Responsiveness and Resilience in the Built Environment

Understanding and Impacting the Physical Dimensions of Sustainability

SUMA PS5162 // Fall 2023 // Mondays, 6:10-8:00 PM // Lewisohn 602

Introduction

Ask a layperson to define "resilience" and you may hear a response that focuses on the capacity to recover from disaster. Another might focus instead on the capacity within regular conditions to absorb an unanticipated shock. Both definitions – recovery and bandwidth – are correct, although each references different values placed on what constitutes status quo. Resilience can also refer to an individual, a society, a physical environment, a nation or a species. This course will begin with these definitions, then move on to considering how the built environment can serve to support multiscalar resilience as well as a sustainability agenda. It will consider solutions that encourage social equity, make economic sense and can be tailored to the myriad environmental hazards that our increasing encroachment on a changing natural context produce.

Professor Lynnette Widder
lw268@columbia.edu

Office hours:
Mondays 2-4pm or upon request
2929 Broadway, 5th Floor

Teaching Associates
Julia Bontempo
jb4252@columbia.edu

Yoni Ronn
jcr2214@columbia.edu

Office hours:
Mondays, 8-9pm, or by app't

A sustainable and resilient built environment is part of a dynamic system. Conventional infrastructure and building have aimed to hold back or transform the non-anthropogenic forces around it. In this course, we will work to understand how manmade conditions can also accommodate and adapt to changing environmental conditions, especially those that have the potential to destroy. We will discuss solutions that allow us to be ***responsive and adaptive*** to change. 21st century civic infrastructure can contribute to improving the way cities respond to long-term and catastrophic climate events while also enhancing their citizens' daily lives. We will study techniques and conditions contributing to this change in approach, and have the opportunity to apply our findings in a concrete setting.

In past iterations of this course, students have developed solutions for sites in Brooklyn and Bronx, NY; New Rochelle, NY; Butte, Montana; Bridgeport, Ct; and Blue Island, Ford Heights and Robbins, Il. Last year, we looked at a site closer to us, Newark, NJ, and at the simultaneous challenges of urban heat island, energy insecurity, surface water and coastal flooding at the infrastructural crossroads of the US East Coast. This year, we will travel a bit further down the coast to Baltimore, where we will collaborate with students in the Masters of Social Design program at MICA to explore three sites in which major urban systems converge in different ways: water, energy, food, waste, health, transportation and patterns of vacancy and marginal land. As always in this course, issues of environmental equity and civic opportunity will be foregrounded. A weekend workshop will inaugurate the projects that this class will complete over the semester.

The purpose is to envision what is needed for our physical environment to attain and maintain **resilience**, from the scale of the person all the way up to the scale of regional infrastructure. We will also consider the cultural shifts required for urban systems to become sustainable. And we will ask fundamental questions about how resilience and sustainability can be made relevant to social, spatial and technological approaches to the physical world. This class will also teach you how to visualize, diagram and convey these vital ideas.

By the end of this course, you will be able to:

- Describe the basic concepts by which the legacy-built environment functions and how 21st century infrastructure could differ to enhance resilience and improve environmental justice deficits;
- Understand and use the terms that govern our discourse on both sustainability and resiliency in the built environment;
- Describe the ways material, water, energy, labor and cultural practice interact with and upon the built environment;
- Understand current models for assessing, benchmarking and communicating sustainability and resiliency of the anthropogenic environment;
- Use creative methods to communicate outcomes and propose alternatives to standard practices in managing the built environment;
- Develop and use highly effective visual communication techniques.

Course Format, Weekend Workshop and Term Project

This course will ask you to engage actively as well as providing information through lectures and readings. The work includes class discussion, student presentations, longer-term group research projects, in-class lab time (to confer with Professor Widder, our TAs Julia Bontempo and Yoni Ronn, and other student groups), and an elective weekend design workshop. Outside experts will occasionally lecture; their profiles are provided at the end of this syllabus. All that you learn will be leveraged in your final group design project for Baltimore, MD.

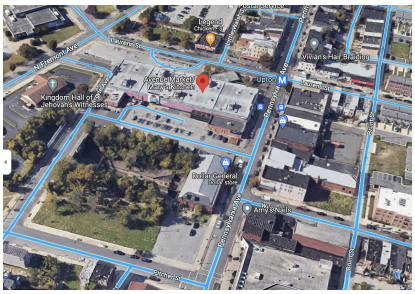
Site Backgrounds and their Systems

There are general, consensual definitions and practices that accrue to resilience, and we will consider these in our readings and lectures. But when considering a specific place and its hazards, specificity is necessary. This semester, we are considering three different urban conditions which manifest the inadequacies and potentials of urban systems relative to their capacity to deliver on promises to the people who depend on them.

- **Avenue Market:** Part of Baltimore's public market network which delivered fresh food throughout the city from earliest days, Avenue Market is located on Pennsylvania Avenue, once the thriving commercial and cultural center of one of Baltimore's traditionally African American communities. First founded as Lafayette Market in 1871, the market has been reconceived, rebuilt and renovated numerous times; it is now beginning a process of community-based review before another

renovation that can make it an even more important public space, economic driver and fresh food source for the several neighborhoods it serves. The study of, and development of proposals for, Avenue Market offers an opportunity to think more deeply about resilient and equitable regional food systems; the meaning of social spaces in the context of increasing heat, economic stressors and population fluxuations; potentials for transpotation, energy and employment equity; and the cultural legacy and future of place.

- **Jones Falls Corridor**: Baltimore is characterized by a series of hills and crevices which result in its five watersheds. The waterways that ran along these crevices into the bay were the source of the city's first energy system, which served the sailcloth mills upon which its wealth was built. Jones Falls includes the sites of the city's first drinking water reservoir as well as the epigonous falls which served as a power source. The city's primary north/south freight rail lines and depots ran alongside its course and in the mid-20th century, Interstate 83 was laid alongside it. A naturally-occurring caesura in the city fabric, the watercourse and the parallel infrastructure now read as marginal land. During storm water events, increasing in intensity with climate change, the area is a CSO outlet and is subject to substantial flooding. Under everyday conditions, it is now part of a bicycle network that connects the city and the site of spontaneous urban reforestation, mostly through fast-growing, species-limited trees and shrubs. Study of this area will allow us to consider water and transportation infrastructures, urban plantlife systems and the ways in which disruption and continguity can be considered to the benefit of the city's social cohesion.
- **Upland East Baltimore**: Baltimore has net population loss according to census information, although it has seen gains at its center and near the Inner Harbor district. From its peak population just after WWII of around 800,000, the city's occupancy has declined to around 500,000 according to the 2020 count. West and East Baltimore, built out in the period of rapid growth from the end of the Civil War through the early 20th century in swaths of two and three-storey brick row houses, suffers most from these population declines. Mass vacancy and the gap-toothing of blocks as condemned properties have been cleared makes redevelopment difficult, since the need for critical mass of population to support civic, public and business infrastructures relies on density of users. We will look at one area in West Baltimore near a redevelopment zone centered on the efforts of Humanim social enterprise site City Seeds, which provides catering and food services staffed by local residents, and has rehabilitated several 19th century industrial buildings nearby. Land banking, innovative use of vacant land for infrastructural and community use, community and B-corp financing mechanisms, job creation – these are all opportunities through which to consider how urban systems can be transformed through localized interventions.



Avenue Market

Jones Falls Corridor

City Seeds Area

To launch these projects, we have organized a two-day workshop in collaboration with Maryland Institute College of Arts (MICA)'s Masters in Social Design. During the workshop, groups of students, combining SUMA and MICA students, will consider each of the three sites. The workshop take place in Baltimore. There, we will meet with government officials and planners, community activists and representatives and elected officials; then work towards initial proposals for all three sites. Travel to and from the city will be via Amtrak, departing New York either on Thursday evening or first thing Friday morning, depending on group preference. All expenses while in Baltimore, including meals (but not including any alcoholic beverages) will be covered by a grant from the Climate School. The approaches proposed will form the basis for the work in this class for the rest of the semester. We have selected Friday October 20 - Saturday October 21 for the workshop.

Additional information and a full schedule will be shared in advance of the workshop. Participation is encouraged but it is voluntary.

Coursework, Evaluation, Academic Integrity

Readings and Written Discussions (individual assignment, 20% of grade, each reading discussion is approximately 4-5% of total grade ie +/- ½ letter)

- ***Part A:*** students will post responses to readings based upon the reading guides provided to CourseWorks no later than 11:00 AM on the day of class.

- ***Part B:*** students are expected to be prepared for active, intelligent participation in in-class discussions. Participation will be tracked and evaluated for consistency and quality.

  NB: **If you cannot attend a class, it is your responsibility to communicate your absence no later than 9:00 AM on the day of class in the case of illness or a week in advance in the case of other personal or business conflicts. Neglecting to do so will mean you will not receive credit for the reading/discussion portion of that day's class.**

"Students Have to Eat" (group assignment, 10% of grade)

Cook a meal together. Quantify and track material, labor, energy and waste; then diagram the meal's production and consumption. A separate assignment sheet will be on Courseworks.

Precedent Studies (group assignment, 30% of grade)

Work in new groups of 3-5 to research one of the assigned case studies into both small scale and large scale resilient urban infrastructure and architecture. A separate assignment sheet will be available and includes a template for submission. Results will be presented during class by each group and posted to CourseWorks.

Resilient Community Term Project (group assignment, 40% of grade)

Urban systems design and proposal; working in groups of 3-5, you will develop integrated strategies for development and revitalization of our sites in Baltimore. The proposals developed during the workshop will form the basis for each group's approach. Lab time in the second portion of the semester will be used for interactive consultation with Professor Widder, Julia Bontempo and Yoni Ronn.

Grading Criteria

The criteria for grading will value deep, open-minded engagement with course material. Active class participation is expected, as well as evidence of solid preparation and willingness to invest personal expertise into group work. The work submitted should be graphically clear and free of careless errors.

For example, your term projects will be graded using the following rubric:

- research evidence – 20%
- analysis – 20%
- synthesis and mission statement – 10%
- thoughtful presentation – 20%
- creativity and integrative thinking – 30%

Feedback on projects will include both letter grades and comments to help you consistently improve performance through the semester. However, final work may not be redone and resubmitted for a new grade. Requests for extensions will only be granted if made in advance and warranted by extenuating circumstances (e.g., sickness, personal or family matters). Failure to submit an assignment will result in an F for that portion of the grade. Plagiarism is an academic offense that will result in automatic failure for the course; use of bots or AI to generate assignments is tantamount to plagiarism. Grading concerns and clarifications can be discussed through email or during office hours.

Assignments and Submissions

We meet once a week for just under two hours. During the first part of the semester, we will generally have review readings and discussing questions for the first forty-five minutes of class, then spend the second portion of lectures, workshops and presentations of student work.

All in-class **presentations must be submitted to CourseWorks by 11:00 AM** on the day of the class in which the presentations will occur. You will upload under “assignments” (as attachment). We will repost your presentations to the files portion of the site for sharing.

In the latter part of the semester, we will devote more time to consultation and group discussion about your design proposals. Lectures at the beginning of the period will cover topics related directly to the term project, and the remainder of class will be dedicated to lab time and consultations. To aid review and discussion of your group’s term project, a panel of guest experts will be present during presentation of both your initial proposal and its ultimate iteration.

Special consideration of individual effort
Fair grading of group work has its challenges. If you would like your individual contributions considered for grading, it is your responsibility to document carefully both process and product, and submit it as detailed above. Your work documentation should include research notes, sketches, notes from brainstorming sessions, and your individual input into the group’s work. (If it’s more convenient, you can submit your course notebook, including any other class materials, as long as the work you want reviewed is clearly marked.)

Workshop, Weekend of October 20th -21st

Professor Widder, in collaboration with Prof. Thomas Gardner (MICA), will offer an optional interdisciplinary workshop beginning (exclusive of travel) at 9:00 AM on Friday October 20 and concluding on the evening of Saturday October 21(in Baltimore). Attendance is not mandatory, but is strongly recommended. There will be no cost to participate unless separate travel or hotel arrangements are desired. Detailed information will be shared separately.

Required Book

- Daniel Lerch, ed. *The Community Resilience Reader Essential Resources for an Era of Upheaval* (Washington: Island Press, 2017)

Available at:

- Book Culture, 536 West 112th St/ between Broadway & Amsterdam (pre-ordered and available on site or by order at bookculture.com)
- Butler Library or on Clio

Readings

Required readings are listed in the schedule below. In addition to The Community Resilience Reader, other readings are required and all are provided on CourseWorks. Please prepare answers to the questions your colleagues write on each reading, and have the readings (paper or digital) available for reference during class. Supplemental optional readings (listed after the schedule, below) are available in the library, on CourseWorks or via hyperlink.

Schedule

PART I – Overview and Central Concepts: Understanding the Physical Dimensions
Lecture and discussion of readings – Lecture and Discussion of Readings

September 11 – Class 1

Lecture – Where, Not What: Resilience and The Physical Dimensions of Sustainability

Assignment – Mapping exercise 'Students Have to Eat' will be initiated

Listen

- On the Media: Apocalypse Now https://www.wnycstudios.org/podcasts/otm/episodes/on-the-media-apocalypse-now-2020-08-14 An amazing set of "science fiction" stories about climate change and human settlement.
- Marketplace: How We Survive https://www.marketplace.org/shows/how-we-survive/ A series of podcasts on the energy transition – and more science fiction

September 18 – Class 2

Lecture – Settlements and Agglomerations: legacy and new, systems and stand-alones

Readings

- Raven Cretney, 'Resilience for Whom? Emerging Critical Geographies of Socio-ecological Resilience,' *Geography Compass* (2014) 8/9: 627-640 (on Canvas)
- Daniel Lerch, Ed., *The Community Resilience Reader* (Washington: Island Press, 2017), Introduction and Chapter 9, 'A Crash Course in the Science of Resilience
- Maxwell Woods, '"Stop Calling Me Resilient": Addressing Environmental Degradation in Louisiana', Edge Effects, May 9, 2017 updated October 12, 2019 link'
- Anya Groner, 'Between Worlds', in: *Orion* April 11, 2019 (optional read)

Listen

- Nature: the next big thing in climate adaptation technology? Jul 18, 2019 https://www.marketplace.org/shows/marketplace-tech/nature-the-next-big-thing-in-climate-adaptation-technology/

Assignment – Mapping exercise 'Students Have to Eat' continues, student add/drop accommodated.

September 25 – Class 3

Discussion – Sacrificial Landscapes

Readings

- Adrian Parr, *Hijacking Sustainability* (Cambridge: MIT Press, 2009), Ch 6 'Trash' pp 95-107
- Chloe Ahmann, 'It's Exhausting to Create an Event Out of Nothing: Slow Violence and the Manipulation of Time', *Cultural Anthropology* (2018) v.33, n.1: 142-171
- Daniel Lerch, Ed., *The Community Resilience Reader* (Washington: Island Press, 2017), Chapters 12 'Building Resilience at the Water's Edge', 16 'Resilient Streets, Resilient Communities' and 17 'Community Resilience and the Built Environment'
- Karen Russell, 'The Gondoliers', from *Orange World* (New York: Knopf, 2019)

Submittals for Presentation, by 11:00 AM – Results of 'Students Have to Eat

Assignment – Precedent Studies in anticipation of term project will be initiated

PART II - Resilience and Sustainability at the Building and Settlement Scale: Self-Reliance or Networked? - Lectures and Lab Time

October 2 – Class 4

Lecture – Systems Integration, Shrinkage and Growth

Readings

- Daniel Lerch, Ed., *The Community Resilience Reader* (Washington: Island Press, 2017), Chapter 7 'Systems Literacy: A Toolkit for Purposeful Change'
- Brett Milligan, "Landscape Migration," *Places* Journal, June 2015. Accessed 16 Aug 2019. https://doi.org/10.22269/150629 (or on CourseWorks)
- Jill Desmini, 'From Planned Shrinkage to Formerly Urban: Staking Landscape Architecture's Claim in the Shrinking City Debate', *Landscape Journal*: design, planning, and management of the land, Volume 33, Number 1, 2014, pp. 17-35 (on CourseWorks)

Lab Time – Precedent Studies in anticipation of term project

October 9 – Class 5

Lecture – David Waggoner + Andrew Sternad (Waggoner and Ball/Moffatt & Nichol)

Readings

- David Waggoner, 'Learning to Live with Water'
- Alexander von Humboldt, excerpt *Views of Nature* (or log on to Clio, then search 'Views of Nature'. This is a book by the 19th century explorer and naturalist Alexander von Humboldt. Read the two author prefaces and then leaf through the plates and skim the text for the rest of the book. Important is the way Humboldt thinks and writes about what he has seen.)

- Thomas Merton, *The Way of Chuang Tzu* (this is a preview of Thomas Merton's The Way of Chuang Tzu. please read 'A Note to the Reader' and '1. A Study of Chuang Tau)

Lab Time – Precedent Studies in anticipation of term project

October 16 – Class 6 **Note: class time is 7:10-9:00 on this date only!**

Lab Time (by appointment with Professor and TA outside of class time) – Develop hypothesis, develop visualization concept, develop design proposal

Lecture – Prof. Alexander Heil - impact of systems on community

Readings – tbd

WEEKEND WORKSHOP October 20/21

October 23 – Class 7

Submittals for Presentation, by 11:00 AM – Precedent Study slide decks

Debrief – Workshop Results discussion

Assignment – Baltimore term project initiated

October 30 – Class 8

Lecture – Energy, at Urban, Building and Infrastructure Scale

Readings

- Bill Bryson, *At Home: A Short History of Private Life* (New York: Anchor Books, 2011), Ch VI 'The Fuse Box' pp 131-159 (on CourseWorks)
- Herbert Murray, 'Machines in the Garden', in *Places Journal* January 2022
- Daniel Lerch, Ed., *The Community Resilience Reader* (Washington: Island Press, 2017), Chapter 11 'Energy Democracy'
- Diana Hernàndez, 'Sacrifice Along the Energy Continuum: A Call for Energy Justice', in *Environmental Justice*, v. 8, No. 4, 2015 p. 151=156

November 6 – No Class

Optional Lab Time (by appointment with Professor and TA outside of class time) – Develop visualization concept, develop design proposal.

PART III – Findings and Proposals, Term Project - Lectures and Lab Time

November 13 – Class 9

Submission for Presentation, by 11:00 AM – Mid-project presentation; guest discussants

- TBD

Submittals – Proposal slide decks

November 20 – Class 10

Lecture – Urban Metabolism, Evaluating Cities through Resource Flows

Readings

- Christopher Kennedy et al., 'The Changing Metabolism of Cities,' *Journal of Industrial Ecology*, (2007) 11/2: 43-59
- Christopher Kennedy, *The Evolution of Great World Cities: Urban Wealth and Economic Growth* (Toronto: University of Toronto Press, 2011), Ch 6 'The Ecology of Urban Economies' pp 139-166
- Haberl, Fischer-Kowalski, Krausmann, Martinez-Alier, Winiwarter, 'A Socio-metabolic Transition towards Sustainability? Challenges for Another Great Transformation', *Sustainable Development* (2011) 19, 1-14

November 27 – Class 11

Guest Lecture – Hood Design Studio

Readings

- tbd

Optional Lab Time (by appointment with Professor and TA outside of class time) – Develop visualization concept, develop design proposal.

December 4 – Class 12

Lab Time – Consultations with Professor and TA

December 11 – Class 13

Submittal for Presentation, until 5:00 PM – Final term project presentations; guest discussants.

- TBD

December 22 – Final Submissions Due

Submittals – Final term project slide decks and longer reading response.

Readings (in library or upon demand unless website is noted)

Topic: Baltimore

- Map collection from first founding of Baltimore forward https://jscholarship.library.jhu.edu/handle/1774.2/59948
- Baltimore Neighborhoods Indicators Alliance data and visualizations https://www.bniajfi.org
- Johns Hopkins Baltimore Social-Environmental Collective

https://21cc.jhu.edu/research/bsec/

- Baltimore disaster preparedness website https://experience.arcgis.com/experience/3c6b15374abb47b3a6aca6645f76fe24/page/What-Hazards-Impact-Me%3F/?views=DP3-Overview

- Lawrence T. Brown, The Black Butterfly Project and The Black Butterfly Academy; also see article in readings folder on courseworks

- P. Nicole King et al, ed., *Baltimore Revisited: Stories of Inequality and Resistance in a US City* (Rutgers University Press, 2019) ebook on Clio

Topic: Urban Resiliency Resources

- HUD 2015a, Harnessing Ecosystem Services for Water Management, Part 1, Overview of Floodplain Management, slide deck at: https://www.hudexchange.info/course-content/ndrc-harnessing-ecosystem-services-for-water-management-webinar/Harnessing-Ecosystems-Services-for-Water-Management-Webinar-Slides-2015-01-08-Part-1.pdf

- HUD 2015b, Harnessing Ecosystem Services for Water Management, Part 2, Structural Measures at a Glance, slide deck at: https://www.hudexchange.info/course-content/ndrc-harnessing-ecosystem-services-for-water-management-webinar/Harnessing-Ecosystems-Services-for-Water-Management-Webinar-Slides-2015-01-08-Part-2.pdf

- HUD 2015c, Harnessing Ecosystem Services for Water Management, Part 3, Permeable Pavement Parking, slide deck at: https://www.hudexchange.info/course-content/ndrc-harnessing-ecosystem-services-for-water-management-webinar/Harnessing-Ecosystems-Services-for-Water-Management-Webinar-Slides-2015-01-08-Part-3.pdf

- HUD 2015d, Critical Infrastructure Resilience Webinar at: https://www.hudexchange.info/training-events/courses/critical-infrastructure-resilience/

- HUD 2015e, Energy Investments for Disaster Resilience, slide deck at https://www.hudexchange.info/course-content/energy-investment-for-disaster-resilience/Energy-Investments-for-Disaster-Resilience-Webinar-Slides-2015-02-03.pdf

- HUD 2014a, Equity and Achieving Equitable Outcomes, slide deck at: https://www.hudexchange.info/course-content/ndrc-equity-and-achieving-equitable-outcomes-webinar1/NDRC-Equity-and-Equitable-Outcomes-Slides-2014-11-04.pdf

- HUD 2014b, Climate Adaptation Planning, slide deck at https://www.hudexchange.info/course-content/ndrc-climate-adaptation-planning-101- webinar1/NDRC-Climate-Adaptation-Planning-Slides-2014-11-20.pdf

- HUD 2014c, National Disaster Resilience Competition, Innovative and Inclusive Citizen Engagement Webinar athttps://www.hudexchange.info/training-events/courses/ndrc-innovative-and-inclusive-c itizen-engagement-webinar/

- IPCC 2011, Renewable Energy Sources and Climate Change Mitigation, report at http://srren.ipcc-wg3.de/report

- WRI 2005, Millennium Ecosystem Assessment, General Synthesis Report On Ecosystems And Human Well-Being, report at http://www.millenniumassessment.org/documents/document.356.aspx.pdf

- WWF 2011, The Energy Report- 100% Renewable Energy by 2050, report at http://wwf.panda.org/what_we_do/footprint/climate_carbon_energy/energy_solutions22/renewable_energy/sustainable_energy_report/

Topic: General Culture and History, Built Environment
(available through CLIO, at Avery or Butler Library)

- Cecil D. Elliott, Technics and Architecture (MIT Press: Cambridge, Ma and London, 1992): an historical overview of the production processes and technological advances over the course of construction history relative to both materials (wood, masonry, terracotta, metals, glass, cements, reinforced concrete), systems (lightning protection, sanitation, lighting, heating and ventilation, a/c, elevators, fire protection, structural engineering and acoustics), labor and technology.

- https://placesjournal.org/ Online journal covering architecture, landscape and urbanism in well-researched and unusual ways

- Andreas Huyssen, ed., Other Cities, Other Worlds: Urban Imaginaries in a Globalizing Age (Duke University Press: Durham and London, 2008): a fascinating set of essays on global cities and the cultural, economic and political imaginaries that drive their growth and perception.