

Environmental Hazards

Fall 2021

Tuesdays/Fridays, 09:45 AM to 11:00 AM – HN 1028

Undergraduate PGEOG 36300-1

Graduate PGEOG 70554-01

Instructor: Enrique Lanz Oca
Office: Virtual
E-mail: enriquelanzoca@gmail.com
Office Hours: Tuesdays, 11:15am – 12:15pm (These meetings could be via Zoom if it is more convenient for you).

Course Description: On November 1st, 1755, Lisbon was devastated by one of the deadliest earthquakes in centuries. Twenty-meter high tsunamis swept the city, annihilating at least 60,000 people. From Greenland to the British Isles, to Scandinavia, Morocco, Spain, and the Caribbean islands, millions of people witnessed this unprecedented telluric event. Such was its impact that Europeans began to see Nature as an unstable and hazardous agency, driving the foundations of seismology. Through similar cases such as the Tambora volcanic eruption in Indonesia and the Chernobyl nuclear accident in the former Soviet Union, this course will introduce you to some of the main geophysical/technological phenomena that create these environmental hazards. You will acquire a solid knowledge of the tectonic system, earthquakes, hurricanes, cliff recession as well as technological catastrophes such as dam failures, oil spills, and nuclear power station accidents. Ecological disasters, as you will see, do not equally impact every population or socio-economic group. Minorities, indigenous groups, and the poor are often exposed to the highest risks. You will hone your critical-thinking skills as you learn to connect natural and manmade disasters to their cultural, technological, socio-economic, political, and gendered values. Finally, you will become aware of how humans have become one of the main forces of Nature, a process that is causing a planetary ecological crisis with extraordinary consequences such as the increase of the global temperature, the flood of extensive coastal areas, the intensification of meteorological phenomena, changes of the ecosystems, and the massive displacement and extinction of millions of living organisms.

Modus Operandi for the Class:

The class will be “in-person.” However, in case of an emergency, we may switch to “hybrid” mode (using Zoom).

Important: the first day of class (August 27, Friday) will be virtual (Zoom)

Zoom link:

<https://pratt.zoom.us/j/94333469850?pwd=KzF4cE03Z0k4WXI4ZVpvMW1LTWRPQT09>

Required Materials:

There will be no textbook. The course will include assigned materials that are available through articles, texts, chapters, films, and audios. These materials are available in the section “Course Materials” on Blackboard. Where indicated on the syllabus, materials will be found online.

Schedule of Topics and Assignments*

*Except for changes that substantially affect implementation of the evaluation statement, this syllabus is a guide for the course and is subject to revision by the instructor. Any changes will be announced in advance.

Course Objectives:

1. This course is designed to introduce you to the local, regional, national, and global implications of geophysical processes and anthropogenic activities that cause or have the potential to generate hazardous conditions in the ecosystems.
2. You will study how local, regional, national, and international organizations have responded to hazardous situations and thereby learn about mechanisms of predicting, monitoring, preventing, and remediating potential environmental or technological risks.
3. You will be guided in forming an independent study on environmental/technological hazards at the local, regional, national, or international levels to enhance your perception of the important role of our collective responsibility towards a sustainable future.

Learning Outcomes

- 1 Students will acquire broad knowledge of the Earth environment, using a systems approach to identify and describe its history, components, their functions and interactions at multiple spatial and temporal scales.
- 2 Students will acquire knowledge of the Earth’s key trends in climate and environmental issues in their socio-political context.
- 3 Students will gather, measure, synthesize and evaluate data from diverse sources using visual, analytical and statistical approaches to describe and interpret relationships, trends and make predictions about future changes.
- 4 Students will communicate effectively in the language of the discipline, incorporating written, oral and visual methods. Students will communicate to audiences ranging from scientific to policy oriented. Students will be prepared to become active, informed citizens ready to have an impact on society.
5. Students will build knowledge about the environmental dimensions of systemic racism and other types of oppression such as those based on gender or religious identity. Students will be able to recognize and explain the diverse human experiences of injustice including environmental racism and apply environmental knowledge and skills to advance social justice and sustainability.
6. Spatial dimensions of systemic racism and other types of oppression. Students will apply geographic methods to analyze the spatial dimensions of systemic racism and other types of oppression such as those based on gender or religious identity. Students will be able to

recognize and explain the diverse human experiences of injustice including environmental racism and apply geographic and environmental knowledge and skills to advance social justice and sustainability.

Course Assignments. This course will be based upon:

Undergraduate and Graduate

<u>ASSIGNMENTS</u>	<u>% for the Final Grade</u>	<u>CHARACTERISTICS/ REQUIREMENTS</u>
Proposal for the (Final Paper)	15% 15%	-At least 2 pages (double space) and 4 References -At least 3 pages (double space) and 6 References
Final Research Paper	30% 30%	-At least 8 pages (double space) and 6 References -At least 10 pages (double space) and 10 Ref.
Abstract (Final Paper)	Not Required 5%	250 words plus keywords
EXAMS	-Mid-Term: 15% and 15% -Final Exam: 15% and 15%	Multiple Choice Questions
POSTER	15% 10 %	-Group activity -Exposition of a case of hazard in the NYC area
PRESENTATIONS	5% 5%	~ 5 minutes (e. g. using PowerPoint) ~ 10 minutes (e. g. using PowerPoint)
PARTICIPATION	5% 5%	-Participation refers to Class and Outdoor activities
Meetings outside the class		-Not required -Required at least ONCE

Final letter grades will be assigned based on the CUNY grading policy that can be found in the online undergraduate catalog available at: <http://catalog.hunter.cuny.edu/>.

Key points about these assignments:

1. You will receive feedback for the Proposal, Final Paper, and the Poster (Group activity).
2. You will have the opportunity to re-write the Proposal of Final Research Paper.
3. A complete description of the assignments is located in Appendix 1 at the end of the Syllabus.
4. You can find the due dates for all of the assignments in the Course Content and Calendar section of the syllabus (see below).

Course Contents and Calendar:

Part I: Course Introduction

Week 1:

August 27th (Friday): Syllabus and the Meaning of Science

Modus Operandi: VIRTUAL CLASS (Zoom; check above for the link)

1. Syllabus Presentation and the Description of the Assignments
2. What are Science and the Scientific Method? And the Traditional Knowledge and Wisdom (TK&W)?

Required Materials:

- Bradford, Alina (2015). "Science & the Scientific Method: A Definition." *Livescience* (March 30). Available on <http://www.livescience.com/20896-science-scientific-method.html>
- Ellis, George (2014). "Defend the Integrity of Physics." *Nature* (Dec. 18/25), Vol. 516, pp.: 321-323
- Nicholas, George (2018). "It's taken thousands of years, but Western science is finally catching up to Traditional Knowledge." *The Conversation* (February 14). Available on <https://theconversation.com/its-taken-thousands-of-years-but-western-science-is-finally-catching-up-to-traditional-knowledge-90291>

Part II: Science, Hazards, and Environmental Racism

Week 2:

August 31st (Tuesday):

1. What is a Hazard?
2. Hazard: Science, Perception, and Traditional Knowledge
3. Hazard Management and Environmental Principles
4. Environmental Racism and Hazards
5. Proposal Phase 1: Selecting a Research Topic

Required Materials:

- Chapter 1: "Natural Hazards and Disasters." *Natural Hazards & Disasters* by Donald Hyndman and David Hyndman. Brooks/Cole
- Milman, Oliver (2018). "Robert Bullard: 'Environmental Justice isn't just slang, it's real.'" *The Guardian* (December 20). Available on <https://www.theguardian.com/commentisfree/2018/dec/20/robert-bullard-interview-environmental-justice-civil-rights-movement>
- Slovak (1987). "Perception of Risk." *Science*, Vol. 236, issue 4799 (April 17), pp.: 280-285

Further Materials:

- Kaufman, Leslie (2012). "Wind Turbines and Health Hazards." *The New York Times* (Jan. 18).

Available at <https://green.blogs.nytimes.com/2012/01/18/wind-turbines-and-health-hazards/>

-The Lisbon Earthquake in “The Engines of Our Ingenuity: No. 1964: Lisbon Earthquake” by Rob Zaretsky. Available at <http://www.uh.edu/engines/epi1964.htm>

September 3rd (Friday): NO CLASS

Week 3:

September 7th (Tuesday): NO CLASS

Part III: Earth’s Internal and External Structure, Volcanism, and Earthquakes

September 10th (Friday): Tectonic Plates, Their Dynamics, and Male Science

1. Earth’s Internal Structure
2. Tectonic Plates Dynamics
3. Marie Tharp: Tectonics and the Scientific Marginalization of Women
4. Proposal Phase 2: Construction of the Research Questions/Focus and the Collection of Data

Required Materials:

- Blakemore, Erin (2016). “Seeing Is Believing: How Marie Tharp Changed Geology Forever.” *Smithsonian Magazine* (August 30). Available on <https://www.smithsonianmag.com/history/seeing-believing-how-marie-tharp-changed-geology-forever-180960192/>
- Chapter 2: “Plates Tectonics and Physical Hazards.”

Week 4:

September 14th (Tuesday): Volcanoes and Their Hazardous Processes

1. Volcanism and Its Hazards
2. Cases: Mount Pelee, Saint Pierre (Martinique) and Political Elections (1902)

Required Materials:

- Chapter 6: “Volcanoes: Tectonic Environments and Eruptions.”
- Chapter 7: “Volcanoes, Hazards, and Mitigation.”
- McCoy, Robin (2002). “Three minutes of horror when 30,000 perished.” *The Guardian* (April 28). Available on <https://www.theguardian.com/world/2002/apr/28/physicalsciences.highereducation>

Further Materials:

- “A Day in Pompeii - Full-length animation” (video). Available at https://www.youtube.com/watch?v=dY_3ggKg0Bc
- The Christian Science Monitor (2018). “With few choices, the poor take risk in volcano's path.” Available on <https://www.csmonitor.com/World/Americas/2018/0608/With-few-choices-the-poor-take-risk-in-volcano-s-path>

September 17th (Friday): Earthquakes and Their Hazardous Processes

1. Earthquakes and their Mechanics
2. Earthquakes: their Forecast, Prevention, and Mitigation 1
3. Proposal Phase 3: Review the Literature

Required Materials:

- Chapter 3: “Earthquakes and their Causes.”
- Chapter 4: “Earthquakes Predictions, Forecasts, and Mitigation.”

Week 5:

September 21st (Tuesday):

1. Earthquakes: their Forecast, Prevention, and Mitigation 2
2. Tsunamis
3. **Invited Speaker: Carrie Garrison-Laney** (Hazards Specialist in Tsunamis; College of Environment, University of Washington)

Required Materials:

- Chapter 4: “Earthquakes Predictions, Forecasts, and Mitigation.”
- Chapter 5: “Tsunamis.”
- National Geographic (2011). “Rare Video: Japan Tsunami | National Geographic” [video]. Available at <https://www.youtube.com/watch?v=oWzdgBNfhQU>

PART IV: Atmospheric Hazards

September 24th (Friday): Hurricanes/Typhoons/Cyclones

1. Formation and Development
2. Consequences: Flood, waves, wind, and storm surge
3. Case: Hurricane Katrina and New Orleans

Required Materials:

- Chapter 15 “Hurricanes and Nor’Easters.”
- Lehmann, Nicholas (2020). “Why Hurricane Katrina Was Not a Natural Disaster.” *The New Yorker* (August 26). Available on <https://www.newyorker.com/books/under-review/why-hurricane-katrina-was-not-a-natural-disaster>

Further Materials:

- Micheals, Samantha (2015). “Maps: 10 Years After Katrina, NOLA’s Poor Neighborhoods Are Still Largely Abandoned.” *MotherJones* (August 10). Available on <https://www.motherjones.com/politics/2015/08/maps-10-years-after-hurricane-katrina-uneven-recovery-new-orleans/>

Week 6:

September 28th (Tuesday): From Fronts to Lightning and Tornadoes

1. Atmospheric Dynamics: from Fronts to Thunderstorms
2. Tornadoes: **Mark Dempsey (Invited Speaker)**

Required Materials:

- Chapter 10: “Weather, Thunderstorm, and Tornadoes.”

PART V: Hydrospheric Hazards

October 1st (Friday): Streams and Floods:

PAPER PROPOSAL DUE

1. Watersheds and the riparian ecosystems
2. Floods, Causes, and Flood Control Mechanisms
3. Germany 2021: A 1,000-Year Flood Scenario

Required Materials:

- Chapter 12: “Streams and Flood Processes.”
- Chapter 13: “Floods and Human Interactions” (pages 364-368 and 375-381)
- “The Extent of Flooding in the Hardest-Hit Areas of Europe.” *The New York Times*, July 17, 2021. Available on <https://www.nytimes.com/interactive/2021/07/17/world/europe/europe-flood-map.html?action=click&module=Spotlight&pgtype=Homepage>
- “Climate scientists shocked by scale of floods in Germany.” *The Guardian*, July 16, 2021. Available on <https://www.theguardian.com/environment/2021/jul/16/climate-scientists-shocked-by-scale-of-floods-in-germany>

Further Materials:

- Tellman, B. et al. (2021). Satellite imaging reveals increased proportion of population exposed to floods.” *Nature* (August 5).

Week 7:

October 5th (Tuesday): Ocean Dynamics and Hazards

1. Coastal Geomorphology, Ocean Processes, and Human Interference
2. Coastal Recovery Methods
3. Mangrove Ecosystem

Case: The Sundarbans (Bangladesh)

4. Final Research Paper: Phase 1 (Building the Thesis)

Required Materials:

- Chapter 14: “Waves, Beaches, and Coastal Erosion.”
- Ganguly, Meenakshi. (2020.)“Bangladesh Coal Plants Threaten World’s Largest Mangrove Forest.” Human Right Watch (June 18). Available on <https://www.hrw.org/news/2020/06/18/bangladesh-coal-plants-threaten-worlds-largest-mangrove-forest>
- UNESCO, World Heritage Centre (2016). “The Sundarbans.” Available on <http://whc.unesco.org/en/list/798>

Further Materials:

- Harvey, Chelsea (2016). “A new power plant could devastate the world’s largest mangrove forest.” *The Washington Post* (July 18th). Available at <https://www.washingtonpost.com/news/energy-environment/wp/2016/07/18/a-new-power-plant-could-devastate-the-worlds-largest-mangrove-forest/>

Part VI: Mass Movement and Hazards

October 8th (Friday): Landslides

1. Mass Movement: from Landslides to Mudflows
2. Hazards, Prevention, and Mitigation

3. Cases: Rio de Janeiro's Fabelas

5. Final Research Paper: Phase 1 (Building the Thesis)

Required Materials:

-Chapter 8: "Landslides and Other Downslope Movement." *Natural Hazards & Disasters* by Donald Hyndman and David Hyndman. Brooks/Cole

-*RioOnWatch* (2020). "Favelas and Landslide Risk: If They Know Their Homes Might Collapse, Why Do They Build There?" Available on <https://www.rioonwatch.org/?p=51579>

Further Materials:

-"Amazing Flash Flood/Debris Flow Southern Utah HD." Available at https://www.youtube.com/watch?v=_yCnQuILmsM&t=240s

-Associated Press (2018). "Raw: Massive Mud Flow Swallows Desert Road." [Video]. Available on <https://www.youtube.com/watch?v=K1ODt3fNgZg>

-National Geography (2007). "Landslides." [Video]. Available at <https://www.youtube.com/watch?v=mknStAMia0Q>

Part VII. Environmental/Technological Hazards

Week 8:

October 12th (Tuesday): Energy/Infrastructure and their Hazards 1: Coal

1. Basics: Formation, Types, Its Physical Qualities

2. The Coal Landscape: from the Mine to the Power Station

3. Coal and its Hazards: Air Pollution, Diseases, Landslides, and Coal Fires

Required Materials:

-Berks, Howard (2018). "An Epidemic Is Killing Thousands Of Coal Miners. Regulators Could Have Stopped It." *NPR* (December 18) (also audio). Available at <https://www.npr.org/2018/12/18/675253856/an-epidemic-is-killing-thousands-of-coal-miners-regulators-could-have-stopped-it>

-British Pathe (1966). "This is Tragedy." [Video]. Available on <https://www.youtube.com/watch?v=-Nr-6uxM7y8>

-Krajick, Kevin (2005). "Fire in the Hole." *Smithsonian Magazine* (May). Available at <https://www.smithsonianmag.com/science-nature/fire-in-the-hole-77895126/>

-Reisser, Wesley and Reisser, Colin (2019). Chapter 3, "Coal" in *Energy Resources: From Science to Society*

-*Scientific American* (2017, Jun. 7). "The Other Reason to Shift away from Coal: Air Pollution That Kills Thousands Every Year." Available at <https://www.scientificamerican.com/article/the-other-reason-to-shift-away-from-coal-air-pollution-that-kills-thousands-every-year/>

October 15th (Friday): Energy Sources and their Hazards 2: Petroleum

1. Basics: Formation, types, and physical qualities

2. Petroleum Landscape: from Extraction to Consumption

3. The Impact of the Canadian Tar-Sand Oil and Hydraulic Fracturing (fracking)

4. Oil Spills

Case: The Greenpoint Oil Spill

Required Materials:

- Newtown Creek Alliance (2016). “Green point Oil Spill.” Available on <http://www.newtowncreekalliance.org/greenpoint-oil-spill/>
- NRDC (2015). “The Dirty Fight Over Canadian Tar Sands Oil.” Available on <https://www.nrdc.org/stories/dirty-fight-over-canadian-tar-sands-oil#:~:text=Tar%20sands%20extraction%20emits%20up,%2C%20a%20hazardous%20by%2Dproduct.>
- Reisser, Wesley and Reisser, Colin (2019). Chapters 4, “Oil” in *Energy Resources: From Science to Society*
- University of Michigan Engineering (2012). “The Impact of fracking.” [Video]. Available on <https://www.youtube.com/watch?v=YAgI8qTtotc>

Further Materials:

- Canadian Association of Petroleum Producers (2015). “What are the oil sands?” Available on <http://www.capp.ca/canadian-oil-and-natural-gas/oil-sands/what-are-oil-sands>

Week 9:

October 19th (Tuesday): Energy Sources and their Hazards 3: Nuclear Energy

1. What is Nuclear Energy? Fission, Fusion, and Radioactivity
2. Nuclear Landscape: from the Mine to the Reactor and Beyond
3. Nuclear Accidents: From Chernobyl (1986) to Fukushima (2011)
4. Nuclear and the Indigenous Groups: Navajos and the Marshall Islands
5. **Final Research Paper: Phase 2 (Evidence)**

Required Materials

- Reisser, Wesley and Reisser, Colin (2019). Chapter 6, “Nuclear Power” in *Energy Resources: From Science to Society*
- Rust, Suzanne (2020). “U.S. says leaking nuclear waste dome is safe; Marshall Islands leaders don’t believe it.” *The Angeles Times* (July 1). Available on <https://www.latimes.com/environment/story/2020-07-01/us-says-nuclear-waste-safe-marshall-islands-runit-dome>
- Spanne, Autumnne. “Uranium Pervades homes on a near Navajo Nation.” *HighCountryNews* (August 27, 2017). Available at <https://www.hcn.org/articles/pollution-epa-budget-cuts-threaten-to-slow-uranium-cleanup-at-navajo-nation>
- 8 News NOW Las Vegas (2019). “CBS takes rare tour of test tunnel under Yucca Mountain.” [Video]. Available on https://www.youtube.com/watch?v=H8_NwzRSOeU

Further Materials:

- “Native Planet Program 5: United States-Surviving the Cold War and Uranium Mining.” Available on Hunter Canopy
- “Nuclear Reactor - Understanding how it works” (video). Available at <https://www.youtube.com/watch?v=1U6Nzcv9Vws>
- US Energy Information Administration (2020). “Decommission Nuclear Reactors is Long-Term and Costly Process Available on <https://www.eia.gov/todayinenergy/detail.php?id=33792>

October 22nd (Friday):

- 1. MID-TERM Exam**
2. Final Research Paper: Phase 2 (Evidence)

Week 10:

October 26th (Tuesday): Industrial and Hydraulic Hazards

1. Waste Disposal and Hazards: The Love Canal Disaster, NY
2. Industrial Hazards: Bhopal, India (1984)
3. Hydraulic Projects and their Hazards:
 - a. Flint, Michigan
 - b. The Aral Sea Disaster

Required Materials:

- BBC (2015). "Aral Sea: The sea that dried up in 40 years." [Video]. Available at https://www.youtube.com/watch?v=5N-_69cWyKo
- Denckack, Melissa (2018). "Flint Water Crisis: Everything You Need to Know." *Natural Resources Defense Council (NRDC)*. (Nov. 8). Available at <https://www.nrdc.org/stories/flint-water-crisis-everything-you-need-know>
- Mandavilli, Apoorva (2018). "The World's Worst Industrial Disaster Is Still Unfolding." *The Atlantic* (July 10). Available at <https://www.theatlantic.com/science/archive/2018/07/the-worlds-worst-industrial-disaster-is-still-unfolding/560726/>
- "The Love Canal Disaster: Toxic Waste in the Neighborhood - Retro Report." *The New York Times* [video]. Available at <https://www.youtube.com/watch?v=Kjobz14i8kM>

October 29th (Friday): Waste Materials, Garbage and Hazards

1. Garbage and its main Hazards
2. Landfills and Poor Communities
3. Ship-Breakers in Bangladesh

Required Materials:

- Chapter 12: "Waste Disposal" in *Geohazards: Natural and Human* by Nicholas K. Coch (1995)
- Gwin, Peter (2014). The Ship-Breakers. *National Geographic* (May). Available on <https://www.nationalgeographic.com/magazine/2014/05/The-Ship-Breakers/>
- Milman, Olive (2019). "We're not a dump' – poor Alabama towns struggle under the stench of toxic landfills." *The Guardian* (April 15). Available on <https://www.theguardian.com/us-news/2019/apr/15/were-not-a-dump-poor-alabama-towns-struggle-under-the-stench-of-toxic-landfills>

Further Materials:

- Burford, Melanie and Moyer, Greg (2014). "Living City | Where Does Our Trash Go?" *The New York Times* (Sep. 25th, 2014) (Video). Available at <http://www.nytimes.com/video/nyregion/100000003131953/where-does-our-trash-go.html>

-The Freshkills Alliance (n.d.). “Freshkills Park.” Available at <http://freshkillspark.org/>

Saturday October 30: 1st Ecological Tour: Newtown Creek (Greenpoint, Brooklyn)

(See the section “Ecological Tours” on Appendix 1)

Week 11:

November 2nd (Tuesday): Dam Infrastructure and Hazards

1. Dams, Types, and Construction
2. Current Status of Dam Infrastructure in United States
3. Dam and Their Hazards:

Cases:

- The Johnstown Flood, Pennsylvania (1889)
- The Vajont Dam, Italy (1963)
- The Oroville Dam, California (2017)
- The Yihetan Dam, China (2021)

4. Final Research Paper: Phase 3 (Figures/Tables/Maps)

Required Materials:

- Association of State Dam Safety Officials (2019). “Dam Failures and Incidents.” Available on <https://damsafety.org/dam-failures>
- “A Timeline of Oroville Events-2017.” [Video]. Available on <https://www.youtube.com/watch?v=NjbbW37qzak&t=4s>
- France24 (2021). “Chinese army warns dam battered by storms could collapse.” (July 20). Available on <https://www.france24.com/en/live-news/20210720-chinese-army-warns-dam-battered-by-storms-could-collapse>
- History Channel (2012). “The Johnstown Flood of 1889.” [Video]. Available on <https://www.youtube.com/watch?v=Q62vlcFLLIM>
- OVO (n. d.). “The Vajont Disaster” [video]. Available at <http://www.ovovideo.com/en/vajontdisaster/>
- United States Society on Dams (2020). “Types of Dams.” Available at <https://www.usdams.org/dam-levee-education/overview/types-of-dams/>

Further Materials:

- Pupovac, Jessica (2015). “Aging and Underfunded: America's Dam Safety Problem, In 4 Charts.” NPR, WNYC Radio (Oct. 11). Available at <http://www.npr.org/2015/10/11/447181629/aging-and-underfunded-americas-dam-safety-problem-in-4-charts>
- Smith, Laura (2017). “The deadliest structural failure in history killed 170,000—and China tried to cover it up.” Timeline. Available at <https://timeline.com/structural-failure-banqiaochina-7a402a25bb65>

November 5th (Friday): *The Electric Grid Infrastructure: A Risky Dependency*

1. Understanding the Electric Grid
2. Electric Outages: Causes and Main Consequences
3. Cases: From Puerto Rico to Texas (2021) and the NYC Public Housing Projects

4. Final Research Paper: Phase 3 (Figures/Tables/Maps)

Required Materials:

- Domianni, Christine et al. (2018). “Health Impacts of City wide and Localized Power Outages in New York City.” *Environmental Health Perspectives*, June 11, Vol. 126, N. 6. Available on <https://doi.org/10.1289/EHP2154>
- Fernandez Campbell, Alexia (2018). “It took 11 months to restore power to Puerto Rico after Hurricane Maria. A similar crisis could happen again.” *Vox* (August 15). Available on <https://www.vox.com/identities/2018/8/15/17692414/puerto-rico-power-electricity-restored-hurricane-maria>
- “How Does the Power Grid Work?” [Video]. Available on <https://www.youtube.com/watch?v=IZz4sR5vfeo>
- Irfar, Umair (2021). “Why every state is vulnerable to a Texas-style power crisis.” *Vox*. Available on <https://www.vox.com/22308149/texas-blackout-power-outage-winter-ur-grid-ercot>
- The New York Times* (2012). “In New York’s Public Housing, Fear Creeps In With the Dark.” (Nov. 2). <https://www.nytimes.com/2012/11/03/nyregion/in-public-housing-after-hurricane-sandy-fear-misery-and-heroism.html#:~:text=The%20storm%20cut%20off%20water,at%20the%20nearest%20fire%20hydrant.>

Further Materials:

- Hugh Byrd and Steve Matthewman (2004). “Exergy and the City: The Technology and Sociology of Power (Failure).” *Journal of Urban Technology*, Vol. 21, No. 3, 85–102, <http://dx.doi.org/10.1080/10630732.2014.940706>
- The New York Times* (2021). “Climate Crisis Catches Power Companies Unprepared.”, (July 29) Available on <https://www.nytimes.com/2021/07/29/climate/electric-utilities-climate-change.html?action=click&module=Top%20Stories&pgtype=Homepage>
- US Department of Energy (n. d.). “Infographic: Understanding the Grid.” Available on <https://www.energy.gov/articles/infographic-understanding-grid>

Part VIII: Understanding the Current Ecological Crisis

Week 12: Climate Crisis

November 9th (Tuesday): Climate Change: Facing the *Unknown*

1. What is that so-called Climate Change and Global Warming?
2. Past Climates
3. Causes of Climate Change

4. Final Research Paper: Phase 4 (Reviewing the Final Draft)

Required Materials:

- Chapter 11: “Climate Change.”

November 12th (Friday): Some Hazardous Consequences of Climate Crisis:

1. Sea Level Rise
2. Heat Waves
3. Permafrost and Microorganisms

4. Final Research Paper: Phase 4 (Reviewing the Final Draft)

Required Materials:

-Chen, Joyce and Mueller, Valerie (2018). "Climate change is making soils saltier, forcing many farmers to find new livelihoods." *The Conversation* (November 29). Available at <http://theconversation.com/climate-change-is-making-soils-saltier-forcing-many-farmersto-find-new-livelihoods-106048>

-*The New York Times*

(2019). "Rising Seas Will Erase More Cities by 2050, New Research Shows." (Oct. 29). Available on <https://www.nytimes.com/interactive/2019/10/29/climate/coastal-cities-underwater.html>

(2021). "Pacific Northwest Heat Wave Shatters Temperature Records." (June 27, 2021). Available on <https://www.nytimes.com/2021/06/27/us/heat-wave-seattle-portland.html?action=click&module=RelatedLinks&pgtype=Article>

-NPR (2018, Jan. 24). "Are There Zombie Viruses In The Thawing Permafrost?" Available on <https://www.npr.org/sections/goatsandsoda/2018/01/24/575974220/are-there-zombieviruses-in-the-thawing-permafrost>

Further Materials:

-BBC (2021). "Canada Lytton: Heatwave record village overwhelmingly burned in wildfire" (July 1). Available on <https://www.bbc.com/news/world-us-canada-57678054>

-Fountain, Henry (2019). "Europe's Heat Wave, Fueled by Climate Change, Moves to Greenland." *The New York Times* (August 2). Available at <https://www.nytimes.com/2019/08/02/climate/european-heatwave-climate-change.html>

-Tam, Laura (2009). "Strategies for Managing Sea Level Rise." Available on <http://www.spur.org/publications/urbanist-article/2009-11-01/strategies-managing-sea-level-rise>

-*The New York Times* (2021). "That Heat Dome? Yeah, It's Climate Change." (June 29). Available on <https://www.nytimes.com/2021/06/29/opinion/heat-dome-climate-change.html>

November 13 (Saturday): 2nd Ecological Tour: from the "Ghost Forest" to the Alphabet City

(See the section "Ecological Tours" on Appendix 1)

Week 13

November 16th (Tuesday): Urban Hazards: Air, Noise, and Heat

1. Air Pollution
2. Noise Pollution
3. Heat Exposition

Required Materials:

-Gruenwald, Talor and Mushegan, Stephen (2021). "New York Emits More Building Air Pollution Than Any Other State Going Electric Can Fix That." (May 18). Available on <https://rmi.org/new-york-emits-more-building-air-pollution-than-any-other-state/>

-IQAir (2021). "Air Quality in New York City." Available on <https://www.iqair.com/us/usa/new-york/new-york-city>

-NYC Government (2021). "Noise." Available at <https://www1.nyc.gov/site/doh/health/health-topics/noise.page>

-*The New York Times*

(2020). "How Decades of Racist Housing Policy Left Neighborhoods Sweltering." (August 24). Available on <https://www.nytimes.com/interactive/2020/08/24/climate/racism-redlining-cities-global-warming.html>

(2021).

a. "What Technology Could Reduce Heat Deaths? Trees." (July 2). Available on <https://www.nytimes.com/2021/07/02/climate/trees-cities-heat-waves.html>

b. "Work Injuries Tied to Heat Are Vastly Undercounted, Study Finds." (July 15). Available on <https://www.nytimes.com/2021/07/15/climate/heat-injuries.html>

November 19th (Friday): Wildfires, Hazards, and the Modern Civilization

RESEARCH PAPER DUE

1. What is a Wildfire?
2. Causes and Consequences
3. Cases: Australia and Paradise (California)
4. Traditional Knowledge and Wildfires Prevention

Required Materials:

-Chapter 16, "Wild Fires" pages (488-492)

-Irfan, Umair (2021). "We must burn the West to save it." *Vox* (July 13). Available on <https://www.vox.com/21507802/wildfire-2020-california-indigenous-native-american-indian-controlled-burn-fire>

-*The New York Times*

a. (2018). "Wildfire Becomes Deadliest in California History" (Nov. 12). Available on <https://www.nytimes.com/2018/11/12/us/california-fires-camp-fire.html>

b. (2021). "Wildfires Are Intensifying. Here's Why, and What Can Be Done." *The New York Times* (July 16). Available on <https://www.nytimes.com/2021/07/16/climate/wildfires-smoke-safety-questions.html>

-Woodward, Aylin (2020). "Australia's fires are 46% bigger than last year's Brazilian Amazon blazes. There are at least 2 months of fire season to go." *Business Insider* (Jan. 8). Available on <https://www.businessinsider.com/australia-fires-burned-twice-land-area-as-2019-amazon-fires-2020-1/amp/>

Further Materials:

-*The New York Times* (2020). "They're among the world's oldest living things. The climate crisis is killing them." (Dec. 11). Available on <https://www.nytimes.com/interactive/2020/12/09/climate/redwood-sequoia-tree-fire.html>

Week 14

November 23rd (Tuesday): Extraterrestrial Hazards: Asteroids and Comets

1. Main Characteristics of Asteroids and Comets
2. Historical Cases: Tunguska (1908) and Chelyabinsk events (2013) (Russia)
3. Asteroids, Comets, and Extinction

4. A 27.5 million-year cycle Event for extinctions?

Required Materials:

-ABC News (2013). “Meteor Strikes Russia, Over 1,000 Believed Injured” [video]. Available on <https://www.youtube.com/watch?v=gRrdSwhQhY0>

-Chapter 17: “Asteroid and Comet Impact.”

-NASA (2008). “The Tunguska Impact-100 Year Later.” Available at https://science.nasa.gov/science-news/science-at-nasa/2008/30jun_tunguska

-Phys.org (2021). “The 27.5-million-year cycle of geological activity” (June 18). Available on <https://phys.org/news/2021-06-million-year-geological.html>

November 26th (Friday): NO CLASS; THANKSGIVING

Week 15

November 30th (Tuesday): Presentation of the POSTER: Environmental/Technological Hazards in New York City

(see details in Appendix 1)

December 3rd (Friday):

Presentations 1 (Research Paper)

Week 16

December 7th (Tuesday):

Presentations 2 (Research Paper)

December 10th (Friday): Final Ecological Meditations: Present and Future Hazards

Presentations 3 (Research Paper)

1. Bunkers, Seeds, and the Doomsday
2. Climate Change Refugees/Migrants
3. The UN Secretary-General, António Guterres’s Vision of the Climate Crisis
4. Carl Sagan and the Final Ecological Meditations

Required Materials:

-Davenport, Coral and Friedman, Lisa (2021). “Biden Cancels Key Stone XL Pipeline and Rejoins Paris Climate Agreement.” *The New York Times* (Jan. 21). Available at <https://www.nytimes.com/2021/01/20/climate/biden-paris-climate-agreement.html>

-Duggan, Jennifer (n. d.). “Inside the Doomsday ‘Vault.’”

-“Iceland holds funeral for first glacier lost to climate change.” *The Guardian* (2018). Available on <https://www.theguardian.com/world/2019/aug/19/iceland-holds-funeral-for-firstglacier-lost-to-climate-change>

-Popovich, Nadja, Albert-Ripka, Livia, and Pierre-Louis, Kendra (2021)“The Trump Administration Rolled Back More Than 100 Environmental Rules. Here’s the Full List.” *The New York Times* (Jan. 21). Available at <https://www.nytimes.com/interactive/2020/climate/trump-environment-rollbacks-list.html>

-Sagan, Carl (n. d.). “Carl Sagan’s Pale Blue Dot Official” [video]. Available on

<https://www.youtube.com/watch?v=GO5FwsblpT8>

-Taylor, Matthew (2017). "Climate change 'will create world's biggest refugee crisis'." *The Guardian* (Nov. 20. Available on <https://www.theguardian.com/environment/2017/nov/02/climate-change-will-create-worlds-biggest-refugee-crisis>

-United Nations (UN) (2020). "Climate Action: It's time to make peace with nature, UN chief urges" [Speech included of António Guterres]. Available on <https://news.un.org/en/story/2020/12/1079032>

Week 16:

December 14th (Tuesday): Reading Day

December 17th (DAY?): Final Exam

It will be announced

Course Policies:

Attendance:

I will take attendance at every class meeting. You should arrive in class on time and stay for the entire session. If you will miss class for any reason, you should discuss this with me ahead of time. You are responsible for any material you may miss. You are allowed five hours of absence, not five days. A low attendance could determine the distinction between an "F" or "WU" grade. Finally, the tardiness generates constant interruptions of the class. The continuous tardiness could generate a reduction of points for the final grade. **DO NOT BE LATE IN CLASS.**

Incompletes:

I do not give incompletes (IN) except under the most extraordinary and documented medical emergencies. No late assignments will be accepted. Without a valid medical excuse, you will receive a grade of zero (0) on any assignment missed. If, for a valid medical emergency, you do miss an assignment, you must contact me within 48 hours of the missed assignment and present acceptable documentary evidence for your absence. At the time of the request, you must also complete a Contract to Resolve an Incomplete Grade in consultation with me. We will agree on what needs to be completed and when it will be due and, if you meet the mutually agreed upon conditions, your course grade will be recomputed and a new grade, if appropriate, will be submitted. I will allow only one semester in which you can resolve the IN/FIN. After that time no request will be considered. The contract form is available in the Department of Geography office, HN 1006, during normal business hours or in OneStop on the 2nd floor of the North Building.

To receive a CR/NC you must have completed all course requirements and have requested the CR/NC option no later than the last scheduled lecture. That means all written assignments, quizzes, exams (including the final exam) must have been completed. If you choose this option, then all grades above 70% will be assigned CR and 69.9% and below will be assigned NC unless you choose the assign D option for grades between 60 and 69.9. Finally, CR/CN is only available to undergraduate students. More information is available at

<http://www.hunter.cuny.edu/advising/how-to/file-credit-no-credit-cr-nc>

Classroom Electronics Use:

I permit the use of laptops and tablets **ONLY** for the purpose of taking notes during lecture and discussion. All other personal electronics should be turned off or set to silent before entering the classroom. Absolutely no texting is allowed during class. Any use of electronics beyond their permitted use is a disruption to the class and will be treated accordingly.

Hunter College Policy on Academic Integrity:

Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The College is committed to enforcing CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures. Plagiarism, dishonesty, or cheating in any portion of the work required for this course will be punished to the full extent allowed according to Hunter College. Being in college requires discipline, collegiality, and overall honesty. Although knowledge is an accumulation of ideas from different people and epochs that you can use, you have to do so under certain conditions. If you are going to use another's ideas you have to identify their names and works. If you don't, it is called 'plagiarism,' and that is illegal. Plagiarism is the presentation of someone else's ideas, words or artistic, scientific, or technical work as one's own. Using the idea or work of another is permissible only when the original author is identified. Paraphrasing and summarizing, as well as direct quotations, require citations of the original source. Plagiarism may be intentional or unintentional. Lack of dishonest intent does not necessarily absolve a student of responsibility for plagiarism. Students who are unsure how and when to provide documentation are advised to consult with their instructors.

ADA Policy:

In compliance with the American Disability Act of 1990 (ADA) and with Section 504 of the Rehabilitation Act of 1973, Hunter College is committed to ensuring educational parity and accommodations for all students with documented disabilities and/or medical conditions. It is recommended that all students with documented disabilities (Emotional, Medical, Physical, and/or Learning) consult the Office of AccessABILITY, located in Room E1124, to secure necessary academic accommodations. For further information and assistance, please call: (212-772-4857)TTY or (212-650-3230).

Students requiring special consideration during the exams must make arrangements with the Office of Accessibility and tell your instructor of the arrangements.

Hunter College Policy on Sexual Misconduct:

"In compliance with the CUNY Policy on Sexual Misconduct, Hunter College reaffirms the prohibition of any sexual misconduct, which includes sexual violence, sexual harassment, and gender-based harassment retaliation against students, employees, or visitors, as well as certain intimate relationships. Students who have experienced any form of sexual violence on or off

campus (including CUNY-sponsored trips and events) are entitled to the rights outlined in the Bill of Rights for Hunter College.

- a. Sexual Violence: Students are strongly encouraged to immediately report the incident by calling 911, contacting NYPD Special Victims Division Hotline (646-610-7272) or their local police precinct, or contacting the College's Public Safety Office (212-772-4444).
- b. All Other Forms of Sexual Misconduct: Students are also encouraged to contact the College's Title IX Campus Coordinator, Dean John Rose (jtrose@hunter.cuny.edu or 212-650-3262) or Colleen Barry (colleen.barry@hunter.cuny.edu or 212-772-4534) and seek complimentary services through the Counseling and Wellness Services Office, Hunter East 1123.

CUNY Policy on Sexual Misconduct Link: <http://www.cuny.edu/about/administration/offices/la/Policy-on-Sexual-Misconduct-12-1-14-with-links-pdf>

Appendix 1: A Detailed Description of the Assignments

1. Proposal of the Research Paper:

It is a document where the student (or researcher) exposes the principal topic of the investigation, what type of research questions she/he will use to explore the topic, the main objectives of the investigation, what methods will be managed to collect data, and the significance of the investigation. The paper proposal is a type of reference that the teacher (or reader) uses to evaluate a priori the plan proposed by the student, and decide any type of necessary change. Any proposal should mainly have the following parts:

Structure of the Proposal:

1. Introduction
2. Literature Review
3. Research Questions and Objectives
4. Methodology and Materials
5. Intellectual Contribution
6. Conclusion
7. Bibliography

1. Introduction: section of the proposal that illustrates the principal theme of the investigation through a short background of the topic. For instance, “Since the 1990s renewable energy projects have become visible features of our landscapes. Countries such as Denmark, Germany or Spain have regions possess an extraordinary density of renewable projects in their territories.”

2. Literature review: part of the proposal where the student demonstrates her/his knowledge about some of the main scholars’ works and arguments analyzing this topic. Examples: “Whereas Peter Smith and Lucas Felman (2014) have analyzed the impact of the new wind farm projects in Europe, Leonardo Sanprocio and his research team (2013) have analyzed the environmental consequences of solar and wind projects in the Southwest of United States.”

3. Research questions and objectives: section that exposes the main research objectives and question/s used by the student to investigate the topic. For example, “I will explore in this work those environmental impacts caused by wind farm facilities in North Dakota, putting especial attention on the visual integration of wind turbines in the landscape. To study this relation, I will try to answer the following questions: what type of sociopolitical and environmental impacts do renewable energy project generate? How have local communities accepted this type of energy plants?”

4. Methodology and Materials: the student displays in this section all of those methods that will be managed for data collection. These methods can be classified in two categories:

- a. Primary sources: information obtained directly by the student: experiments, interviews, direct observation, etc.

b. Secondary sources: articles, books, websites, films, or audios.

5. Intellectual contribution: In this section the student demonstrates the importance or significance of her/his work. For instance, “This work is crucial because it will contribute to the understanding of those environmental and cultural impacts caused by the renewable projects.”

6. Conclusion: Summary of the paper proposal.

7. Bibliography, Works Cited, or References section

Citation Styles: A completed description of the different citation styles can be found at The University of Pittsburgh (2020). “Citation Styles: APA, MLA, Chicago, Turabian, IEEE: Home” Available on <https://pitt.libguides.com/citationhelp>

2. Final Research Paper:

The students should choose a topic that is related to Planet Earth. The main component to evaluate the paper will be the solidity and clarity of the argument (or thesis), and the examples and information that you provide to corroborate it; that is the evidence. Moreover, the paragraphs should be built around textual evidence in the form of quotes or paraphrases. Although any writing style (MLA, APA, Chicago, Harvard, etc.) for all of the in-text quotations can be used, the students must be coherent. For this paper, the undergraduate students should use 6 references (**for Graduate students at least 10 references**) (books, chapters, journal articles, interviews, audios, etc.) to support their thesis in this paper. In addition, the paper must be double spaced, with heading and title.

Structure of a Research Paper

-Introduction

- a. Brief description of the main topic of the paper
- b. Research question/s and objectives
- c. Argument (or thesis)

-The Main Core of the paper: This is the central section of the paper where you provide enough information, cases, examples from other scholars to defend your argument.

-Conclusion: This is the part of the work where you summary your paper.

-Bibliography (or References, Works Cited): Section where you show all of those scholars’ works that you have used in your work.

An example of a research question and argument could be:

“In this paper I will analyze the question how did Eratosthenes know the Earth’s size more than 2,000 years ago? I argue Eratosthenes possessed privileged information that he collected in the Alexandria library.”

Other alternative structure could be,

1. Introduction
2. Literature Review
3. Methodology
4. Results
5. Discussion
6. Conclusion
7. Citations

For a completed description of this type of scientific paper structure, see *Nature* (2014). “Scientific Papers.” Available at [https://www.nature.com/scitable/topicpage/scientific-papers-13815490/#:~:text=To%20reach%20their%20goal%2C%20papers,aim%20to%20inform%2C%20not%20impress.&text=Papers%20that%20report%20experimental%20work,body\)%3B%20and%20finally%2C%20Conclusion.](https://www.nature.com/scitable/topicpage/scientific-papers-13815490/#:~:text=To%20reach%20their%20goal%2C%20papers,aim%20to%20inform%2C%20not%20impress.&text=Papers%20that%20report%20experimental%20work,body)%3B%20and%20finally%2C%20Conclusion.)

Citation Styles: A completed description of the different citation styles can be found at The University of Pittsburgh (2020). “Citation Styles: APA, MLA, Chicago, Turabian, IEEE: Home” Available on <https://pitt.libguides.com/citationhelp>

3. Abstract (for Graduates):

Section that described shortly, precisely, and efficiently the main components of a paper: background of the topic, research focus, thesis, and methods. Most of the abstracts have around 250 words and are composed by three sections:

- Title
- Main Text
- Key words: between three and four words that reflect precisely the main key points of the investigation.

You can find some guidelines in this link <https://writingcenter.gmu.edu/guides/writing-anabstract>.

A Sample of an Abstract for the American Association of Geographers Conference (AAG):
“Climate Change Denial and the Tragedy of North America's Dams”

With approximately 90,000 big dams, the United States has more dams than nearly any other country. It is commonly recognized that these dams, largely built between the 1930s and the 1960s, are in a state of disrepair; in fact, 80 percent of U.S. dams will reach their life span by 2020. This condition is exasperated by unprecedented changes in climatic patterns. Climate change is accelerating dam vulnerability and boosting the risk of collapse. In California, the Oroville dam, the tallest dam in the United States, nearly collapsed due to the unusual amount of winter precipitation in 2017. In Puerto Rico, the Guajataca Dam, hit hard by hurricane Maria, also nearly collapsed in 2018. And in March 14, 2019, the Spencer Dam did collapse, making it the first dam ever to be destroyed by ice chunks. Despite the undeniable influence of the weather,

some entities still reject climate change as a factor threatening dam infrastructure, asserting that the managerial negligence of public institutions and the aging status of dams are the only causes of this decay. This paper exposes how two main ideologies have contributed to the current rejection of climate as a factor in dams' vulnerability. First, the engineering profession still produces engineers who are taught to observe nature mechanically, without recognizing the changing ecological scenario. Second, some conservative agencies, in an effort to convince the public that public institutions and infrastructures do not and cannot function, erase climatic influence from their descriptions.

Keywords: Dams, climate change, engineering, and conservatism

Note: The students will receive feedback for the proposal, final paper, and the poster. They will have possibilities to re-write some of the reviews for the proposal.

4. Two Exams: Mid-Term and Final Exams:

These exam will be completed in class. The exams will be composed of a set of multiple-choice questions. These questions will be divided in two categories:

1. The question has "just" one correct answer
2. The choice could be either "All of them" or "None of them"

Sample of a Multiple-Choice question:

1. Choose the correct answer about the Earth's shape:
 - a. The Earth is a sphere with flattened poles
 - b. The Earth is a perfect sphere
 - c. It is a flat planet moving around the sun
 - d. The Earth is not planet, but a moon

5. Elaboration of a Poster: We will divide the class in various groups. Each group will choose a particular case of environmental/technological hazards in the area of New York City. Some possible examples could be: sea level rising and water pollution in the Long Island area or the Greenpoint oil spill. Each group will present their work in a Poster format. This type of posters are very typical in conferences such as the American Association of Geographers. This poster works like the structure of a research paper; that is, you need to show the Background (Introduction), Research Objective, Argument, Methods, Evidence. Although you can use texts, the main mechanism is visual. You can find some examples posted on Blackboard.

6. Oral Presentation of the Final Research Paper:

You can use programs such as PowerPoint or others to present your research paper

- Undergraduate students: around 5 minutes
- Graduate students: around 10 minutes

7. Participation:

Two Types:

a. Class Participation:

Participation is fundamental for your success in this class and includes all of the following: class discussion, Blackboard posts, group activities, data-collection quizzes, environmental fieldtrips, data collection excursions, and attendance. You need to study the “Materials” every week (check each class in the syllabus) in order to prepare the class.

b. Outdoor Participation (Ecological Tours):

-Description of the Activity: The main objective of these two outdoor activities is to observe directly on the field some of the main environmental/technological hazards (e. g. air pollution) that we will see in class. The students will become direct observers as well as participants of this type of processes in the city of New York. Although it is **NOT** a requirement to go to all of them, **I recommend you strongly to attend to at least one of them.** This is the information about these tours,

-1st Ecological Tour: The Newtown Creek (Greenpoint, Brooklyn)

-When: Saturday October 30

-Time: 9:30am

-Directions: Take the “G” Train to the station Greenpoint Ave. Wait at the corner of Manhattan Av. and Greenpoint Ave. (see the map below).

-Description: The Newtown Creek is one of the most fascinating spots nationally speaking in terms of environmental/technological hazards and disasters and very rich in natural history. We will visit the scenario of one of the largest oil spills in US history as well as the largest water treatment plant facility in the city and an ecological restoration of the East River.



b. 2nd Ecological Tour: From the “Ghost Forest” to the Alphabet City

-When: Saturday November 14

-Time: 9:30am

-Directions: Take the trains N, Q, R, W to 23rd Station or the train 6 to the 23rd station (see the map below). Wait at the corner of Madison Ave. and E 23rd street.

-Description: We will start visiting Maya Li’s Exhibition “Ghost Forest” at Madison Square Park, an art exhibition that shows a group of dead trees due to the sea level rising. From there we will walk to the “Alphabet City” (see map below) where we will discuss about the 14th street power plant, air pollution, Hurricane Sandy, and hazards caused by power outages.

You can check Maya Li’s Exhibition “Ghost Forest” on

<https://madisonsquarepark.org/art/exhibitions/maya-lin-ghost-forest/>

