattern

Pickett, S., *et al*. 2011. Urban ecological systems: Scientific foundations and a decade of progress. *Journal of Environmental Management* 92. doi:10.1016/j.jenvman.2010.08.022

Wu, J. 2014. Urban ecology and sustainability: The state-of-the-science and future directions. *Landscape and Urban Planning* 125: 209-221.

Holling, C. S. & M. A. Goldberg 1971. Ecology and planning. *Journal of the American Institute of Planners*, Vol. 37: 221-230.

Waldheim, C. (2006). Landscape as Urbanism. In *Landscape Urbanism* (pp. 35-53). New York: Princeton Architectural Press.

Supplemental Reading: Forman 2014. Chapters 1 and 2

WEEK 2 / Jan 26

Cities as Integrated Ecological Systems: Representing and Understanding Flows, Movements, and Change

Gaston, K.J. *et al*. 2013. Managing urban ecosystems for goods and services. *Journal of Applied Ecology*. doi: 10.1111/1365-2664.12087

Ramalho. C.E. and R.J. Hobbs. 2012. Time for a change: dynamic urban ecology. *Trends in Ecology and Evolution* 27:179-188.

Dramstad, W., Olson, J., & Forman, R. (1996). *Landscape ecology principles in landscape architecture and land-use planning*. Cambridge, Mass.: Harvard University Graduate School of Design.

Ian, M. (1969). Processes as Values. In *Design With Nature* (pp. 102-115). Garden City, NY: Published for the American Museum of Natural History [by] the Natural History Press.

Supplemental Reading: Forman 2014. Chapter 3

WEEK 3 / Feb 2

The Physical Matrix: Landform, Soils, Water, and Air

Kaye, J.P., *et al.* 2006. A distinct urban biogeochemistry? *Trends in Ecology and Evolution* 21:192-199.

Groffman, P.M., *et al.* 2004. Nitrogen Fluxes and Retention in Urban Watershed Ecosystems. *Ecosystems* 7:393-403.

Laura, S. (n.d.). Reconsidering the Underworld of Urban Soils. *Scenario Journal, 03: Rethinking Infrastructure*. Retrieved from http://scenariojournal.com/article/reconsidering-the-underworld-of-urban-soils/

Holmes, R., & Milligan, B. (2013). Feedback: Designing the Dredge Cycle. *Scenario Journal, 03 Rethinking Infrastructure*(01). Retrieved from http://scenariojournal.com/article/feedback-designing-the-dredge-cycle/

Supplemental Reading: Forman 2014. Chapters 4 and 6

WEEK 4 / Feb 9

Field Trip 1: SCAPE Landscape Architecture / Living Breakwaters
Meet 9am at 277 Broadway Suite 1606

SCAPE/LANDSCAPE Architecture. 2014. Rebuild by Design: Living Breakwaters.
Watch video at: http://www.scapestudio.com/news/scape-living-breakwaters-revealed/

Orff, K. (2016). Toward an urban ecology. Scape / landscape architecture. Monacelli Press. To be distributed in class.

WEEK 5 / Feb 16
Urban Vegetation I: Forests, Wetlands, and Parks

Dobbs, C., *et al.* 2011. A framework for developing urban forest ecosystem services and goods indicators. *Landscape and Urban Planning* 99:196-206.

Roy, S, *et al.* 2012. A systematic quantitative review of urban tree benefits, costs, and assessment methods across cities in different climatic zones. *Urban Forestry and Urban Greening* 11:351-363.

Lister, N. (2007). Sustainable Large Park: Ecological Design or Designer Ecology? In J. Czerniak & G. Hargreaves (Eds.), *Large Parks* (pp. 35-58). New York: Princeton Architectural Press.

Geuze, A., & Buijs, M. (2014). West 8: Airport Landscape. *Scenario Journal, 04: Building the Urban Forest*, 2014-2014. Retrieved from http://scenariojournal.com/article/airport-landscape/

Supplemental Reading: Forman 2014. Chapter 8

WEEK 6 / Feb 23

Urban Vegetation II: Gardens, Streetscapes, and Buildings

Lovell, S.T. and J.R. Taylor. 2013. Supplying urban ecosystem services through multifunctional green infrastructure in the United States. *Landscape Ecology* 23: 1447-1463. DOI 10.1007/s10980-013-9912-y

Hope, D. ,*et al*. 2003. Socioeconomics drive urban plant diversity. *Proceedings of the National Academy of Sciences* 100:8788-8792.

Tredici, P. (2010). Introduction. In *Wild urban plants of the Northeast: A Field Guide* (pp. 1-25). Ithaca, NY: Cornell University Press.

Desemini, J. (2013). Wild Innovation: Stoss in Detroit. *Scenario Journal, 03: Rethinking Infrastructure*. Retrieved from http://scenariojournal.com/article/wild-innovation-stoss-in-detroit/

Supplemental Reading: Forman 2014. Chapter 10 and 11

WEEK 7 / Mar 2

Mid-Term Presentations

WEEK 8 / Mar 9

Field Trip 2: The Bronx River watershed

Crimmens, T. and M. Larson. 2006. Bronx River Alliance: Ecological Restoration and Management Plan. Bronx River Alliance, NY, NY. 84 p.

WEEK 9 / Mar 16
Spring Break

Week 10 / Mar 23

Urban Wildlife

Beninde, J. *et al*. 2015. Biodiversity in cities needs space: a meta-analysis of factors determining intra-urban biodiversity variation. *Ecology Letters* 18:581-592.

Munshi-South, J. 2012. Urban landscape genetics: canopy cover predicts gene flow between white-footed mouse (*Peromyscus leucopus*) populations in New York City. *Molecular Ecology* 21:1360-1378.

Felson AJ. 2013. "The role of designers in creating wildlife habitat in the built environment," In: J Beardsley, Ed. Designing Wildlife Habitat. 215-240. Harvard Press. Cambridge, MA.

Cronon, W. 1996. "In search of nature" and "The trouble with wilderness; or Getting back to the wrong nature". In: W. Cronon (ed). Uncommon Ground: Rethinking the Human Place in Nature. NY: Norton.

Supplemental Reading: Forman 2014. Chapter 9

WEEK 11 / Mar 30

Social Dimensions of Urban Ecosystems

Krasny, M.E. and K.G. Tidball. 2012. Civic Ecology: A pathway for Earth Stewardship in cities. *Frontiers in Ecology and the Environment.* 10(5): 267-273.

Poe, M.R. et al. 2013. Urban Forest Justice and the Rights to Wild Foods, Medicines, and Materials in the City. *Human Ecology* 41:409-422.

Bratman, G.N. et al. 2012. The impacts of nature experience on human cognitive function and mental health. *Year in Ecology and Conservation Biology* 1249:118-136.

Orff, K. (2016). Engage. In Toward an Urban Ecology. New York: Monacelli Press.

Wolf, J. (2014). Cultural Landscapes and Dynamic Ecologies: Lessons from New Orleans. In Projective Ecologies (pp. 22-39). New York: Actar.

WEEK 12 / Friday April 6

Team meetings for final projects

Saturday April 7

Field Trip 3: Transforming a landscape: Marshes, landfills, and coastlines on Staten Island

Field Operations. 2006. Fresh Kills Park: Lifescape. Staten Island, New York. Draft Master Plan.

Review competition materials available via website: http://www.nyc.gov/html/dcp/html/fkl/fkl2_1.shtml

---

WEEK 13 / Apr 13

Field Trip 4: Gowanus Canal Conservancy Salt Lot

Felson AJ and L Pollak. 2010. "Situating ecological experiments as public space." Pp. 356-363 In: M Mustafavi with Gareth Doherty, Eds. Ecological Urbanism. Lars Muller Publishing, Baden.

WEEK 14 / Apr 20

Final Project Presentations

WEEK 15 / Apr 27

Response to final projects; Synthesis, discussion, and articulating a research and design agenda

---