

**NUTR 0256: Climate Change: Risk and Adaptation in Food Systems and Beyond
Fall 2021**

Class Meetings: Monday, Wednesday, 10:30am-12:00pm

Instructor(s): Erin Coughlan de Perez
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Instructor Office Hours: Fridays, 12pm, <https://tufts.zoom.us/my/erincdp>
I welcome you to contact me by email outside of class hours.

Teaching Asst.: Amber Masoni: Amber.Masoni@tufts.edu
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Teaching Asst. Office Hours:

Amber: 10am on Mondays or by appointment

Leah:

Semester Hour Units: 3

Prerequisites: Graduate standing or instructor consent.

Course Description: Climate change is one of the most pressing problems in the world today. This course will focus on the projected impacts of climate change around the world and related adaptations (risk management), with particular attention to humanitarian impacts and food systems. We will cover climate risk assessment, risk perception, risk communication, and climate risk management/adaptation. In doing this, we will cover major climate impacts by sector, as well as their interactions and humanitarian implications.

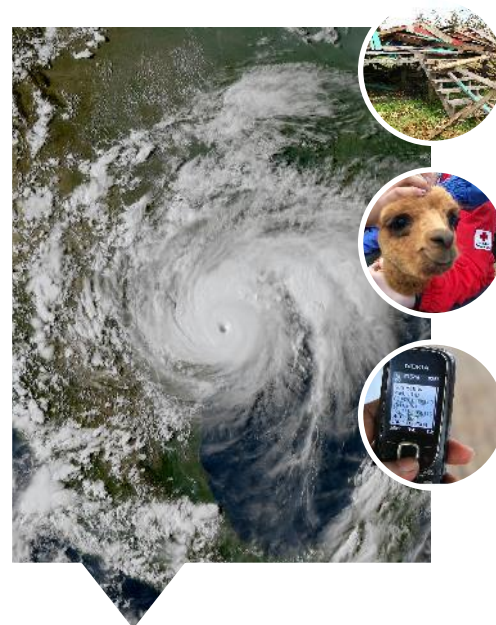
Each week of class will have two components: a lecture and a lab. The lecture will consist of instructor presentation of content as well as student reflection and discussion. The lab will consist of an exercise or simulation of technologies and methods related to climate impact assessment and management. There is no prior experience needed for the labs.

Students will experiment with different methodologies to assess climate risk and identify impact modeling methodologies that are most appropriate for specific applications. Students will learn why people perceive risk differently and experiment with innovative methods to communicate risk. In the risk management section, students will critique alternative risk management strategies and identify equity and justice implications. As a final project, students will develop a proposal for the Green Climate Fund, which is the largest global fund to address climate change.

Course Goals: Students will understand the variety of impacts of climate change. They will become familiar with methods to assess climate risk, from global and long-term risks to short-term and localized risks.

Students will learn heuristics behind risk perception, and they will evaluate risk communication techniques. Finally, students will understand the variety of climate change adaptation and risk management options that are being used or proposed around the world.

Texts or Materials: Readings are posted online on the course Canvas site.



Academic Conduct: Each student is responsible for upholding the highest standards of academic integrity, as specified in the [Friedman School's Policies and Procedures Handbook](#) and Tufts University policies (<http://students.tufts.edu/student-affairs/student-life-policies/academic-integrity-policy>). It is the responsibility of each student to understand and comply with these standards, as violations will be sanctioned by penalties ranging from failure on an assignment and the course to dismissal from the school.

Classroom Conduct: It is critical for the class that you read all the required readings before attending class, in order to be able to participate effectively in the discussion and labs. The class format is discussion-based, and therefore you will need to participate actively in each class session. Extenuating circumstances arise that can make this difficult. If you cannot attend a class, please let the teaching team know. If circumstances make you miss more than 3 classes during the semester, you may be overextended. I ask that you come see me to discuss your options.

All of us in the class, you, me, your peers, have a responsibility to create an environment in which we can all learn from each other. I expect everyone to participate in class so that we can all benefit from the insights and experiences that each person brings.

The Learning Process: What you can expect over the course of the semester.

<p>1</p> <p>Pre-class reading</p>	<p>2</p> <p>Monday Discussion</p>	<p>3</p> <p>Pre-lab reading</p>	<p>4</p> <p>Wednesday Lab</p> <p>Interactive exercise Submitted at end of class</p>
<p>5</p> <p>Assignments</p> <p>3 written assignments through the semester Two weeks to complete each one</p>		<p>6</p> <p>Final Project</p> <p>Groups of 3 develop a written proposal for the Green Climate Fund due at the end of the semester. This will also be presented to the class.</p>	

Assessment and Grading:

Assignments: 30%

3 assignments throughout the semester

Each worth 10%

Format: A one-page policy brief containing three bolded main messages with supporting text and references

Topics:

Policy brief on climate change related to the UN Food System Summit

Key climate-related risks for food systems

Communication priorities on climate risk for the public

Grading scheme: You will grade your own assignment using a reflection and feedback form, and this which will serve as the starting point for the teaching team to assign your final grade. The teaching team will provide written feedback on the assignment content, style, writing, and messages.

Labs: 30%

“Lab” exercises completed on Wednesdays during class time, with submission at end of class

11 labs during the semester; lowest grade is dropped

Grading scheme:

0	Did not participate
1	Partial work
2	Completed
3	Demonstrated mastery of concepts

Final project: 40%

Students form groups of ~3 people, create a group contract (roles, meeting times)

Presented in class in last weeks of semester

Written version due at end of semester, along with a self-assessment and group assessment

Grading scheme:

10	Outline: <ul style="list-style-type: none">• Justification• Salience of idea
35	Presentation: <ul style="list-style-type: none">• Rationale and country context• Proposed intervention is beneficial and feasible• Information is communicated efficiently and clearly
55	Written submission: <ul style="list-style-type: none">• Proposed idea is justified given risk context• Risk management outcomes are realistic and significant• Course material is integrated• All proposal sections are completed

Grading Range: A passing grade in the course is B- or better. Course grades will be based on the below (subject to revision during the course):

A	> 94%
A-	90 - <94%
B+	87 - <90%
B	84 - <87%
B-	80 - <84%

Instructions for Submission of Assignments and Exams: Labs are due at the end of class time and will be submitted via an electronic form provided during class. Assignments are due by midnight on the date assigned, and they should be submitted directly in Canvas. The final project consists of a class presentation and a written portion, the latter to be submitted in Canvas.

Assignments received after their deadline will not be accepted or graded unless an extension is approved in advance. Students who are unable to complete an assignment or exam on time for any reason should notify the instructor by email prior to the deadline, with a brief explanation for why the extension is needed.

Accommodation of Disabilities: Tufts University is committed to providing equal access and support to all students through the provision of reasonable accommodations so that each student may access their curricula and achieve their personal and academic potential. If you have a disability that requires reasonable accommodations, please contact the Friedman School Assistant Dean of Student Affairs at 617-636-6719 to plan for determination of appropriate accommodations. Please be aware that accommodations cannot be enacted retroactively, making timeliness a critical aspect for their provision.

Zoom: Friedman's on-campus courses may be offered by Zoom on days when the Boston campus is closed due to weather or a temporary cancellation issue. Students should expect to be notified by email if class is cancelled and will be provided with the Zoom link for students to use for any remote class sessions. Also, any relevant course slides or materials will be made available on [Canvas](#). The Zoom will be recorded and posted on Canvas when completed.

Diversity, Equity, and Justice We believe that the diversity of student experiences and perspectives is essential to the deepening of knowledge in this course. We consider it part of our responsibility as instructors to address the learning needs of all of the students in this course. We will present materials that are respectful of diversity: race, color, ethnicity, gender, age, disability, religious beliefs, political preference, sexual orientation, gender identity, socioeconomic status, citizenship, language, or national origin among other personal characteristics.

This course endeavors to follow an antiracist pedagogy, focused on diversity, equity, and justice throughout the material. This includes:

- The authors of assigned readings come from different national and racial backgrounds, including both the Global South and the Global North.
- The topics of study include explicit analysis of equity and justice implications in climate risk assessment and climate change adaptation.
- While the teaching team will provide detailed feedback and instruction on writing style and communication clarity, grammar will not be included in the grading rubric for written assignments. This is to ensure that people with writing styles from diverse backgrounds are not graded differently. Grading will be on content only.
- Efforts will be made to make everyone feel welcome and comfortable in the class discussions.

Your suggestions on how we can improve are encouraged and appreciated.

Course Topics and Assignment Schedule at a Glance:

This schedule is subject to modification at the instructor's discretion. Courses will be lead by the instructor.

Monday	Class Topic	Wednesday	Class Topic
		8 Sep	Introduction Course structure and concepts
13 Sep	Introduction History of climate change	15 Sep	Introduction: Lab C-Roads Negotiation Simulation
20 Sep	Introduction Climate modeling	22 Sep	Introduction: Lab Debate CRDPs
27 Sep	Risk Assessment Key concepts <i>Assignment 1 posted</i>	29 Sep	Risk Assessment: Lab Climate discourse since 1990
4 Oct	Risk Assessment Global risk trends	6 Oct	Risk Assessment: Lab IPCC Atlas + Inform Index <i>Assignment 1 due Friday 8 Oct</i>
11 Oct	Risk Assessment Risks to systems <i>Assignment 2 posted</i>	13 Oct	Risk Assessment: Lab Methods to assess risk
18 Oct	Risk Assessment Impact-based Forecasting	20 Oct	Risk Assessment: Lab InaSAFE <i>Assignment 2 due Friday 22 Oct</i>
25 Oct	Risk Perception Heuristics <i>Assignment 3 Posted</i>	27 Oct	Risk Perception: Lab Cognitive bias and climate
1 Nov	Risk Communication Strategies	3 Nov	Risk Communication: Lab Paying for Predictions Game <i>Assignment 3 due Friday 5 Nov</i>
8 Nov	Risk Management International <i>Final project assigned</i>	10 Nov	Risk Management: Lab COP 26
15 Nov	Risk Management Adaptation finance	17 Nov	Risk Management: Lab Peer review article <i>Group project check-in</i>
22 Nov	Risk Management National Adaptation Planning <i>Group project check-in</i>	24 Nov	<i>No class</i>
29 Nov	Risk Management Urban and local	1 Dec	Risk Management: Lab Equity and justice
6 Dec	Risk Management Monitoring and evaluation	8 Dec	Presentations
13 Dec	Presentations	15 Dec	<i>No class</i> <i>Final project due</i>

Detailed Description of Course Topics, Assignment Schedule, and the Learning Goals for Each Class Session:

This schedule is subject to modification at the instructor's discretion.

Date of Class: 8 September

Course Topics: Introduction to course structure and concepts

Learning Objectives:

1. Students are familiar with each other and the teaching team.
 2. Define basic concepts of climate change mitigation, adaptation, geoengineering, and their relationship.
 3. Students can articulate their fundamental questions about climate.
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Date of Class: 13 September

Course Topics: Introduction: History of climate change

Lecture and discussion.

Learning Objectives:

1. Relate major historical milestones in climate science and climate policy.
2. Describe the interplay between advancements in climate science, international climate governance, major geopolitical events, and development transitions.
3. Define the purpose and roles of the IPCC and the UNFCCC.
4. Analyze how climate science and climate policy affects food systems.



Christiana Figueres, Costa Rica

"Optimism is not soft, it is gritty."
- The Future We Choose

Required Reading:

- [Excerpt from](#) "The Future We Choose" by Christiana Figueres & Tom Rivett-Carnac
 - [The Fragile Framework](#)
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Date of Class: 15 September

Course Topics: Introduction Lab: C-ROADS simulation

All students are assigned a country; they then proceed in a mock negotiation about emissions and adaptation commitments. Results of the negotiation are fed into a simple climate model, and students are given feedback about how their results affect global climate change.

Learning Objectives:

1. Dissect the variety of international positions on climate change mitigation and adaptation.
2. Experiment with the impact of national-level emissions cuts on global climate change.
3. Assess the solution space for preventing "dangerous" human interference with the climate system.

Required Reading:

Briefing note for your country in the negotiation.

Assignments Due: Lab 1

Date of Class: 20 September

Course Topics: Introduction: Climate and weather modeling

Lecture and discussion.

Learning Objectives:

1. Explain how global climate models work.
2. Recognize biases in model output and misapplications of global climate projections.
3. Identify areas of consensus among global climate models.



Dr. Fredolin Tangang, Malaysia

"Precipitation extremes of Southeast Asia in the future are characterized by decrease in total precipitation and longer consecutive dry days over the southern part, and increase in frequency and intensity of extremes over the northern part."

-Tangang et al. 2019

Required Reading:

Before class: <https://www.carbonbrief.org/qa-how-do-climate-models-work#cmip>

After class: Tangang, F., Santisirisomboon, J., Juneng, L., Salimun, E., Chung, J., Supari, S., ... & Yang, H. (2019). Projected future changes in mean precipitation over Thailand based on multi-model regional climate simulations of CORDEX Southeast Asia. *International Journal of Climatology*, 39(14), 5413-5436. <https://doi.org/10.1016/j.envres.2020.109350>

[Open letter from the Saami Council](#), representing Saami indigenous peoples' organisations in Sweden, Norway, Finland and Russia, to the SCoPEX Advisory Committee.

Date of Class: 22 September

Course Topics: Introduction Lab: Debate Climate Resilient Development Pathways

Students will debate the pros and cons of CRDPs presented in the AR5. They will be assigned a group in advance of the debate, and prepare intro/concluding statements.

Learning Objectives:

1. Compare and contrast Climate Resilient Development Pathways.
2. Assess trade-offs between action now vs. action later.
3. Theorize the connections between climate change mitigation, adaptation, and sustainable development goals.

Required Reading:

IPCC 1.5 Degrees Report [Summary for Policy-Makers](#): All bold text, All of Section D, Figures 3B and 4.

IPCC Special Report on Climate Change and Land [Summary for Policy Makers](#): Section B focus on food systems

Assignments Due: Lab 2

Date of Class: 27 September

Course Topics: Risk Assessment: Key concepts

Lecture and discussion.

Learning Objectives:

1. Explain how hazards, vulnerability, and exposure combine to create risk.
2. Analyze major trends in the components of risk around the world.
3. Critique the components of vulnerability in different contexts.



Dr. Patricia Romero Lankao, Mexico

"The polar bear is us."
- Dr. Lankao at the
release of the AR5
report

Required Reading:

IPCC AR5 WGII [Summary for Policymakers](#): Page 3

Otto, F, Coelho C, King A, Coughlan de Perez E, Wada Y, van Oldenborgh GJ, Haarsma R, Haustein K, Uhe P, van Aalst M, Aravequia JA, Almeida W, and Cullen H. 2015. Factors Other than Climate Change, Main Drivers of 2014/15 Water Shortage in Southeast Brazil. *Bulletin of the American Meteorological Society*, no. September.

<https://doi.org/10.1175/BAMS-D-15-00120.1> .

Assignments Posted: Assignment 1

Date of Class: 29 September

Course Topics: Risk Assessment Lab: Climate discourse since 1990

Students will be given the table of contents of the first IPCC report (1990), the fourth (2007), and the sixth (2021). They will analyze the changes in focus over time in small groups.

Learning Objectives:

1. Recall what the IPCC is and why it was created the way it was.
2. Criticize the evolution of focus topics for climate impact assessment and adaptation.
3. Predict future focus of climate impact assessment and adaptation.

Required Reading:

Haunschild R, Bornmann L, Marx W (2016) Climate Change Research in View of Bibliometrics. *PLoS ONE* 11(7): e0160393.

<https://doi.org/10.1371/journal.pone.0160393>

Assignments Due: Lab 3

Date of Class: 4 October

Course Topics: Risk Assessment: Global risk trends

Lecture and discussion.

Learning Objectives:

1. Compare key risks due to climate change.
2. Explain how climate affects individual sectors.
3. Infer how climate risks were determined.



Fatima Denton, Gambia

"Risks will vary through time across regions and populations, dependent on myriad factors including the extent of adaptation and mitigation."

- IPCC AR5 WGII SPM

Required Reading:

IPCC AR5 [Summary for Policymakers](#): Section B

Vermeulen, S. J., Campbell, B. M., & Ingram, J. S. (2012). [Climate change and food systems](#). Annual review of environment and resources, 37, 195-222.

Date of Class: 6 October

Course Topics: Risk Assessment Lab: IPCC Atlas and INFORM Index

Students will select a region of interest and answer questions about climate change and vulnerability in that location using the IPCC WGI Atlas and the INFORM index.

Learning Objectives:

1. Manipulate IPCC Atlas to answer questions about climate projections and their uncertainties.
2. Assess vulnerability using a global level INFORM index.
3. Fact-check claims about climate change for a certain location, specifically related to food production.

Required Reading:

Haque, D. M. E., Mimi, A., Mazumder, R. K., & Salman, A. M. (2020). Evaluation of natural hazard risk for coastal districts of Bangladesh using the INFORM approach. *International Journal of Disaster Risk Reduction*, 48, 101569.

<https://doi.org/10.1016/j.ijdrr.2020.101569>

Assignments Due: Assignment 1 Due Friday 8 October

Assignments Due: Lab 4

Date of Class: 11 October

Course Topics: Risk Assessment: Risks to systems

Lecture and discussion.

Learning Objectives:

1. Analyze relationships between cascading and compounding climate events.
2. Examine food systems and test for the ways in which climate can cause impacts.
3. Assess pathways by which climate impacts nutrition, migration, and humanitarian work.



Dr. Gina Ziervogel, South Africa

"Adapting food systems both to enhance food security for the poor and vulnerable and to prevent future negative impacts from climate change will require attention to more than just agricultural production."

- Ziervogel et al. 2010

Required Reading:

Zscheischler, J., Martius, O., Westra, S. *et al.* A typology of compound weather and climate events. *Nat Rev Earth Environ* **1**, 333–347 (2020). <https://doi.org/10.1038/s43017-020-0060-z>

Ziervogel, G., & Ericksen, P. J. (2010). Adapting to climate change to sustain food security. *Wiley Interdisciplinary Reviews: Climate Change*, *1*(4), 525-540. <https://doi.org/10.1002/wcc.56>

Ziervogel, G., Satyal, P., Basu, R. *et al.* Vertical integration for climate change adaptation in the water sector: lessons from decentralisation in Africa and India. *Reg Environ Change* **19**, 2729–2743 (2019). <https://doi.org/10.1007/s10113-019-01571-y>

Assignments Posted: Assignment 2 posted

Date of Class: 13 October

Course Topics: Risk Assessment Lab: Methods to assess risk

Students will be presented with a series of questions about risk in a particular location, and they will co-design methodologies for how to answer each question using the tools they have been exposed to.

Learning Objectives:

1. Make use of quantitative and qualitative methods to assess risk.
2. When presented with a question about climate risk, choose methods for answering it and to judge someone else's answer of it.
3. Consider vulnerability, exposure, hazard for specific locations.

Required Reading:

Mach, K.J., Kraan, C.M., Adger, W.N. *et al.* Climate as a risk factor for armed conflict. *Nature* **571**, 193–197 (2019). <https://doi.org/10.1038/s41586-019-1300-6>

Ayanlade, A., Radeny, M. COVID-19 and food security in Sub-Saharan Africa: implications of lockdown during agricultural planting seasons. *npj Sci Food* **4**, 13 (2020). <https://doi.org/10.1038/s41538-020-00073-0>

Assignments Due: Lab 5

Date of Class: 18 October

Course Topics: Risk Assessment: Impact-based Forecasting

Lecture and discussion.

Learning Objectives:

1. Define how early warning systems can be used across sectors/issues.
2. Label the basic components of an impact-based forecasting system.
3. Recognize how the risk analysis in Impact-based Forecasting can contribute to wider adaptations such as Forecast-based Financing.

Required Reading:

The Future of Forecasts: Impact-based Forecasting for Early Action.

https://www.climatecentre.org/downloads/files/Standalone_Impact%20based%20forecasting%20guide%202020.pdf

Coughlan de Perez, E., van den Hurk, B., van Aalst, M. K., Jongman, B., Klose, T., and Suarez, P.: Forecast-based financing: an approach for catalyzing humanitarian action based on extreme weather and climate forecasts, *Nat. Hazards Earth Syst. Sci.*, 15, 895–904, <https://doi.org/10.5194/nhess-15-895-2015>, 2015.

Date of Class: 20 October

Course Topics: Risk Assessment Lab: InaSAFE

Students will model an extreme flood in Jakarta using the InaSAFE software, calculating who was estimated to be at risk.

Learning Objectives:

1. Identify who is vulnerable/exposed/potentially impacted by an extreme event.
2. Discover the role of satellite data in assessing risk.
3. Experiment with spatial analysis for flood risk assessment.



Dr. Ignatius Ryan Pranantyo, Indonesia

"Error in estimation of casualties can cause delays in the delivery of aid, the poor targeting of aid, or the insufficient provision of aid for the evacuees."

- Pranantyo et al. 2015

Required Reading:

Pranantyo, I. R., Fadmastuti, M., & Chandra, F. (2015, April). InaSAFE applications in disaster preparedness. In *AIP Conference Proceedings* (Vol. 1658, No. 1, p. 060001). AIP Publishing LLC. <https://doi.org/10.1063/1.4915053>

Assignments Due: Lab 6.

Assignment 2 due Friday 22 October

Date of Class: 25 October

Course Topics: Risk Perception: Heuristics

Lecture and discussion.

Learning Objectives:

1. Explain why people perceive risk differently.
2. Recall several heuristics that affect risk perception.
3. Theorize the implications of risk perception in terms of people's willingness to manage risk and adapt to climate change.



Dr. Tony Patt, United States

"This was not the first floodplain resettlement program to have failed."
- Patt et al. 2008

Required Reading:

Patt, A. G., & Schröter, D. (2008). Perceptions of climate risk in Mozambique: implications for the success of adaptation strategies. *Global Environmental Change*, 18(3), 458-467. <https://doi.org/10.1016/j.gloenvcha.2008.04.002>

Meyer, R. J., Baker, J., Broad, K., Czajkowski, J., & Orlove, B. (2014). The dynamics of hurricane risk perception: Real-time evidence from the 2012 Atlantic hurricane season. *Bulletin of the American Meteorological Society*, 95(9), 1389-1404. <https://doi.org/10.1175/BAMS-D-12-00218.1>

Assignments Posted: Assignment 3 Posted

Date of Class: 27 October

Course Topics: Risk Perception Lab

Students will be given a variety of questions on climate change to answer and discuss, exploring how heuristics affect our perception of risk.

Learning Objectives:

1. Experience how heuristics can impact people's perception of global and/or local risks.
2. List cognitive biases that affect risk perception.
3. Assess how risk perception affects the prioritization of adaptation actions.

Required Reading:

Risk Perception and Decision-Making. <https://www.ncbi.nlm.nih.gov/books/NBK233844/>

Lee, T., Markowitz, E., Howe, P. *et al.* Predictors of public climate change awareness and risk perception around the world. *Nature Clim Change* 5, 1014–1020 (2015). <https://doi.org/10.1038/nclimate2728>

Assignments Due: Lab 7

Date of Class: 1 November

Course Topics: Risk Communication: Strategies

Lecture and discussion.

Learning Objectives:

1. Discuss how communication strategies should differ based on risk perception.
2. Recall a variety of conventional and unconventional strategies used to communicate climate information.
3. Assess communication plans based on their message, method, and target group.

Required Reading:

[How the people of Bangladesh live with climate change and what communication can do](#)

Date of Class: 3 November

Course Topics: Communication Lab: Paying for Predictions Game

Students will play the Paying for Predictions game of the Red Cross Red Crescent Climate Centre.

Learning Objectives:

1. Assess experiential techniques to communicate risk or adaptation strategies
2. Visualize how games can be used as a tool to communicate climate information.
3. Critique the use of early warning systems in risk management.



Dr. Jason Wu, United States

"Imagine you have the ability to travel through time and hear voicemail recordings from 100 years into the future."

- Wu et al. 2015

Required Reading:

Wu, J., Lee, J. Climate change games as tools for education and engagement. *Nature Clim Change* **5**, 413–418 (2015). <https://doi.org/10.1038/nclimate2566>

Moser, S. C. (2014). Communicating adaptation to climate change: the art and science of public engagement when climate change comes home. *Wiley Interdisciplinary Reviews: Climate Change*, *5*(3), 337-358. <https://doi.org/10.1002/wcc.276>

Assignments Due: Lab 8

Assignment 3 Due Friday November 5

Date of Class: 8 November

Lecture and discussion.

Course Topics: Risk Management: Adaptation concepts

Learning Objectives:

1. Recall a list of adaptation options by sector and risk.
2. Theorize barriers to equitable and just adaptation.
3. Summarize global progress on adaptation.



Dr. Benjamin Preston, United States

"We find that the heuristic reasoning employed in adaptation research and practice often fails to reflect the nuances associated with the practical pursuit of adaptation."

- Preston et al. 2015

Required Reading:

Preston, B.L., Mustelin, J. & Maloney, M.C. Climate adaptation heuristics and the science/policy divide. *Mitig Adapt Strateg Glob Change* **20**, 467–497 (2015). <https://doi.org/10.1007/s11027-013-9503-x>

Shackleton, S., Ziervogel, G., Sallu, S., Gill, T., & Tschakert, P. (2015). Why is socially-just climate change adaptation in sub-Saharan Africa so challenging? A review of barriers identified from empirical cases. *Wiley Interdisciplinary Reviews: Climate Change*, *6*(3), 321-344. <https://doi.org/10.1002/wcc.335>

[Climate Change Adaptation Plan for Akwesasne](#), Mohawk Nation Territory.

Assignments Posted: Final project assigned

Date of Class: 10 November

Course Topics: Risk Management Lab: COP26

Exercise TBD – will be selected based on the progress of COP26.

Learning Objectives:

1. Explain to what extent the Paris Agreement and NDCs contain adaptation goals.
2. Follow the progress of the ongoing COP26.
3. Critique preliminary outcomes and discuss expectations for COP27.

Required Reading:

Jacquet, J., Jamieson, D. Soft but significant power in the Paris Agreement. *Nature Clim Change* **6**, 643–646 (2016). <https://doi.org/10.1038/nclimate3006>

Fanzo, J., Davis, C., McLaren, R., & Choufani, J. (2018). The effect of climate change across food systems: Implications for nutrition outcomes. *Global food security*, *18*, 12-19. <https://doi.org/10.1016/j.gfs.2018.06.001>

Assignments Due: Lab 9

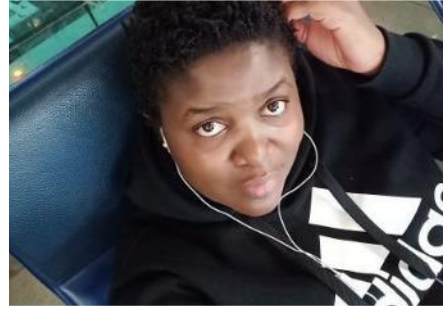
Date of Class: 15 November

Course Topics: Risk Management: Global Adaptation and Finance

Lecture and discussion.

Learning Objectives:

1. List major funds and institutions that invest in adaptation.
2. Critique where adaptation finance is going and what it pays for.
3. Discover gaps in adaptation around the world and humanitarian implications.



Asha Sitati, Kenya

"People affected by conflict are unusually vulnerable to climate shocks and climate change, yet little is known about climate change adaptation in fragile contexts."

- Sitati et al. 2021

Required Reading:

Sitati et al. Forthcoming.

Khan, M., Robinson, Sa., Weikmans, R. *et al.* Twenty-five years of adaptation finance through a climate justice lens. *Climatic Change* **161**, 251–269 (2020). <https://doi.org/10.1007/s10584-019-02563-x>

Date of Class: 17 November

Course Topics: Risk Management Lab: Peer review

Students will be given an article to read that was recently submitted for publication in a journal with open peer review (e.g. NHESS). They will critique the article in small groups and identify several review comments. These will then be collated and submitted to the journal as part of the open review process.

Learning Objectives:

1. Critique an analysis of risk and adaptation for a specific location.
2. Experiment with writing peer review comments for an academic publication.
3. Justify criticisms of work on risk assessment or adaptation solutions.

Required Reading:

Students will be given an article to read that was recently submitted for publication in a journal with open peer review (e.g. NHESS). It must be read before class.

Assignments Due: Lab 10, *Group project check-in*

Date of Class: 22 November

Course Topics: Risk Management: National Adaptation Planning

Lecture and discussion.

Learning Objectives:

1. List the components of the NAP process.
2. Evaluate different ways that countries have invested in adaptation at the national level.
3. Assess achievements of different national adaptation plans.



Livia Bizikova, Canada

"Priorities listed in the national documents but not captured in current initiatives include human health, pastoralism, security and migration."

- Bizikova et al. 2015

Required Reading:

Wahid S.M., Mukherji A., Shrestha A. (2016) Climate Change Adaptation, Water Infrastructure Development, and Responsive Governance in the Himalayas: The Case Study of Nepal's Koshi River Basin. In: Tortajada C. (eds) Increasing Resilience to Climate Variability and Change. Water Resources Development and Management. Springer, Singapore. https://doi.org/10.1007/978-981-10-1914-2_4

Bizikova, L., Parry, J. E., Karami, J., & Echeverria, D. (2015). Review of key initiatives and approaches to adaptation planning at the national level in semi-arid areas. *Regional Environmental Change*, 15(5), 837-850. <https://doi.org/10.1007/s10113-014-0710-0>

Assignments due: *Group project check-in*

Date of Class: 29 November

Course Topics: Risk Management: Local and urban adaptation

Lecture and discussion.

Learning Objectives:

1. Critique priorities for adaptation in urban areas.
2. Discover adaptation initiatives that have been run by local governance structures.
3. Theorize special considerations for rapidly urbanizing regions.



Harini Nagendra, India

"The need to confront pressing problems combined with lack of financial capacity can spur progressively minded city leaders to look for radically disruptive but affordable solutions."
- Nagendra et al. 2018

Required Reading:

Nagendra, H., Bai, X., Brondizio, E.S. *et al.* The urban south and the predicament of global sustainability. *Nat Sustain* **1**, 341–349 (2018). <https://doi.org/10.1038/s41893-018-0101-5>

Umar, M.A., Saeed, F., Salik, K.M. *et al.* Exposure, Impacts, and Responses to Heat Stress: A Comparison Between Rural and Peri-urban Poor Population. *Earth Syst Environ* **2**, 633–642 (2018). <https://doi.org/10.1007/s41748-018-0070-x>

Date of Class: 1 December

Course Topics: Risk Management Lab: Equity and Justice

Students will watch [The Danger of a Single Story](#) and we will discuss implications for climate risk assessment and climate change adaptation planning/implementation/evaluation.

Learning Objectives:

1. Recognize groups that have been marginalized in adaptation and risk management work around the world.
2. Identify examples of adaptations that have supported marginalized groups.
3. Critique plausible pathways by which marginalized groups could be affected by adaptations.

Required Reading:

Christine Jost, Florence Kyazze, Jesse Naab, Sharmind Neelormi, James Kinyangi, Robert Zougmore, Pramod Aggarwal, Gopal Bhatta, Moushumi Chaudhury, Marja-Liisa Tapio-Bistrom, Sibyl Nelson & Patti Kristjanson (2016) Understanding gender dimensions of agriculture and climate change in smallholder farming communities, *Climate and Development*, 8:2, 133-144, DOI: [10.1080/17565529.2015.1050978](https://doi.org/10.1080/17565529.2015.1050978)

Tubridy, D. (2020). Green climate change adaptation and the politics of designing ecological infrastructures. *Geoforum*, **113**, 133-145. <https://doi.org/10.1016/j.geoforum.2020.04.020>

Assignments Due: Lab 11

Date of Class: 6 December

Course Topics: Risk Management: Monitoring and Evaluation

Lecture and discussion.

Learning Objectives:

1. Explain the concept of “maladaptation”.
2. List the unique difficulties in M&E for climate change adaptation due to complexity and timescales.
3. Recall tools available for M&E and where to find them.



Dennis Bours, United States

"One of the most central questions is what climate change adaptation is seeking to achieve."

- Bours et al. 2014

Required Reading:

Pages 78-81 of: Bours, D., McGinn, C., & Pringle, P. (2014). [Monitoring & evaluation for climate change adaptation and resilience: A synthesis of tools, frameworks and approaches](#). *SEA Change Community of Practice, and UK Climate Impacts Programme*.

Date of Class: 8 December

Course Topics: Final Presentations

Date of Class: 13 December

Course Topics: Final Presentations

This schedule is subject to modification at the instructor's discretion.