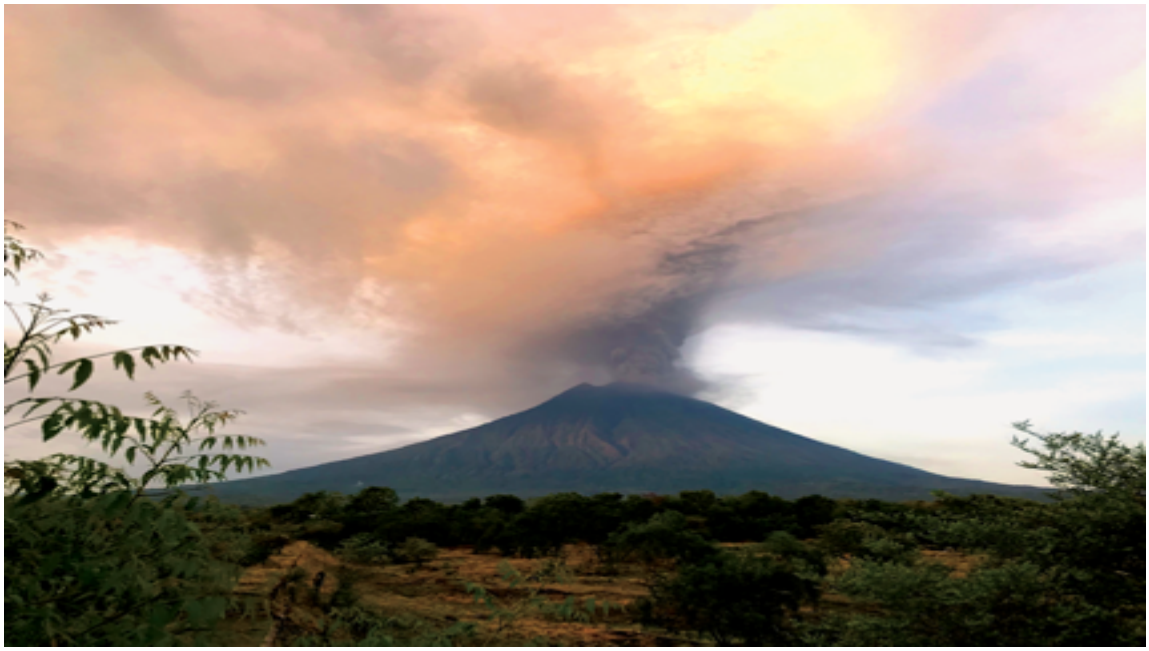
Environmental Hazards



Spring 2025
Tuesdays/Fridays, 11:30 AM to 12:45 AM – NH 1022
Undergraduate PGEOG 36300-01
Graduate PGEOG 70554-01

HUNTER COLLEGE
Department of Geography and Environmental Science

Instructor Information:
-Instructor: Enrique Lanz Oca
-E-mail: enriquelanzoca@gmail.com
-Office Hours: Tuesdays, 1:00pm – 2:00pm

Course Information:
3-credit course

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 of the Class:

The class will be **"in-person."** However, in case of an emergency, we may switch to virtual mode (using Zoom).

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 Brightspace. 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.

Note: (for the graduate students): The attainment of these course-specific learning outcomes will be also evaluated through the writing assignments (Literature Review), group projects (report), fieldwork, presentations, and class participation. However, the writing assignments will be more extensive in terms of number of pages and references used as well as more academic orientation.

Course Assignments. This course will be based upon:

Undergraduates

ASSIGNMENTS	% for the Final Grade	CHARACTERISTICS/ REQUIREMENTS
Proposal for the (Final Paper)	**15**	**-At least 2 pages (double space) and 4 References**
GROUP PROJECT Report (based on a 4 student group)	**35**	**-At least 30 pages; 5 references -Around 7-10 pages per student**
Presentations	**5**	**Each group will present their Group Report section in class.**
Mid-Term and Final Exams	**30**	**Multiple Choice Questions**
Fieldwork Notebook	**5**	**Every student will be responsible of elaborating a fieldwork notebook through the semester.**
Class Participation	**10**	**In-class and Out-class activities**
***Eco*Credits Report/s**	**Extra-credit**	**-Participation in different outdoor activities (e. g. tree planting)**

Graduates

ASSIGNMENTS	% for the Final Grade	CHARACTERISTICS/ REQUIREMENTS
Proposal for the (Final Paper)	**10**	**-At least 2 pages (double space) and 4 References**
GROUP PROJECT Report (based on a 4 student group)	**30**	**-At least 30 pages; 5 references -Around 7-10 pages per student**
Coordinator Group Work (Final COMPLETE Report)	**15**	**Graduate students will be responsible of the implementation of the Final Complete Report (all of the reports together)**
Abstract	**5**	**The Graduate students will be the main responsible for writing the abstract of her/his/ their respective Group Complete Report.**
Presentations	**5**	**Each group will present their Group Report section in class.**
Literature Review Document	**10**	**At least 5 References (Individual activity).**
Mid-Term and Final Exams	**15**	**Multiple Choice Questions**
Fieldwork Notebook	**5**	**Every student will be responsible of elaborating a fieldwork notebook through the semester.**
Class Participation	**5**	**In-class and Out-class activities**
***Eco*Credits Report/s**	**Extra-Credit**	**-Participation in different outdoor activities (e. g. tree planting)**

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 Report), Final Group Report, and Final Complete Report, Abstract/Literature Review (graduate students)
2. You will have the opportunity to re-write the Proposal of the 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).

Collaboration with the Greenbelt Society

Educate/Engage/Empower

https://www.instagram.com/greenbeltsociety/

Our course works and participates in close collaboration with the Greenbelt Society, a group formed by a diverse group of professionals, faculty, alumni and students affiliated with the Department of Geography and Environmental Science at Hunter College in NYC. The outdoor activities are organized in collaboration with the Greenbelt as well as The NYC Parks Department and other organizations such as the American Littoral Society. Our mission is to provide a platform for members to actively participate in projects, events and other activities in environmental science and sustainable development. We seek to promote intellectual and professional development through discussion, interdisciplinary collaboration and external networks. You can participate or be a member of the group.

Course Contents and Calendar:
Part I: Course Introduction
<u>Week 1</u>:
January 28th (Tuesday): Presentation, Syllabus, and Environmental Hazards
1. Course Presentation and Description of the Syllabus
2. What is an Environmental Hazard?
3. General Visualization of the Main Env. Hazards
4. Group Report Project (Phase 1): Proposal
    a. Formation of the Groups
    b. Selection of the Research Topic/Study Area

January 31st (Friday): The *Eco*Crisis of *Our* Civilization and Environmental Hazards
1. Ulrich Beck's "Risk Society"
2. Ian Burton and Robert Kates's "The Great Climacteric"
3. Is the Anthropocene Just an *Anthropocentric* Vision?
4. Slovak's "Perception of Risk"
5. Fake News and Risk Perception
5. Group Report Project (Phase 1): Proposal

a. Research Questions/Objectives

5. Fieldwork Exercises 1: Mapping

(see Appendix 1)

Week 2:

February 4th (Tuesday): Tectonic Plates and Volcanic Hazards

1. Tectonic Plates Dynamics
2. Volcanic Hazards 1: from Pyroclastic Flows to Lahars
3. Cases:
   a. La Palma (Spain)
   b. Tonga Eruption (2022)

February 7th (Friday): Volcanoes and Their Hazardous Processes 2

1. Volcanism and Prevention Methods:

2. Group Report Project (Phase 3): Proposal

Literature Review

3. Fieldwork Exercises 2: Volcanic Hazards Exercises:

The Island of Hawaii and La Palma (Spain) Maps

(see Appendix 1)

Week 3:

February 11th (Tuesday): Earthquakes and Their Hazardous Processes

1. Earthquakes and their Mechanics
2. Earthquakes: their Forecast, Prevention, and Mitigation
3. Tsunamis

February 14th (Friday):

1. Group Report Project (Phase 4): Proposal

a. Methodology and Data
b. Intellectual Contribution

2. Fieldwork Exercises 3: Visual Identification of Seismic Hazards Exercises

Area: 125th street (Harlem) (see Appendix 1)

Week 4:

February 18th (Tuesday): NO CLASS; CLASSES FOLLOW MONDAY'S SCHEDULE

February 21st (Friday): Climate Change

Assignment: PROPOSAL of the Group Report

1. Climate Change, Global Warming, and Greenhouse Effect
2. Causes

2. Group Report Project (Phase 5): Proposal

Revision of the Final Proposal Draft

Week 5:

February 25th (Tuesday): Sea Level Rise

1. Sea Level Rise
   Cases: From NYC to the New Jakarta
2. Mitigation Strategies

February 28th (Friday): Arctic Communities and Sea Level Rise:

1. The Alaskan Native Communities of Newtok, Kivalina and Quinhagak (Alaska)
2. **Group Report Project (Phase 6): Visualization of the Final Report Structure**

Week 6:

March 4th (Tuesday): Heat Waves and Vulnerability

1. What is a Heatwave?
2. The Urban Heat Island Effect
3. Heatwaves and Cities:
   -Sevilla (Spain), Zoe and the First Heatwave named
   -Richmond (USA)
   -New York City (USA)
4. Trees: Mitigation Strategy

March 7th (Friday):

1. **Fieldwork Exercises 4: Heat Risk Exercise (Hunter College area)**
(see Appendix 1)

Week 7:

March 11th (Tuesday): Hurricanes/Typhoons/Cyclones and Nor'Easters

1. Formation of Hurricanes
2. Protection Strategies
3. Hurricane Katrina/New Orleans: An Ecological Crisis
4. Nor'Easters

March 14th (Friday): Tornadoes, Derechos and Thunderstorms

1. What are the Tornadoes?
2. Derechos
3. Thunderstorms and Lightning
4. **Group Report Project (Phase 7): Working on the Final Report**

Week 8:

March 18th (Tuesday): From Atmospheric Rivers to DANAs

1. Cold Waves. Case: Texas Feb. 2021
2. 'Hydroclimate Whiplash' and 'Atmospheric Rivers': California
3. "Gota Fria" (Cold Drop) and DANA (Depresión Aislada en Niveles Altos): Valencia (Spain)
4. The Bomb Cyclones: Storm Éowyn (Ireland, Jan. 2025)

March 21st (Friday):
1. Group Report Project (Phase 8): Working on the Final Report

Week 9:
March 25th (Tuesday): Floods 1
1. Floods, Causes, and Flood Control Mechanisms
2. Two Historical Events:
    a. North Carolina and Helen Hurricane
    b. Valencia (Spain) and a 2024-DANA

March 28th (Friday): Floods 2
1. Group Report Project (Phase 9): Working in the Final Report
2. Fieldwork Exercises 5: Identification of Watersheds and Flood Risk Mapping
(see Appendix 1)

Week 10:
April 1st (Tuesday):
Assignment: MID-TERM Exam

April 4th (Friday): Urban Flooding
1. Visualizing the Urban Flood Process
2. NYC's Poor Communities and Flood Risk
3. Strategies/Mitigations: Bioswales, Rain Gardens and Greenrooms
4. Group Report Project (Phase 10): Working in the Final Report

Week 11:
April 8th (Tuesday): Dam Infrastructure and Hazards
1. Dams, Types, and Construction
2. Current Status of Dam Infrastructure in United States
3. Historical Cases 1:
    a. Banqiao Dam (China)
    b. The Vajont Dam (Italy)
    c. The Oroville Dam (California)
    d. The Derna Dams (Libya)

April 11th (Friday):
2. Group Report Project (Phase 11): Working in the Final Report

Week 12:
April 15 and 18: NO CLASSES; SPRING BREAK

Week 13:

Assignment: Literature Review (Graduate Students)

April 22nd (Tuesday): Wildfires

1. What is a Wildfire? Causes and Consequences
2. Cases:
    a. Australia's Fires
    b. Los Angeles's Fires 2024-25
    c. The Arctic *Zombi Fires*
3. Mitigation/Prevention Methods:
    a. Traditional Knowledge
    b. Watch Duty Platform: LA Fires and the Community Platform

April 25th (Friday):

Group Report Project (Phase 11): Reviewing the Final Report

April 27th (Sunday):

Assignment: Submission of the the FINAL GROUP REPORTS

Week 14:

April 29th (Tuesday): Mass Movement and Hazards: Landslides 1

1. Mass Movement: from Landslides to Mudflows
2. Prevention and Mitigation Mechanisms
3. Cases:
    a. Landslide Dams: Hattian Bala Landslide (Kashmir)
    b. Landslide case: Himachal Pradesh (Indian Himalayas)

4. Fieldwork Exercises 6: Identification of Potential Landslides

(see Appendix 1)

May 2nd (Friday): Permafrost and its Hazards

1.What is the Permafrost?
2. Permafrost and the Arctic Infrastructure Collapse
3. Diseases and Permafrost
4. Case: Quinhagak (Alaska) (Photos)

Week 15:

May 6th (Tuesday):

1. Final Meditations and Commentaries of the Semester

2. Checking the Scientific/Fieldwork Notebook (in class)

3. Fieldwork Exercises 7: How to Present

(see Appendix 1)

May 9th (Friday):

PRESENTATIONS 1

Week 16:
May 11th (Sunday): THE FINAL COMPLETE REPORT

May 13th (Tuesday):
1. PRESENTATIONS 2
2. Revision of the Final Exam

Week 17:
May 20th (Tuesday): 9:00 - 11:00 am
FINAL EXAM

Required Materials (by week)
Week 1:
January 28th (Tuesday): Presentation, Syllabus, and Environmental Hazards
-Chapter 1: "Natural Hazards and Disasters." Natural Hazards & Disasters by Donal Hyndman and David Hyndman. Brooks/Cole
-FEMA (2022). "Natural Hazards." Available at https://hazards.fema.gov/nri/natural-hazards

January 31st (Friday): The *Eco*Crisis of *Our* Civilization and Environmental Hazards
-Foster, John Bellamy (2017). "The Earth-System Crisis and Ecological Civilization: A Marxian View." *International Critical Thought*, Vol. 7, No. 4, 439-458 https://doi.org/10.1080/21598282.2017.1357483 (Read 439-442)
-National Geographic (2023). "Anthropocene." Available at https://education.nationalgeographic.org/resource/anthropocene/
-Slovak (1987). "Perception of Risk." Science, Vol. 236, Issue 4799 (April 17), pp.: 280-285
-*The Guardian*
1. (2025). "Revealed: US climate denial group working with European far-right parties." Available at https://www.theguardian.com/environment/2025/jan/22/us-thinktank-climate-science-deniers-working-with-rightwingers-in-eu-parliament-heartland-institute
2. (2025). "Extreme weather failing to encourage political climate action, says activist Luisa Neubauer." Available at https://www.theguardian.com/environment/2025/jan/24/extreme-weather-failing-encourage-political-climate-action-luisa-neubauer
-Ulrich Becks' Concept of the Risk Society" [video]. Available online.
Further Materials:
-DeSmog (2025). "The Heartland Institute." Available at https://www.desmog.com/heartland-institute/

Week 2:

February 4th (Tuesday): Tectonic Plates and Volcanic Hazards

-Chapter 2: "Plates Tectonics and Physical Hazards."

-Chapter 6: "Volcanoes: Tectonic Environments and Eruptions."

-"Earth's Deadliest Volcanoes | Spain: La Palma | Free Documentary [Video, Youtube] (n. d.). Available at https://www.youtube.com/watch?v=Oq6ODqtzAiY

-"Mapping the La Palma volcano eruption (10th Oct) todos los mapas de la erupción de La Palma." [Video] (n. d.). Available at https://www.youtube.com/watch?v=U_24a3yyzfg

-"Volcano La Palma (Cumbre Vieja)-Drone 4K." [Video, Youtube] (n. d.). Available at https://www.youtube.com/watch?v=X6YxG7W7F7E

-Witze, Alexandra (2022). "Why the Tongan Volcanic Eruption Was so Shocking?" *Nature*, Vol. 602, Feb. 17. Available at https://media.nature.com/original/magazine-assets/d41586-022-00394-y/d41586-022-00394-y.pdf

Further Materials:

-"A Day in Pompeii - Full-length animation" (video). Available at https://www.youtube.com/watch?v=dY_3ggKg0Bc

February 7th (Friday): Volcanoes and Their Hazardous Processes 2

-Chapter 7: "Volcanoes, Hazards, and Mitigation."

-USGS (2023). "Lava Flow Hazards Zones and Flow Forecast Methods, Island of Hawai'i." Available at https://www.usgs.gov/observatories/hvo/science/lava-flow-hazards-zones-and-flow-forecast-methods-island-hawaii

-Valentin R. Troll et al. (2024). "The 2021 La Palma eruption: social dilemmas resulting from life close to an active volcano." Available at https://onlinelibrary.wiley.com/doi/full/10.1111/gto.12472

Week 3: Earthquakes and Their Hazardous Processes

-Chapter 3: "Earthquakes and their Causes."

-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

Week 4:

February 21st (Friday): Climate Change

-Chapter 11: "Climate Change."

-United Nations (UN) (2021). "Climate Change and Weather Related to Disasters Surge Five-Over 50 years, but Early warnings Save Lives-WMO Report." Available at

Week 5:

February 25th (Tuesday): Sea Level Rise

-ARC Group (2024). "Indonesia's New Capital: Leap Forward Or Ghost-Town In The Making?" Available at

https://arc-group.com/nusantara-indonesia-new-capital/#:~:text=In%202019%2C%20the%20Indonesian%20government,and%20broke%20ground%20in%202022.
-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
-Lincoln Institute (2022). "Uprooted: As the Climate Crisis Forces U.S. Residents to Relocate, A New Conversation Emerges." Available at https: www.lincolninst.edu
-NOAA (2022). "Climate Change: Global Sea Level." Available at https://www.climate.gov/news-features/understanding-climate/climate-change-global-sea-level
-Rebuild by Design (n. d.). "The Big U." Available at https://rebuildbydesign.org/work/funded-projects/the-big-u/
-*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
-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

Further Materials:

-Louisiana. gov (2021). "Isle de Jean Charles Resettlement." Available at https://isledejeancharles.la.gov/
-Tuvalu (2025). "Tuvalu: The First Digital Nation." Available at https://www.tuvalu.tv/

February 28th (Friday): Arctic Communities and Sea Level Rise:

-The Nation (2022). "The Future of Climate Adaptation Is Here in the Native Village of Newtok, Alaska.." Available at https://www.thenation.com/article/environment/newtok-alaska-climate-relocation/
-The Christian Science Monitor (2019). "Will climate change force this Alaska village to relocate?" Available at https://www.csmonitor.com/Environment/2019/0701/Will-climate-change-force-this-Alaska-village-to-relocate
-US Climate Resilience Toolkit (2024). "Relocating Kivalina." Available at https://toolkit.climate.gov/case-studies/relocating-kivalina

Week 6:

March 4th (Tuesday): Heat Waves and Vulnerability

-ArcGIS (2021). "Heat Vulnerability in NYC." Available at https://www.arcgis.com/home/item.html?id=baa7adc3aa8140d0b610fbf39901799b
-City of New York (2022). **"**2022 New York City Heat-Related Mortality Report.**"** Available at https://nyccas.cityofnewyork.us/nyccas2022/report/1

-Einhorn, Catrin (2021). "What Technology Could Reduce Heat Deaths? Trees." (July 2). Available at https://www.nytimes.com/2021/07/02/climate/trees-cities-heat-waves.html

-Irfan Umair (2023). **"**How heat waves form, and how climate change makes them worse.**"** *Vox*. Available at https://www.vox.com/22538401/texas-heat-wave-weather-definition-record-temperature-climate-change

-Millan, Laura (2022). "One of Europe's Hottest Cities Is Using 1,000-Year-Old Technology to Combat Climate Change." *Bloomberg* (August 18). Available at https://www.bloomberg.com/news/articles/2022-08-18/one-of-europe-s-hottest-cities-has-a-climate-change-battle-plan

-NYC.Gov (2023). **"**Interactive Heat Vulnerability Index.**"** Available at https://a816-dohbesp.nyc.gov/IndicatorPublic/beta/key-topics/climatehealth/hvi/

-Osborne, Margaret (2022). "'Zoe' Becomes the World's First Named Heat Wave." *Smithsonian* (August 2). Available at https://www.smithsonianmag.com/smart-news/zoe-becomes-the-worlds-first-named-heat-wave-180980512/

-Plumer, Brad and Popovich, Nadja (2020). **"**How Decades of Racist Housing Policy Left Neighborhoods Sweltering.**"** *The New York Times* (August 24). Available at https://www.nytimes.com/interactive/2020/08/24/climate/racism-redlining-cities-global-warming.html

-*Union of Concerned Scientists* (2018). "Heat Waves and Climate Change." Available at https://www.ucsusa.org/resources/heat-waves-and-climate-changeutm_source=googlegrants&utm_medium=search&utm_campaign=CE&gclid=Cj0KCQjw3eeXBhD7ARIsAHjssr8DBjB1qErDIIEbbo5QiSWugys3Yp43MmAzT6RZ75FjL0Rs5CaDgHIaAjREEALw_wcB

-Zitera, Carly D. (2019). **"**Scale-dependent interactions between tree canopy cover and impervious surfaces reduce daytime urban heat during summer.**"** *PNAS* | April 9 | vol. 116 | no. 15 | 7575-7580

<u>Week 7:</u>

March 11th (Tuesday): Hurricanes/Typhoons/Cyclones and Nor'Easters

-Chapter 15 "Hurricanes and Nor'Easters."

-Del Valle, Alejandro et al. (2020). "Mangroves protect coastal economic activity from hurricanes." PNAS (Jan. 7).

-Lehman, Nicholas (2020). "Why Hurricane Katrina Was Not a Natural Disaster." *The New Yorker* (August 26). Available at https://www.newyorker.com/books/under-review/why-hurricane-katrina-was-not-a-natural-disaster

-*The New York Times* (2005). "From the Graphics Archive: Mapping Katrina and Its Aftermath." Available at https://www.nytimes.com/interactive/2015/08/25/us/mapping-katrina-and-aftermath.html

Further Materials:

Mother Jones (2015). "Maps: 10 Years After Katrina, NOLA's Poor Neighborhoods Are Still Largely Abandoned." Available at https://www.motherjones.com/politics/2015/08/maps-10-years-after-hurricane-katrina-uneven-recovery-new-orleans/

March 14th (Friday): Tornadoes, Derechos, and Thunderstorms

-Chapter 10: "Weather, Thunderstorms, and Tornadoes."

-"Derecho" [video]. Available at https://www.youtube.com/watch?v=uS30RA6UjI0

-National Weather Service (n. d.). "Derechos." Available at https://www.weather.gov/lmk/derecho

-National Weather Service and NOOA (2022). "National Weather Service Lightning Fatalities in 2022: 14." Available at https://www.weather.gov/safety/lightning-fatalities

Further Materials:

-Oxenden, McKenna (2022). "Lightning Strike Near White House Kills 3." The new York Times (August 4). Available at https://www.nytimes.com/2022/08/04/us/white-house-lightning.html?action=click&module=RelatedLinks&pgtype=Article

Week 8:

March 18th (Tuesday): From Atmospheric Rivers to DANAs

-Daniel L. Swain et al. (2025). "Hydroclimate volatility on a warming Earth" *Nature* Volume 6 | January 2025 | 35–50. https://doi.org/10.1038/s43017-024-00624-z [read from page 35 to 38]

-FEMA (2022). "Cold Wave." Available at https://hazards.fema.gov/nri/cold-wave

-Royal Meteorological Society (). "Cut-off lows, cold drops and DANA." Available at https://www.rmets.org/metmatters/cut-lows-cold-drops-and-dana

-NOAA

1. (n. d.). "The Great Texas Freeze, February 11-20, 2021". Available at https://www.ncei.noaa.gov/news/great-texas-freeze-february-2021
2. (2023). "What are atmospheric rivers?" Available at https://www.noaa.gov/stories/what-are-atmospheric-rivers

-The Weather Channel (2025). "'Bomb Cyclone' Storm Éowyn Hammers Ireland, United Kingdom With Damaging Winds, Heavy Rain." Available at https://weather.com/news/weather/news/2025-01-23-bomb-cyclone-storm-eowyn-ireland-united-kingdom-forecast

-Zhong, Raymond (2022). "The Coming California Megastorm." *New York Times* (August 12). Available at https://www.nytimes.com/interactive/2022/08/12/climate/california-rain-storm.html

Further Materials:

-BBC (2025). "Storm Éowyn: Danger to life warnings as 'once in a generation' storm hits UK and Ireland." [Video]. Available at https://www.youtube.com/watch?v=NiC5SERH2Gg

-California Department of Water Resources (2022). "Hydroclimate Report-Water Year 2022."

Available at
https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Flood-Management/Flood-Data/Climate-summaries/Hydroclimate_Report_2022-ADA-Final.pdf

-In Spanish: "?Que es una DANA?" Available at
https://www.eltiempo.es/noticias/meteopedia/dana

Week 9:

March 25th (Tuesday): Floods

-Chapter 12: "Streams and Flood Processes."

-Chapter 13: "Floods and Human Interactions" (pages 364-368 and 375-381)

-NOAA (2024). "Hurricane Helene's extreme rainfall and catastrophic inland flooding." Available at
https://www.climate.gov/news-features/event-tracker/hurricane-helenes-extreme-rainfall-and-catastrophic-inland-flooding

-Reuters (2024). "What caused deadly floods in Spain? The impact of DANA explained." [Video]. Available at
https://www.reuters.com/video/watch/idRW607731102024RP1/

Universidad de Valencia (2025). "The emergency map: how the UV accurately delineated the magnitude of the DANA." Available at
https://www.uv.es/uvweb/uv-news/en/news/emergency-map-how-uv-accurately-delineated-magnitude-dana-1285973304159/Novetat.html?id=1286407021453&plantilla=UV_Noticies/Page/TPGDetaillNews

Further Materials:

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

-*The Guardian* (2022). "Record Death Valley flooding 'a once-in-1,000-year event.'" (August 10). Available at https://www.theguardian.com/us-news/2022/aug/10/death-valley-floods-climate-crisis

-"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. man Available on https://www.theguardian.com/environment/2021/jul/16/climate-scientists-shocked-by-scale-of-floods-in-germany

March 28th (Friday):

-University of Valencia (2025). "2024 MapDANA." Available at
https://uveg.maps.arcgis.com/apps/mapviewer/index.html
webmap=8e6c1d2b364f41c79d27e4dcfdf5475a

Week 10:

April 4th (Friday):

-Gordon, Juanita (2023). "As East Harlem Waits for Infrastructure Projects to Mitigate Flood Risk, Residents Are Creating Their Own Solutions." *Inside Climate News*. Available at https://insideclimatenews.org/news/12072023/east-harlem-flooding-resiliency/

-Holpuch, Amanda (2021). New York floods: calls for action after 11 die in basement apartments." *The Guardian*. Available at https://www.theguardian.com/us-news/2021/sep/04/new-york-floods-11-die-basement-apartments

-New York City Comptroller (2022). "Bringing Basement Apartments Into the Light Establishing a NYC Basement Board to Provide Basic Rights, Responsibilities, and Protections for Basement Apartment Residents and Owners." Available at https://comptroller.nyc.gov/reports/bringing-basement-apartments-into-the-light/

-NYC Environmental Protection Agency (2024). "Green Infrastructure Program Map." Available at https://nycdep.maps.arcgis.com/apps/webappviewer/index.html?id=108b0be0cbf246ad85fbb4e2c4fdbcb1

-University of Maryland, College Park A. James Clark School of Engineering Center for DisasterResilience Texas A&M University, Galveston Campus (2018). "The Growing Threat of urban Flooding." Available online.

Week 11:

April 15th (Tuesday): Dam Infrastructure and Hazards

-Association of State Dam Safety Officials
1. (2019). "Dam Failures and Incidents." Available on https://damsafety.org/dam-failures
2. (2025). "Case Study: Banqiao Dam (China, 1975)."

-"A Timeline of Oroville Events-2017." [Video]. Available on https://www.youtube.com/watch?v=NjbbW37qzak&t=4s

-OVO (n. d.). "The Vajont Disaster" [video]. Available at http://www.ovovideo.com/en/vajontdisaster/

-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

-*The New York Times* (2023). "Dire Warnings About Libya Dams Went Unheeded." Available at https://www.nytimes.com/2023/09/16/world/middleeast/libya-dams-warnings.html

-Zhong, Raymond (2022). "The Coming California Megastore." *New York Times* (August 12). Available at https://www.nytimes.com/interactive/2022/08/12/climate/california-rain-storm.html

Further Materials:

-United States Society on Dams (2020). "Types of Dams." Available at https://www.ussdams.org/dam-levee-education/overview/types-of-dams/

Week 13:

April 22nd (Tuesday): Wildfires

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

-Hood. Marlowe (2020). "Scientists warn of 'zombie fires' in the Arctic." *phys.org* (May 27). Available at https://phys.org/news/2020-05-scientists-zombie-arctic.html

-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

-Los Angeles Times (2025). "What makes the Santa Ana winds blow through Southern California?" Available at https://www.latimes.com/california/story/2019-10-09/what-makes-the-santa-ana-winds-blow

-Watch Duty Platform. Available at https://app.watchduty.org/

-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 at https://www.businessinsider.com/australia-fires-burned-twice-land-area-as-2019-amazon-fires-2020-1/amp/

Further Materials:

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

Week 14:

April 29th (Tuesday): Mass Movement and Hazards: Landslides

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

-*Floodlist* (2022). "India – Floods and Landslides Cause Fatalities in Himachal Pradesh." Available at https://floodlist.com/asia/india-floods-himachal-pradesh-july-2022

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

-Niaz, Fawad S. et al. (2020). "Lessons from the Case History of a Massive Landslide Dam." *GeoFluids* (Nov. 30). Available at https://www.hindawi.com/journals/geofluids/2020/8840629/ (Read just the Introduction).

[Videos]:

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

May 2nd (Friday): Permafrost and its Hazards
-*Advancing Earth and Space Science* (AGU) (2021). "How Much of the Earth's Surface is Underlain by Permafrost?" Available at https://agupubs.onlinelibrary.wiley.com/doi/epdf/10.1029/2021JF006123
-Leman, Jennifer (2020). "Welp, Scientists Found 28 New Virus Groups in a Melting Glacier." *Popular Mechanics* (Jan. 23). Available at https://www.popularmechanics.com/science/health/a30643717/viruses-found-melting-glacier/
-NPR (2018, Jan. 24). "Are There Zombie Viruses In The Thawing Permafrost?" Available at https://www.npr.org/sections/goatsandsoda/2018/01/24/575974220/are-there-zombieviruses-in-the-thawing-permafrost
-SkyNews (2021). "The Big Thaw: Russia's disappearing permafrost." [Video]. Available at https://www.youtube.com/watch?v=E4kD9FYXlWk
-Woodwell Climate Research Center (2024). "Permafrost thaw is threatening Arctic communities and our global climate." Available at https://permafrost.woodwellclimate.org/
Further Materials:
-Dobrovidova, Olga (2022). Russia's new permafrost monitoring system could improve climate models, protect infrastructure." *Science* (Jan. 4). Available at https://www.science.org/content/article/russia-s-new-permafrost-monitoring-system-could-improve-climate-models-protect
-Moskvitch, Katia (2014). "Mysterious Siberian crater attributed to methane." *Nature* (July 31).
-*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
-National Snow and Ice Data Center (2023). "What is the Cryosphere?" Available at https://nsidc.org/learn/what-cryosphere#anchor-3
-Yale Climate Connections (2023). "Siberia's sinkholes: What they may mean for climate." [Video). Available at https://www.youtube.com/watch?v=EHbRaDLxEsA

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

Description of Scaffolding Process of High-Stakes Assignments

-Platform of Work:
Each of the Student Groups will develop the Final Group Project (and its Proposal) in a Google Doc document. You will share the document with the Instructor through the process. Thus, all of you and the instructor will be capable of sharing and exchanging comments of the document process. The entire completion process of this project will be constructed through a system of scaffolding process. All high-stakes assignments (also low-stake assignments) are scaffolded in the following manner. These scaffolding processes are indicated also in the Course Content and Calendar section (see below):

-The Final Report, Proposal and the Final Complete Report:
The completion of this project will be implemented through various steps and revisions:
* First step: The students begin to select a list of potential research topics (e. g. nuclear energy pollution or oil spills) for the final project.
* Second step: Choosing a final research topic.
* Third step: Construction of research question/s connected to the topic and how to collect scientific data.
* Forth step: Elaboration of the first draft of the Proposal
* Fifth step: Feedback and revision of the proposal.
These first five steps are implemented through commentaries posted by email as well as in brief conversations in class, as indicated in the section Course Content and Calendar.
* Sixth step: First draft of the final paper. All students who wish to have revisions of their final research paper should meet with the instructor (email or Zoom) to see where and how the final paper could be improved.
* Seventh step: Presentation of the Final Research Paper.

2. WhiteBoard Capacity:
I recommend you to open a whiteboard platform (e. g. Miro) where you can visualize the evolution of the project.

Note for the Writing Assignments: Although students will receive feedback for the proposal, final paper, and ecological sustainability project, the Proposal of the Final Research Paper will be the only assignment that will have the possibility to be re-written.

1. PROPOSAL of the Final Report:
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 GROUP REPORT:

The principal objective of each group is the elaboration of a 'Final Report' that analyzes a particular case of Environmental Hazards in the New York City Metropolitan area. Each group will be focused on a specific impact that that particular site is currently experiencing. Moreover, these groups design potential strategies to 'mitigate' that particular potential hazard of the area. Each group will elaborate a report of that particular topic following the guidelines (sample of the structure) shown below. At the end of the semester, all of the groups will integrate their reports into the **FINAL COMPLETE REPORT**. In order to coordinate these group activities, graduate students will form part of a Coordinator Group (see Figure 1) that implement this Final Complete Report. Finally, these two two groups will organize a tour to the study area.

Main tasks of Graduate Students:

1. Coordinate the internal group operations and transmit them to the other groups
2. Complete the common sections for the Final Complete Report: Introduction, Literature Review, Methodology, Intellectual Contribution, and Conclusion.
3. Elaborate the Abstract of the Final Complete Report
4. Meet with the instructors during the semester (giving updates)

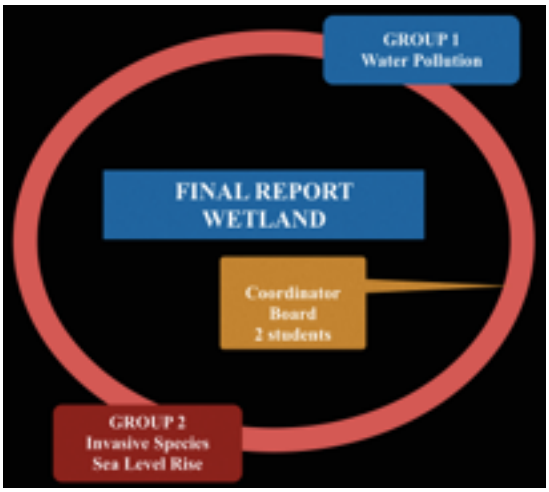


Figure 1 (general View of the Final Report)

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. In addition, the paper must be double spaced, with heading and title.

Structure of the Group Report:

-Introduction
-Research Questions and Objectives
-Literature Review
-Studied Area and Ecological/Historical Evolution of the area
-Identification of the main Problem/s (air pollution)
-Consequences
-Possible Mitigation Measurement/Solutions
-Methodology and Materials
-Intellectual Contribution/Significance
-Conclusion
-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. 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 special 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 projects generate? How have local communities accepted this type of energy plants?**"**

3. 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."

4. Studied Area and Ecological/Historical Evolution of the area

Section where one describes the main geographical and ecological characteristics of the selected. Moreover, this part should include a description of the historical evolution of the area. This historical description would facilitate a more adequate final visualization of the current situation of the territory (e. g. the transformation of a wetland area into a dumping site).

5. Identification of the main Problem/s

Part where the main problems or negative issues are identified. For example, the dumping and draining activities in a wetland area.

6. Consequences

Description of the main consequences generated by those processes.

7. Potential Mitigation Strategies/Solutions

This is one of most fundamental pieces of the Final Report because it represents a crucial component of the course: we are not 'just' analyzing entities of environmental issues, but overall agencies that facilitate the design and implementation of mitigation strategies and solutions. Considering again the wetland example, we not only would analyze how that ecosystem has been negatively impacted by dumping operations and draining activities, but also elaborate possible solutions to transform this area again into a healthy wetland.

8. 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.

9. 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."

10. Conclusion: Summary of the paper proposal.

11. 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

-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.

3. Abstract (for Graduates):

Section that describes 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/writinganabstract.

Sample: 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

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

-You can find some examples for past semesters in an Archive posted on Brightspace.

4. Oral Presentation of the Final Group Reports:
You can use programs such as PowerPoint or others to present your research paper

5. Literature Review (For Graduate Students):
Using at least 5 references, the graduate students will analyze a specific topic related to biogeographic processes.

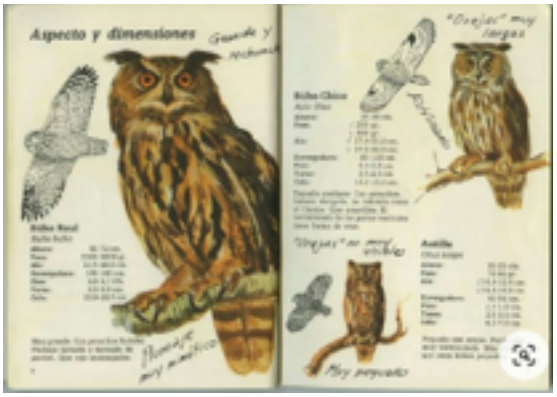
6. Two Exams: Mid-Term and Final Exams:
These exam will be completed in class. The exams will be composed of a set of multiple-choice questions. These questions will be divided in two categories:

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

7. Fieldwork Notebook:
You will complete a notebook where you will practice how to take notes, drawing, painting, and other fieldwork activities. You will collect information from class and outdoor. The notebook is a fundamental tool for any geographer or environmental scientists. At the end of the semester (see Calendar) the teacher will review your notebook in class. See below two samples from Feliz Rodriguez de la Fuente's "Cuadernos de Campo." See two samples below.



8. Class Participation (Indoor and Outdoor):
Class participation is fundamental for your success in this class and includes all of the following: class discussion, Brightspace posts, group activities, fieldwork, outdoor actives (e. g. tree planting, hiking, coastal clean ups, etc.), and attendance. You need to study the "Materials" every week (check each class in the syllabus) in order to prepare the class.

9. Fieldwork Exercises:
-Jan. 31: Fieldwork Exercises 1: Mapping: Understanding a Contour Line Map
a. Description: We will learn how to read a topographic map (or contour line) as well as construct it.
b. Materials: paper

-Feb. 7: Fieldwork Exercises 2: Volcanic Hazards Exercises:
a. Description: Using various maps that display volcanic potential risk for the The Island of Hawaii and La Palma (Spain), we will learn how to identify areas that could present potential future risk.
b. Materials: Paper and digital maps

-Feb. 14: Fieldwork Exercises 3: Visual Identification of Seismic Hazards in the 125th street (Harlem) and surroundings.
a. Description: We will identify which sites (e. g. buildings, infrastructure) could have a potential risk for the community. Our main parameters will be the type of infrastructure (e. g. buildings), materials, open spaces (e. g. green areas).
b. Materials: Google Maps and paper

-March 7: Fieldwork Exercises 4: Heat Risk Exercise
a. Description: We will visit the area around Hunter College: 68th - 71st streets along Lexington Avenue. We will collect data about heat in different points of this area. And then, we will analyze that data. Our main parameters will be #trees, gardens, types of roofs, materials, colors.
b. Materials: Heat guns and fieldwork notes.

-March 28: Fieldwork Exercises 5: Identification of Watersheds and Flood Risk Mapping
a. Description: We will learn how to identify the limits of a watershed in a contour-line map as well as top identify potential risk areas for flood.
b. Materials: Paper and digital maps.

-April 19: 4. Fieldwork Exercises 6: Identification of Potential Landslides
a. Description: We will learn how to identify areas with potential of landslide on maps and satellite/aerial photos.
b. Materials: Paper and digital maps as well as satellite and aerial photos.

-May 6th (Tuesday): Fieldwork Exercises 7: How to Present
Description: we will learn different techniques and methods to present our project in class.

10. *Eco*Credits (Extra-Credit)

Our course in collaboration with the Greenbelt Society (https://www.instagram.com/greenbeltsociety/), and institutions such as NYC Parks will be organizing diverse outdoor activities such as coastal clean-ups during this semester. Every activity represents a number of credits called ***Eco*Credits**. The bigger the number of outdoor activities, the bigger the amount of *Eco*Credits or extra-credit will be. Students will have to report each of the activity. How? Just a brief description of what you did, where, when, and how (see below the the Report sample). The objective of these activities is not just learn about environmental issues, but also contribute to mitigate and restore sensitive ecological areas as well as elaborate solutions for those particular scenarios. The students will become not only direct observers, but also active participants in the resolution of ecological issues. Some examples could be,

1. Coastal Clean-Ups:
    a. Ecological Restoration of coastal areas, marshes and rivers: planting coastal-marsh species such as Spartina or removing of invasive species.
    b. Clean-ups and maintenance of green infrastructure such as bioswales.
2. Tree Planting Activities
3. Hiking Tours such as the Hudson Valley or the Harriman State Park.

4. You may consider activities organized by yourself or collaborating with other institutions. Various examples,
a. How to expand or start your food-waste for compost in your home.
b. How to reduce the amount of energy in your home
c. Or just participating in clean-ups by yourself.

See a Sample below

Sample of a Eco-Credit REPORT

Name:	
Last Name:	
Type of Zone:	(e. g. urban, rural, suburb, marsh, etc.)
Location of the Activity:	(e. g. neighborhood, county, state)
Area/Surface of the site:	(e. g. 400 sq. feet)
Date/Time	
Type of Activity	(e. g. coastal clean-up, coastal restoration, bioswales cleaning, etc)
General Description of the Activity	If you participated in a costal clean-up activity, include data/information about the institution that organized this operation, what you did, how much plastic you collected. You could include photos or maps. ~1 page