

CLIMATOPIA

A Children's Game for Teaching Climate Disaster Resilience

2021 Carolinas Climate Resilience Conference
Durham, NC

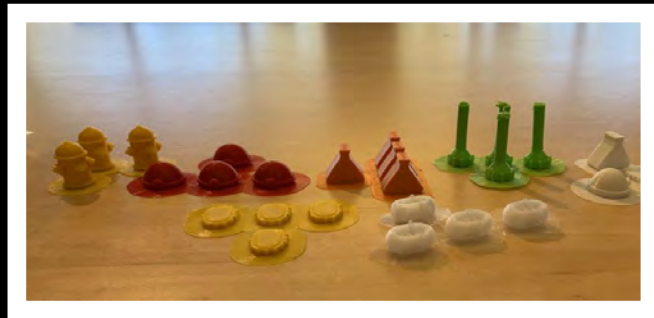
Session 6D, Wed. May 12, 2021, 8:30 – 9.30 am

University of North Carolina, Chapel Hill

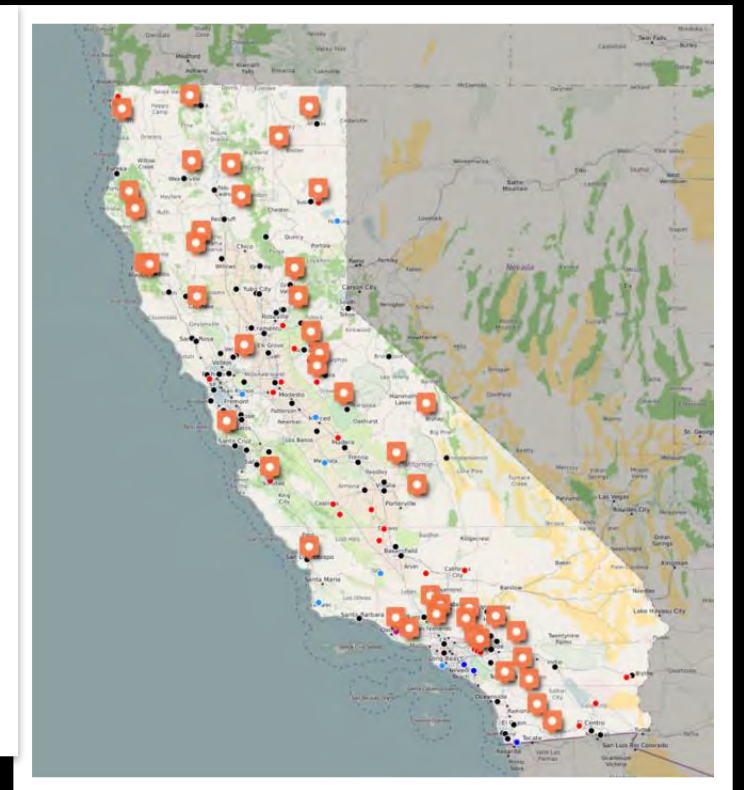
- Dr. Rachel Willis, Professor of American Studies & Economics
- Sydney Thomas, Biology and Environmental Health, UNC 2021
 - Alex Pistiolis, Biology and Chemistry, UNC 2021
- Karla Cordova Araujo, Biology, Buckley Public Service Scholar, UNC 2023



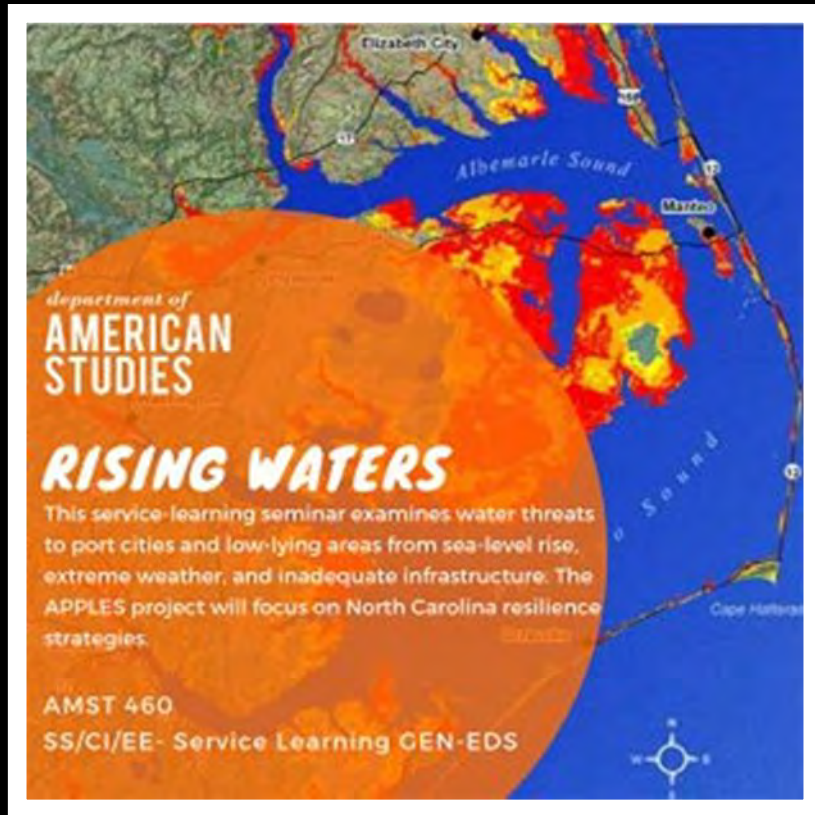
Communicating Climate Change to Children



FIND ENGAGING WAYS TO TEACH ABOUT CLIMATE CHANGE WATER CHALLENGES

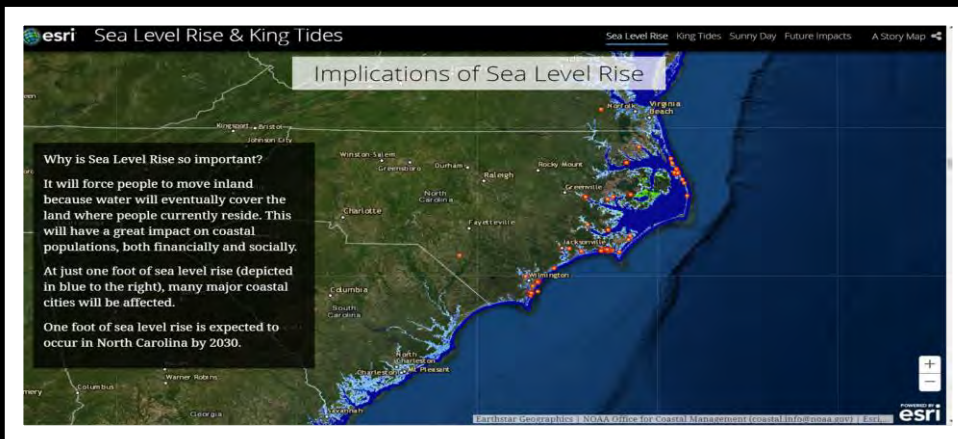
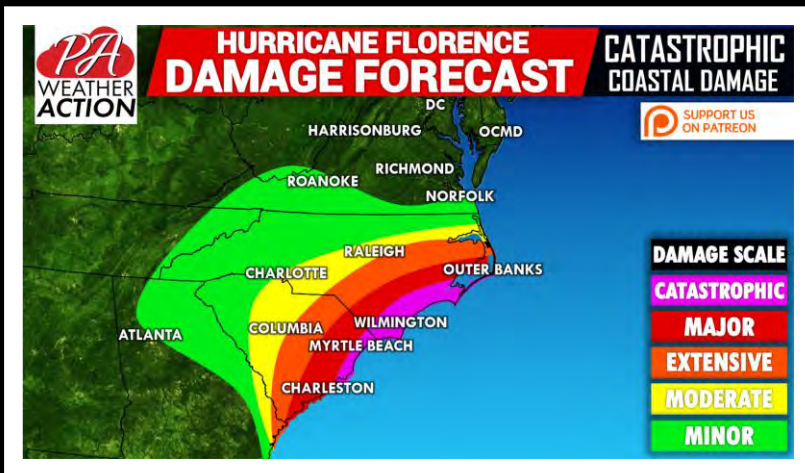


UNC – RISING WATERS SPRING 2017 - SEMINAR VISITS NC COAST



Fall 2018 Rising Waters

Partnered with UNC's King Tide Project and Dr. Christine Voss to develop ArcGIS Sites



HOW WILL RISING WATERS AFFECT YOU?

AMST 460: Rising Water by Dr. Willis Maurea Kitchens, Sydney Thomas, Hannah Williams, & Sarah Zepher
Celebration of Undergraduate Research #82

HOG WASTE LAGOONS
There are over 3,800 active hog lagoons in North Carolina, some of which are on the coast or near a body of water. With rising waters, many of these vulnerable lagoons have the potential to overflow. As storms increase in frequency and strength, this problem will only grow for North Carolina farmers.

PORTS
Without adjusting for sea level rise, seaborne trading will be disrupted and will negatively impact the national and coastal economies. The personal and economic implications of sea level rise involve unreliable evacuation routes, normal travel pattern disruptions, and scarcity of goods and commodities brought by sea.

NATIONAL PARKS
The NPS notoriously has a lack of funding. Completing extreme projects will require greater funding, which might be generated through increased taxes. We can move buildings, but can we move trees? Can we move the Everglades in South Florida to not be at the mercy of the sea and still maintain an ecosystem that may flourish? The answer, sadly, is no.

EDUCATION
With rising seas and chronic inundation, many schools are vulnerable to the effects of climate change. Chronic inundation along with severe weather events could destroy or seriously damage many schools in North Carolina. Education is important to North Carolinians, and sea level rise affects not only students within schools, but also the communities built around them. Students, teachers, faculty, and others who live in the area are at risk of losing their homes and jobs if schools continue to exist within vulnerable areas with no resilience strategies in place.

WASTEWATER TREATMENT
These are sites that hold wastewater treatment permits. Access to safe drinking water is considered a basic human right in the United States. An abundance of clean water is provided to the population of the United States through wastewater treatment plants. Completing day-to-day tasks will become more challenging when the clean water supply is limited due to a large storm or precipitation event.

VULNERABLE HOSPITALS
Each symbol represents a coastal hospital. If the previously mentioned hog waste lagoons and wastewater treatment facilities fail then North Carolina will face a massive public health crisis. In the midst of that crisis, functioning healthcare facilities will be vital.

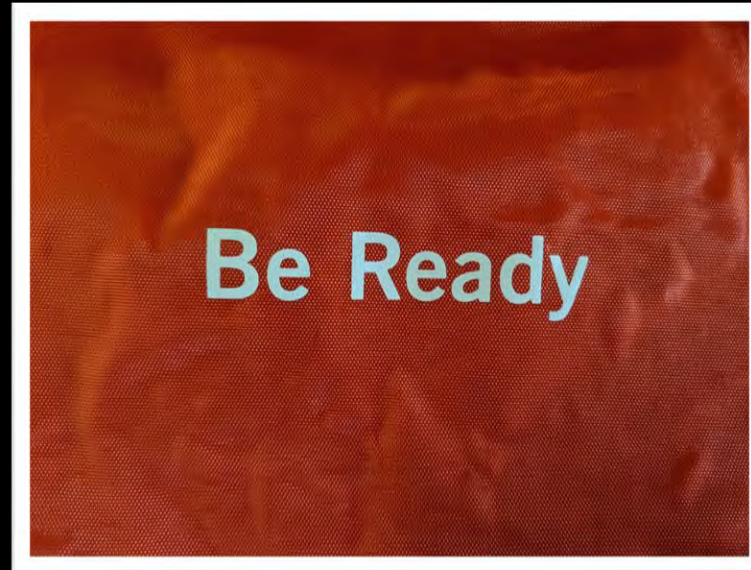
AIRPORTS
Each symbol indicates the location of an airport and its color denotes the type of facility. If an airport's runway is flooded, you will be unable to depart or land. Coastal airports are in danger of more frequent flooding and storm surges, which can interfere with flights and damage the airport's infrastructure.



Fall 2019 Rising Waters – Hurricane Dorian & Early Game Development



Next step: Develop a RESILIENT engaging fabric “game-to-go” with updated RESOURCES!

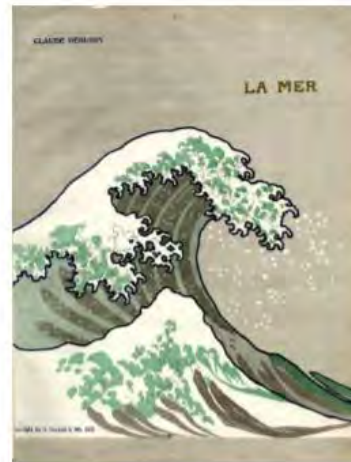


Spring 2020

Grad Seminar Communicating Climate Science

Communicating Water Challenges of Climate Change with the Visual and Performing Arts

American Studies 641, Spring 2020
Professor Rachel Willis
The University of North Carolina at Chapel Hill



Cover of 1905 edition of Claude Debussy's score of *La Mer*, based on Hokusai's *Wave*

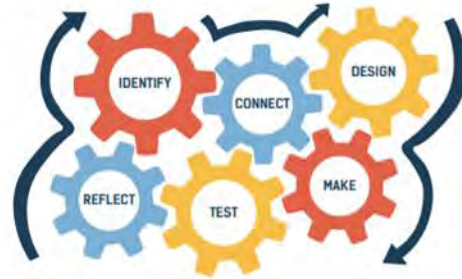
COURSE DESCRIPTION:

Climate change means water challenges that threaten people, property and the existence of nation states. Severe precipitation events from warmer air holding more water, sea-level rise, and more intense hurricanes, mean flooding, water quality, and foodshed issues for more than half the world's population. Drought, resulting wildfires, and the availability of life-sustaining water is a problem for others. Virtually everyone will be impacted by the massive global migration that will result from rising waters as a refugee, or as a member of a community that receives refugees, or perhaps both. The visual and performing arts are used to explore more effective ways to communicate this growing crisis.



Spring 2020 & developing BeAM Course Grant to use design process to make the game in a resilient format.

MAKERSPACE COURSE PROJECTS: The Design Process



All makerspace faculty structure their course projects around some type of design and making process. Here at BeAM, we like to use the one to the left - it reflects the iterative nature of design and making, allowing you to bounce back and forth through different phases depending on what your project goals are. Below, you'll find a description of each phase and a few example assignments that correspond to each phase.

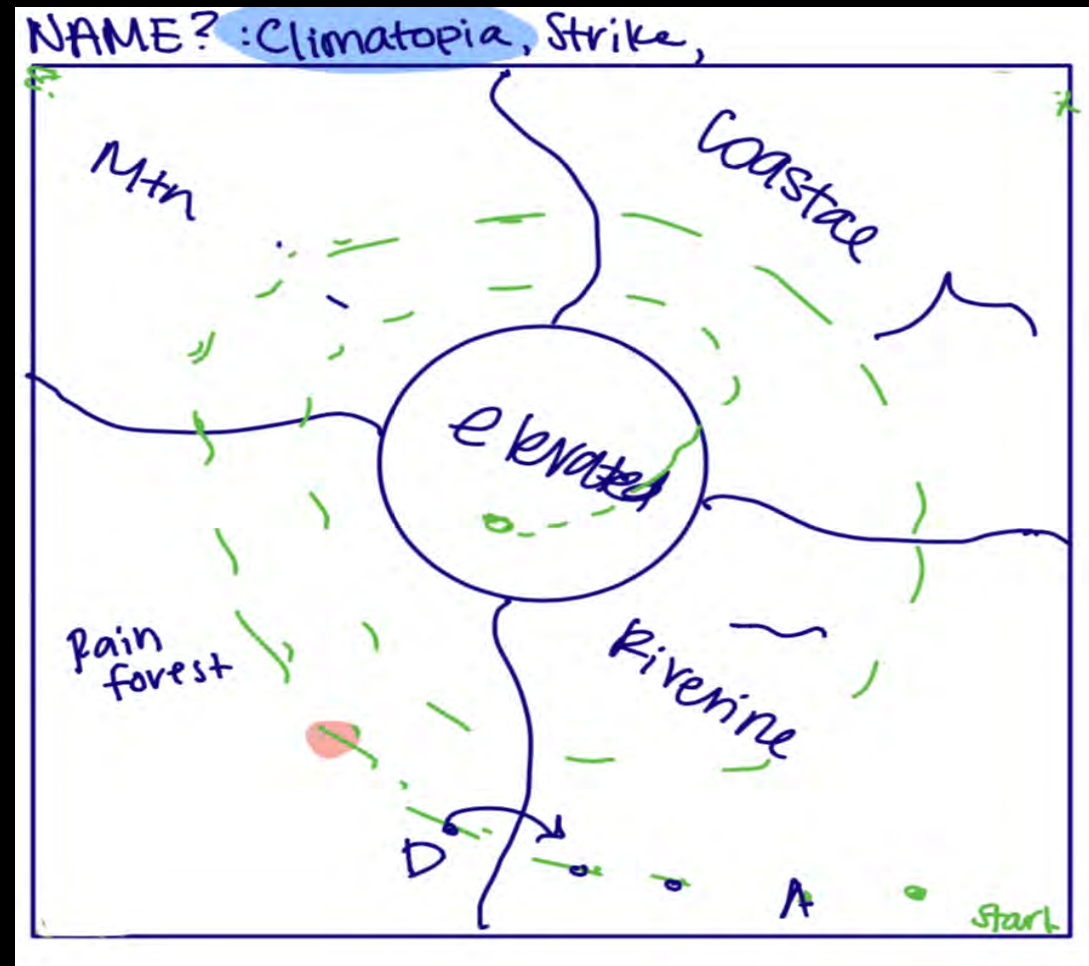
| IDENTIFY | CONNECT | DESIGN | MAKE | TEST | REFLECT |
|--|--|---|---|--|--|
| Students build foundational skills/knowledge to inform their project. | Students connect their foundational knowledge to how it informs their design. | Students turn their ideas into designs for review and fabrication. | Students make a physical version of their final project. | Students get feedback on their project's look and function. | Students reflect on their work and their design process. |
| This could include: | This could include: | This could include: | This could include: | This could include: | This could include: |
| <ul style="list-style-type: none"> • Reading articles • Watching films • BeAM tool trainings • Practicing with design software | <ul style="list-style-type: none"> • Forming a research question • Identifying a theme to investigate • Brainstorming ideas for projects • Creating lists of project needs or specifications | <ul style="list-style-type: none"> • Submitting design sketches for peer feedback or instructor review • Writing design docs that connect design to fabrication (e.g. materials to use, etc.) | <ul style="list-style-type: none"> • Making low-fi prototypes out of everyday materials (cardboard, etc.) • Making higher resolution prototypes using tools (e.g. Laser Cutter, 3D Printer, etc.) | <ul style="list-style-type: none"> • Having small-group design critiques • Students using rubrics to assess draft work • Develop tests and collect data on prototypes through experimentation | <ul style="list-style-type: none"> • Doing a gallery walk or "science fair" • Presenting either in class or through online videos • Writing reflection papers that explain design choices and connections to course content |



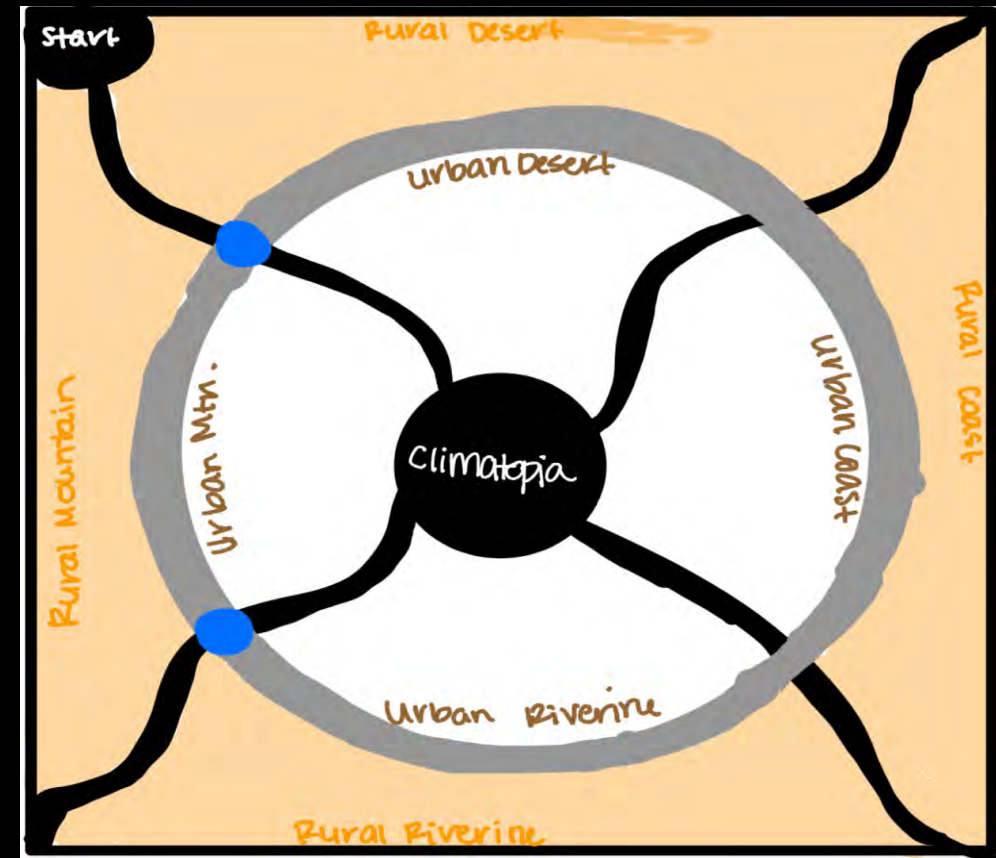
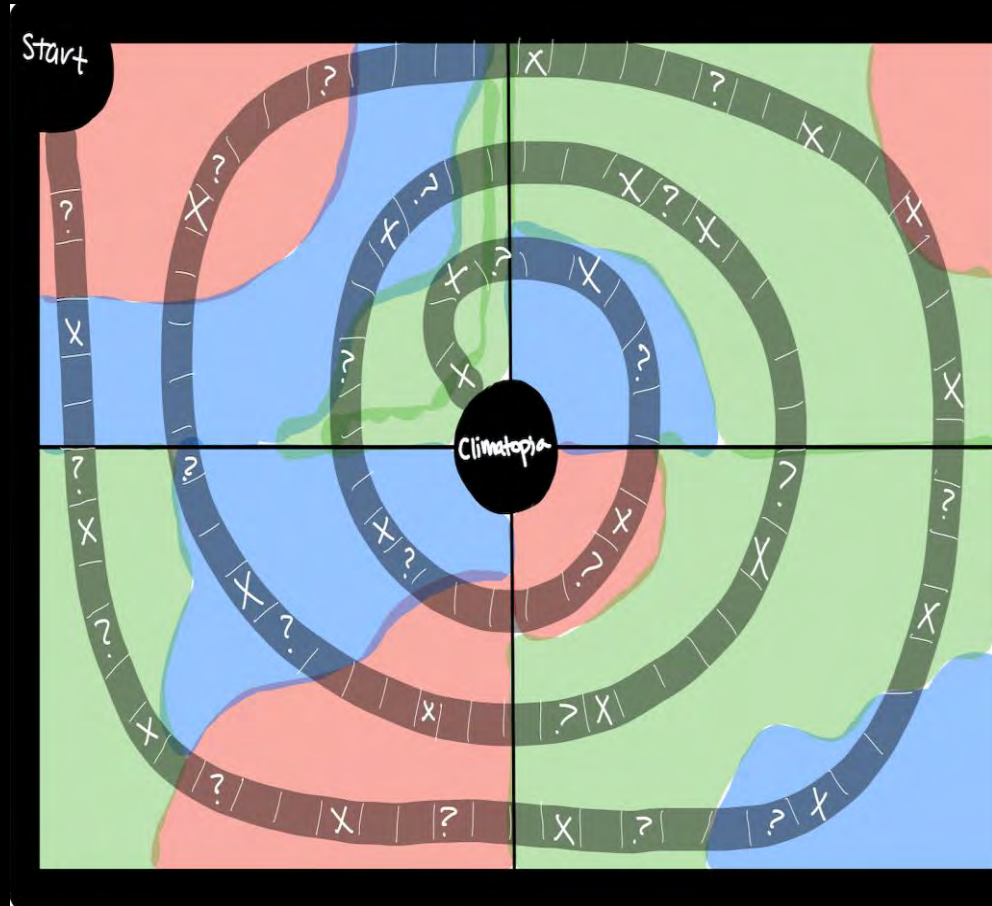


Sydney Thomas

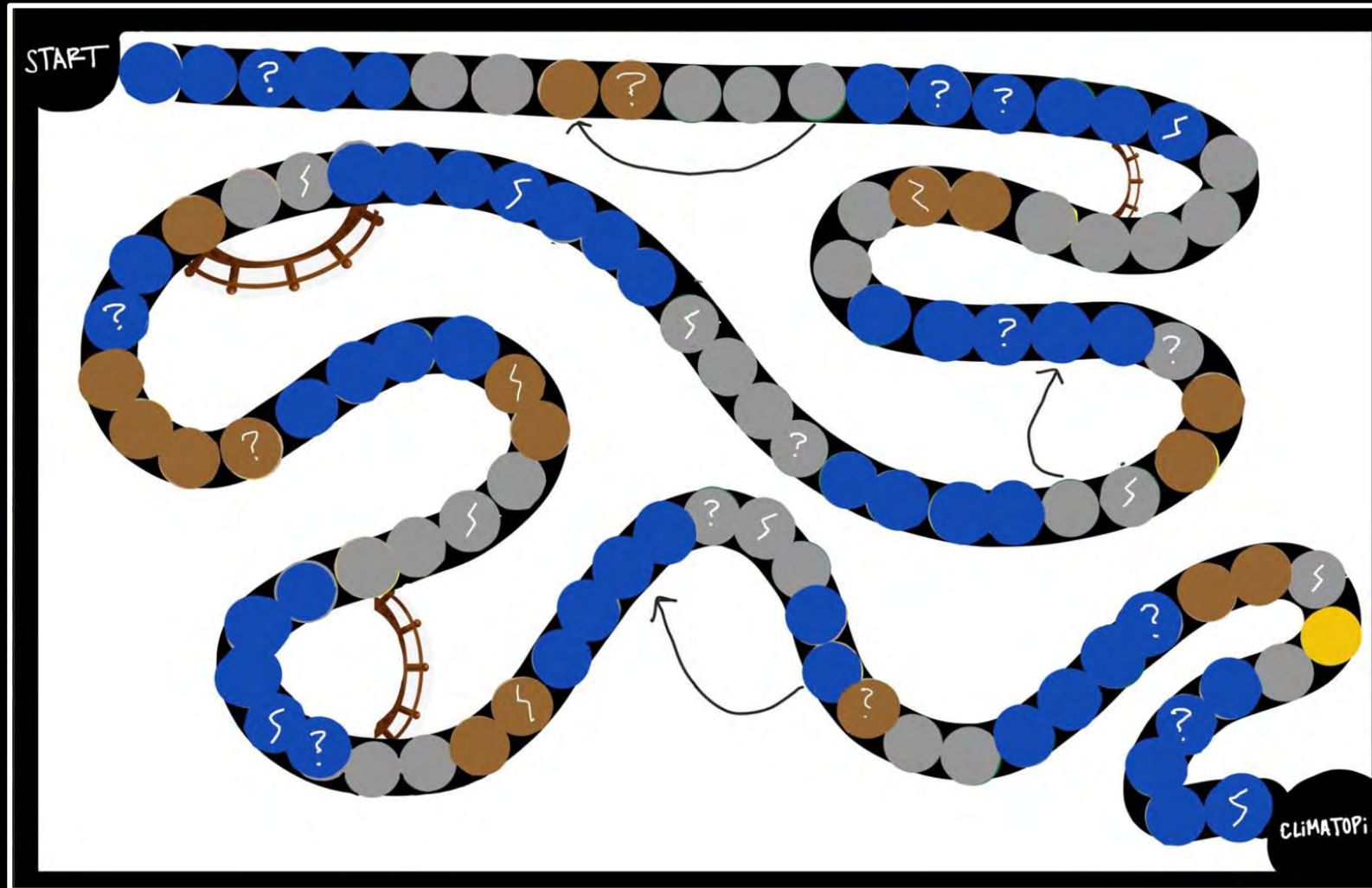
Climatopia: The Early Stages



Spring 2020 Evolution of Game



2020 Final Game Prototype




Climatopia: Fun for all, 8-88!




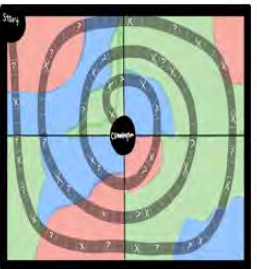
Summer 2020 BeAM Development of Project

Design Ideas for Rising Waters Board Game



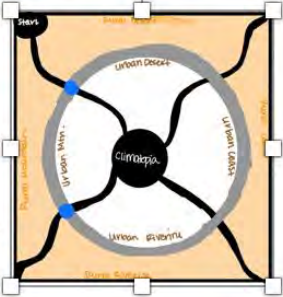
NAME? Climatoopia, Strike







FLOOD INSURANCE

The National Flood Insurance Program (NFIP), managed by the Federal Emergency Management Agency (FEMA), enables homeowners, business owners and renters in participating communities to purchase federally backed flood insurance. It is available community-wide, with premiums that vary according to the level of risk. If you chose to purchase flood insurance, move back 3 spaces.






CLIMATOPIA
Building Resilient Communities



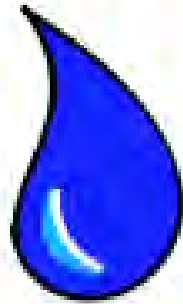
- • • Resource
- • • Event Card
- disasters → lose resources or go back spaces
- policies



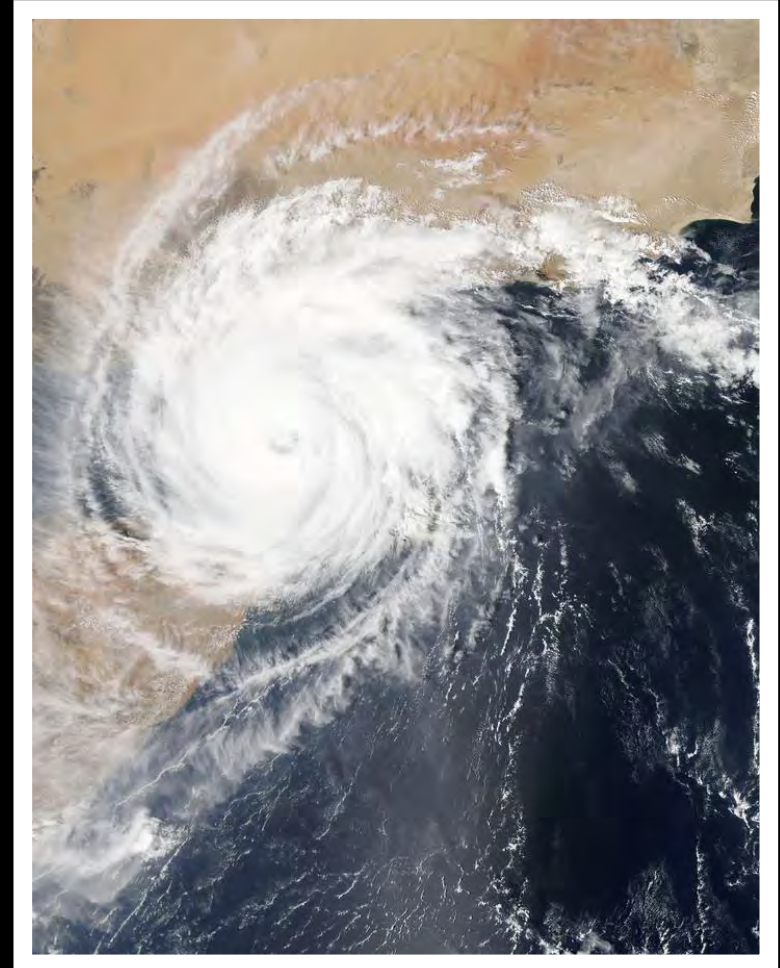
Game Boards produced by Sydney L. Thomas (UNC 2021)
for AMST 641: Communicating Water Challenges of Climate Change
with Professor Rachel Willis



Summer 2020 – Deciding on Disasters



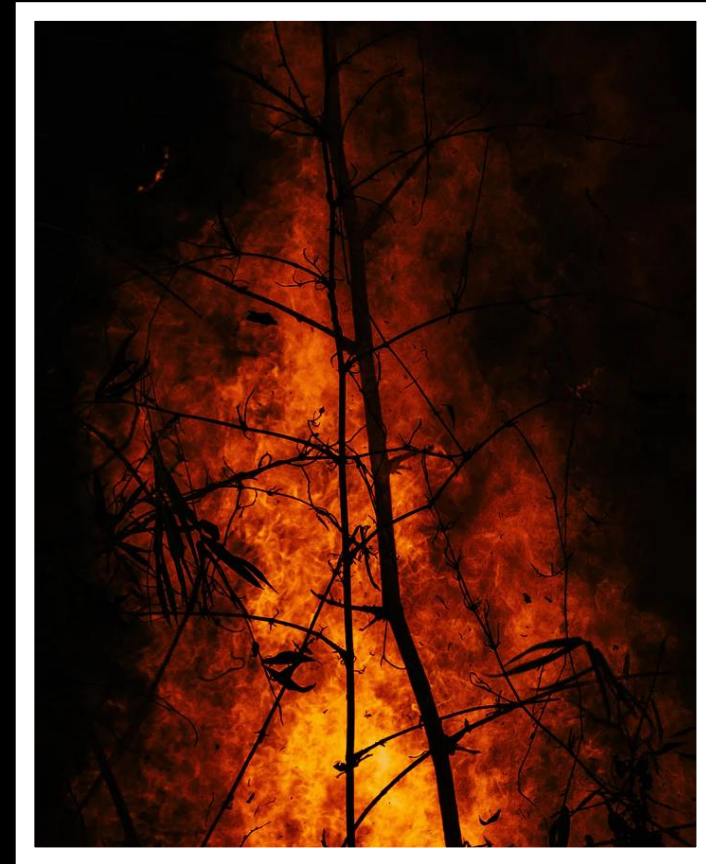
Hurricanes



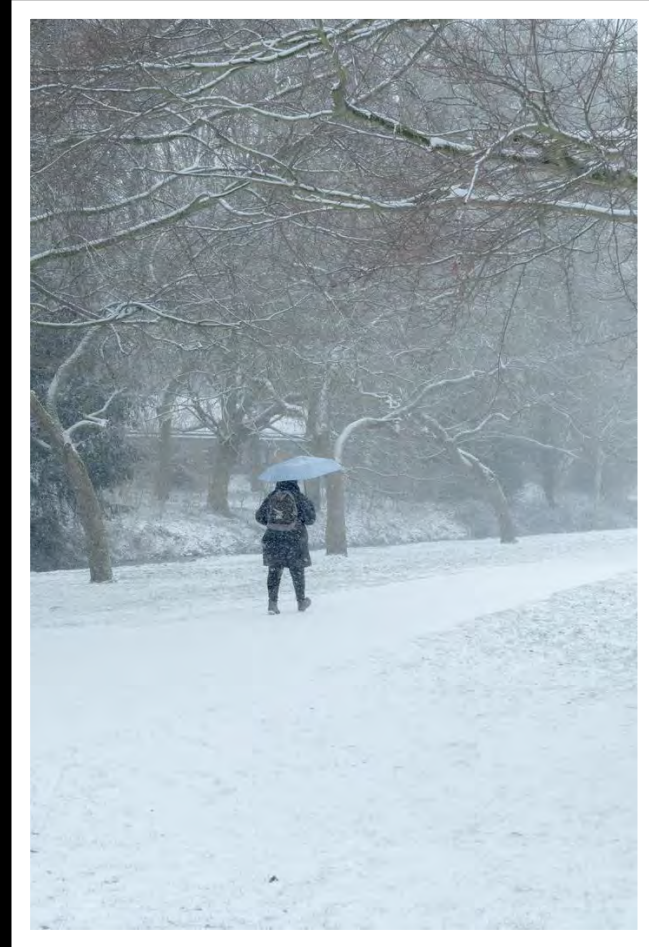
Floods



Droughts/Wildfires



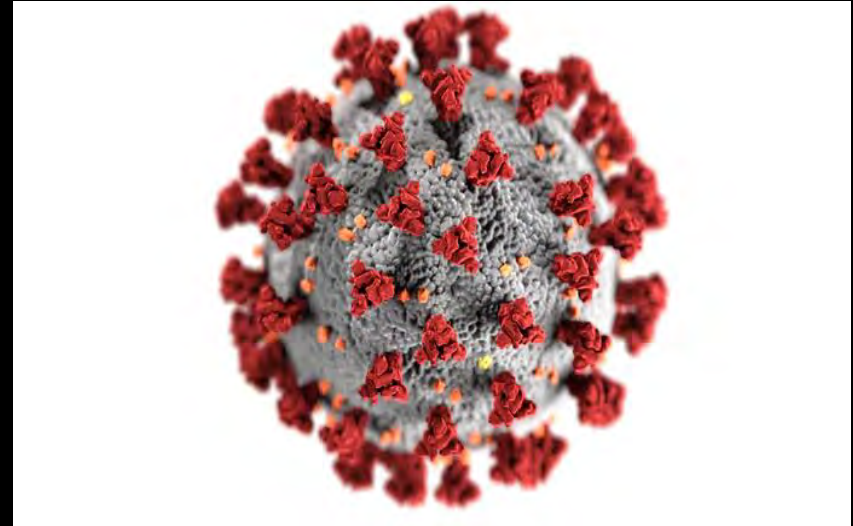
Snowstorms



Extreme Heat



Disease



Goal for Makerspace in Course: Design and make CLIMATOPIA & resources in water resilient format

Makerspace Course List

Click on a course number below to read more about how UNC course instructors are incorporating design, making, and the makerspaces into their curricula.

AMST 460: Rising Waters: Strategies for Resilience to the Challenges of Climate and the Built Environment



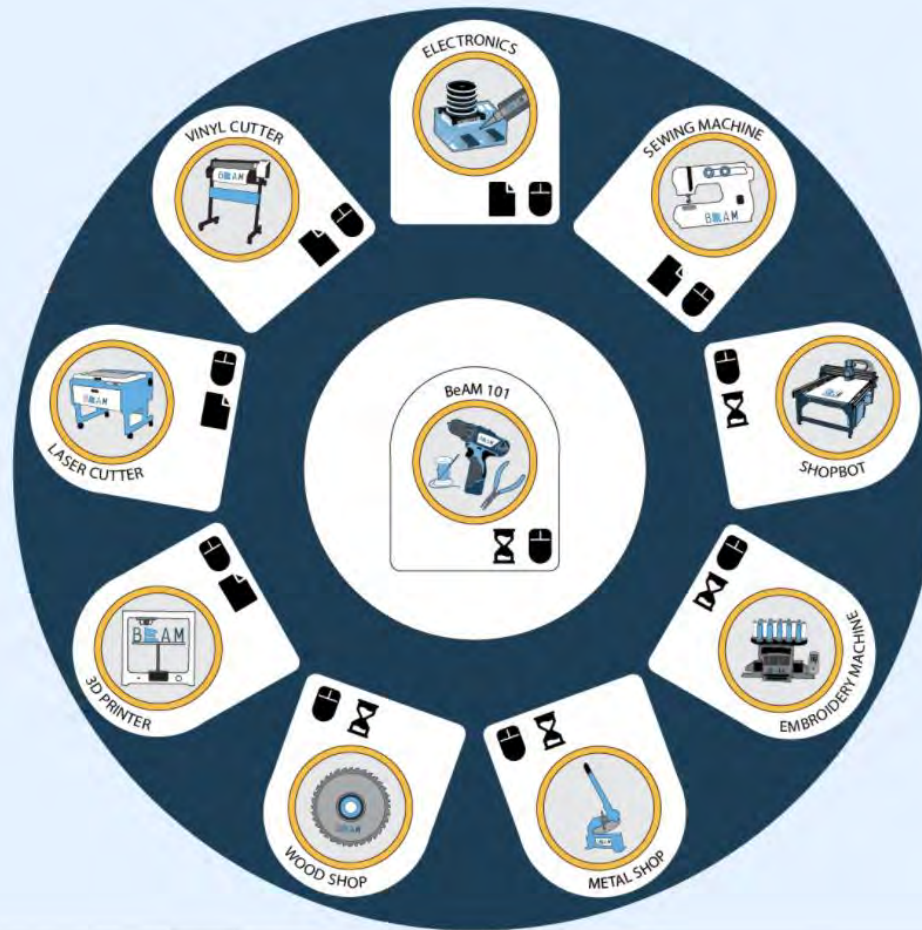
Faculty: Rachel Willis, American Studies

Rising Waters, AMST 460, is an APPLES service-learning seminar focusing on water threats from climate change to port cities, low-lying coastal areas, and land along rivers. Sea-level rise, extreme weather, and inadequate infrastructure all contribute. Students in AMST 460 collaborate on board games, including Climatopia, in which the goal is to build more resilient communities.

Pictured: An early visual prototype of the game board for Climatopia.



Fall BeAM Preparation



Requires
online training



Requires
practice project



Requires onsite
BeAM workshop

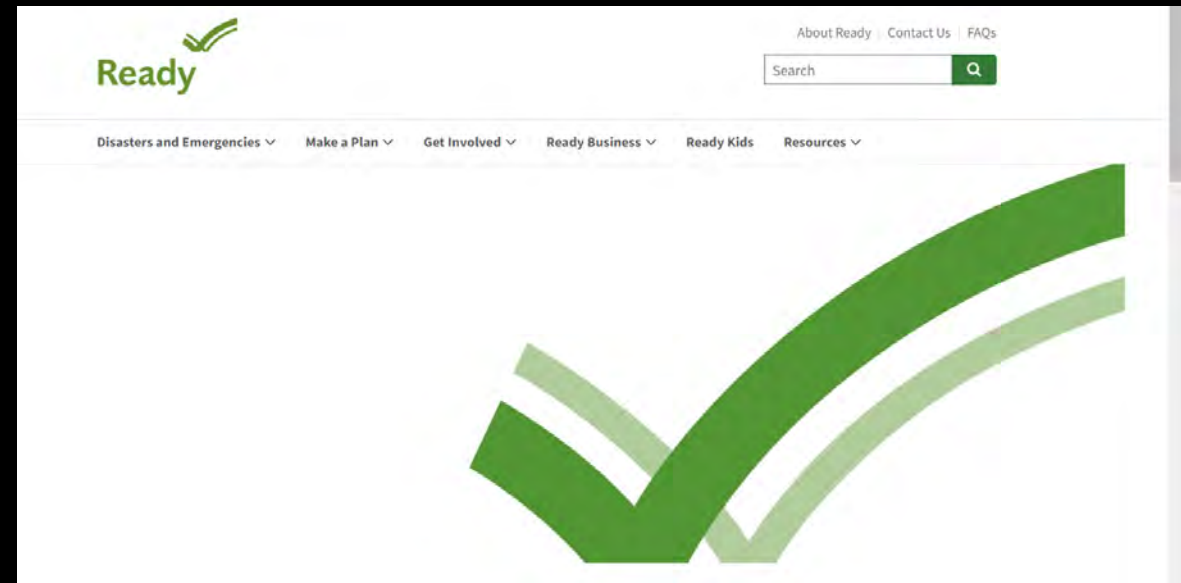
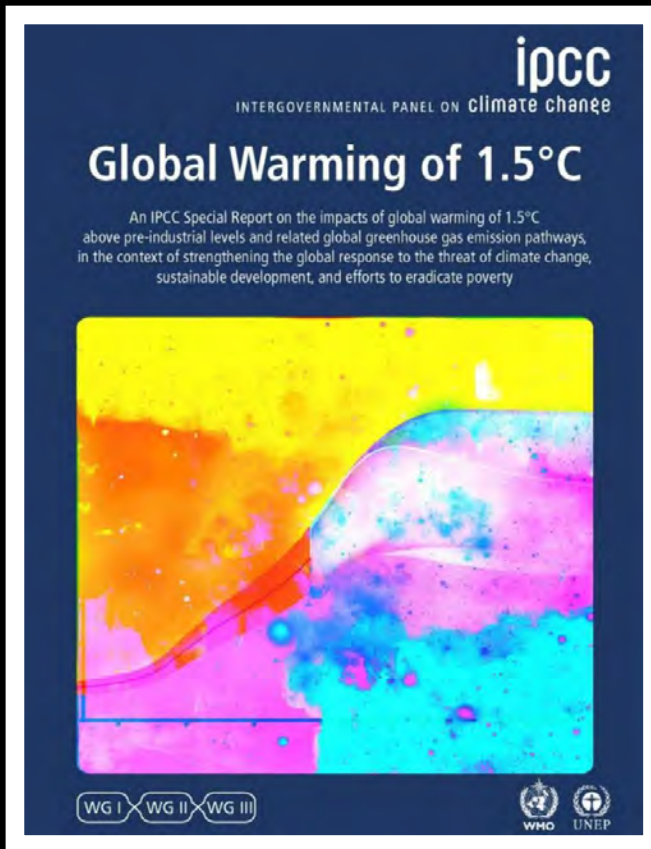




Alex Pistiolis

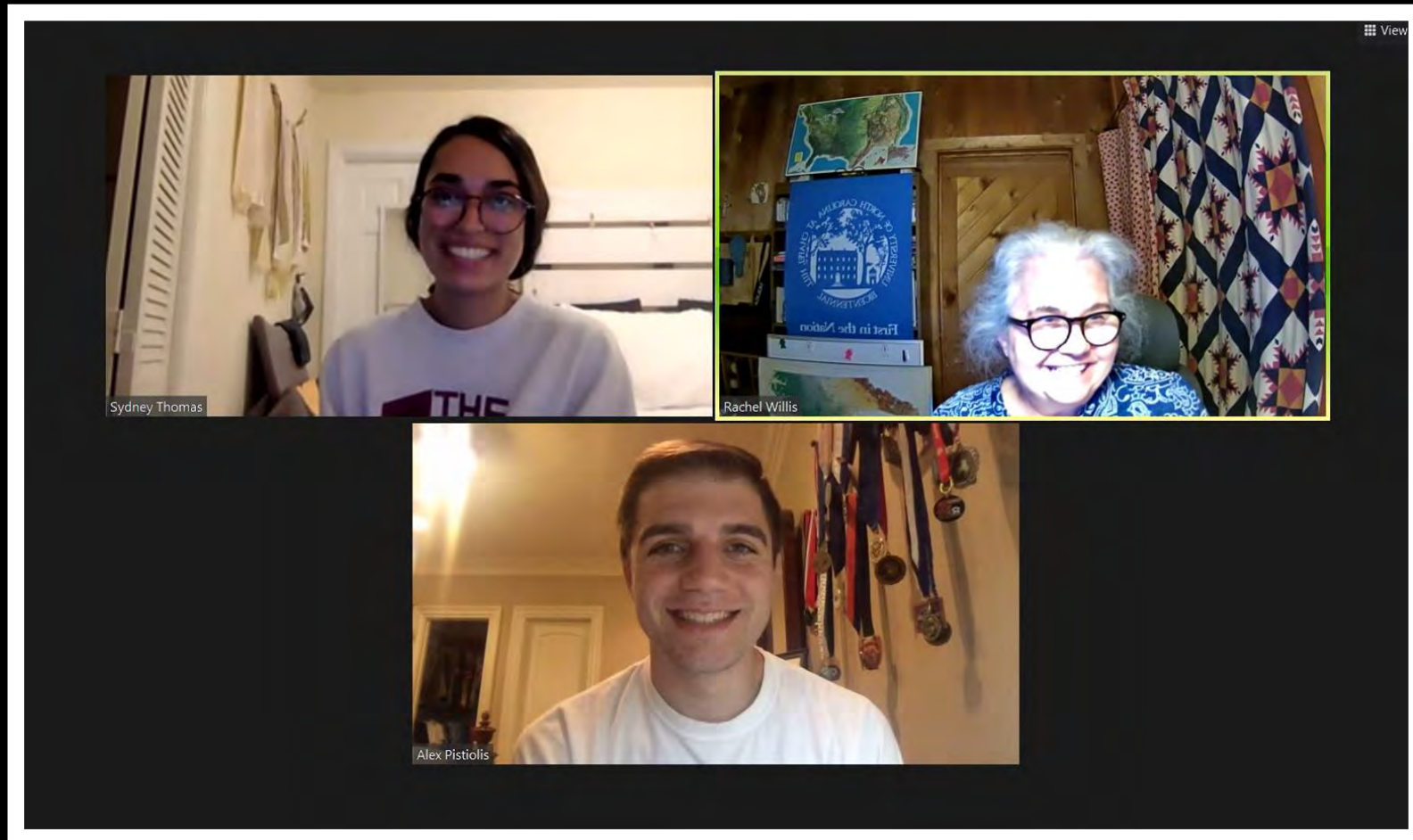
Fall 2020 Rising Waters Course Focus and Structure

- Examining water threats and resilience strategies



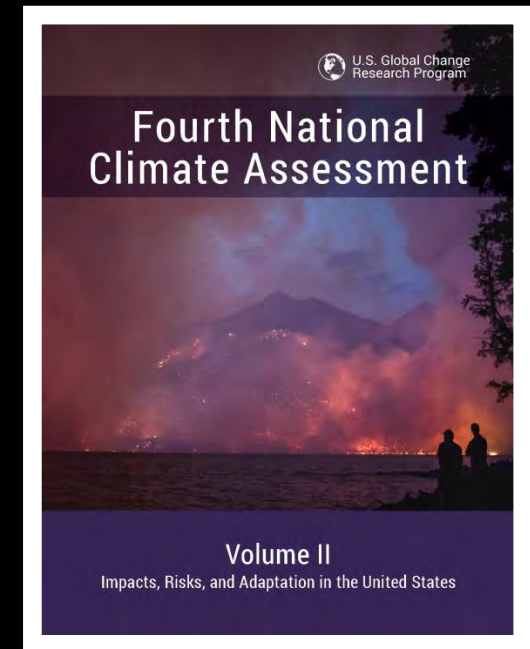
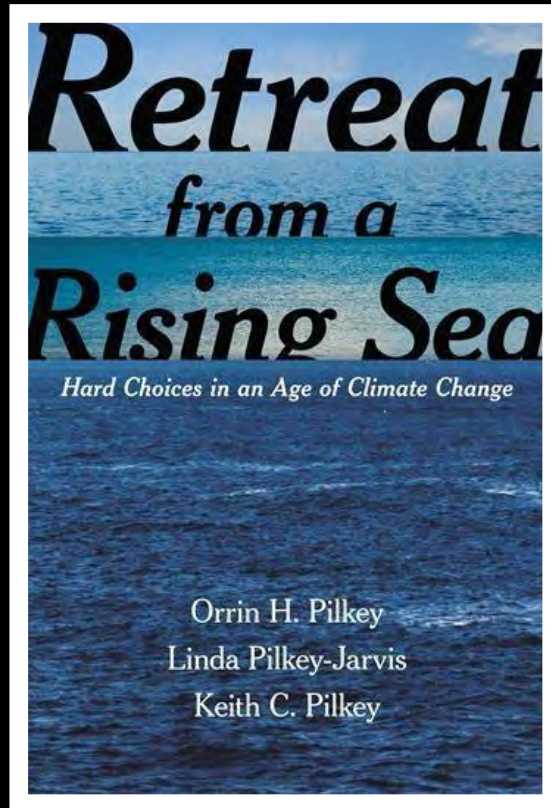
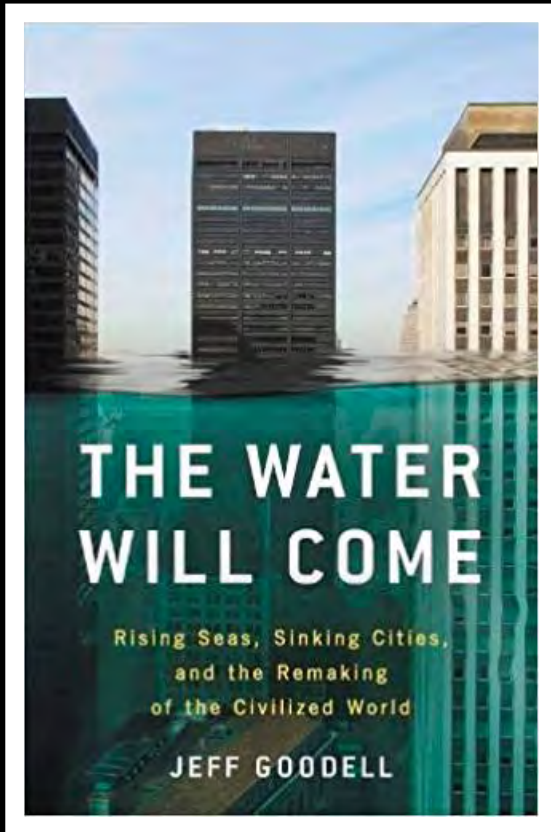
Fall 2020 Teaching Team Collaboration

- Weekly meetings planning for Climatopia development



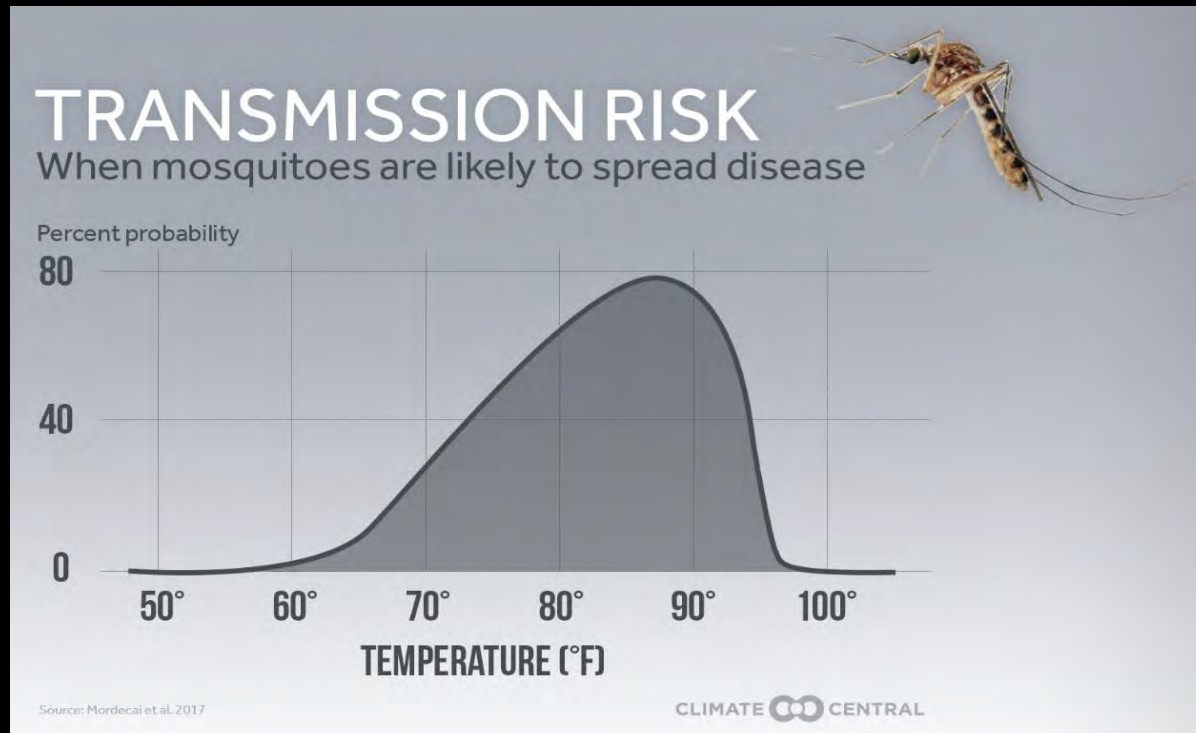
Readings for Rising Waters

- Books, IPCC and National Reports



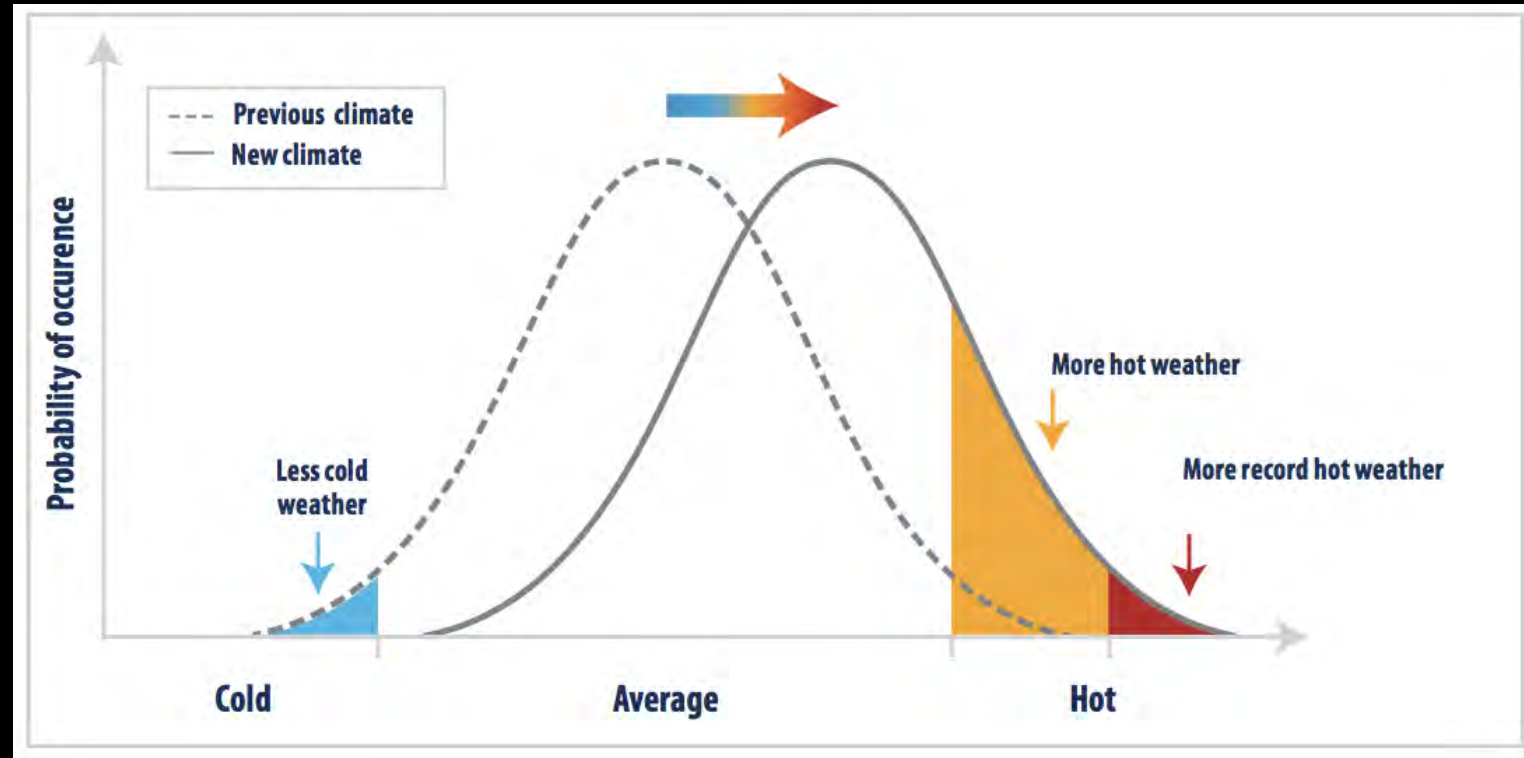
Climate Change and Diseases

- Increased range of vectors (IE: Mosquitos)



Climate Change and Extreme Heat

- Warmer days are becoming the new norm



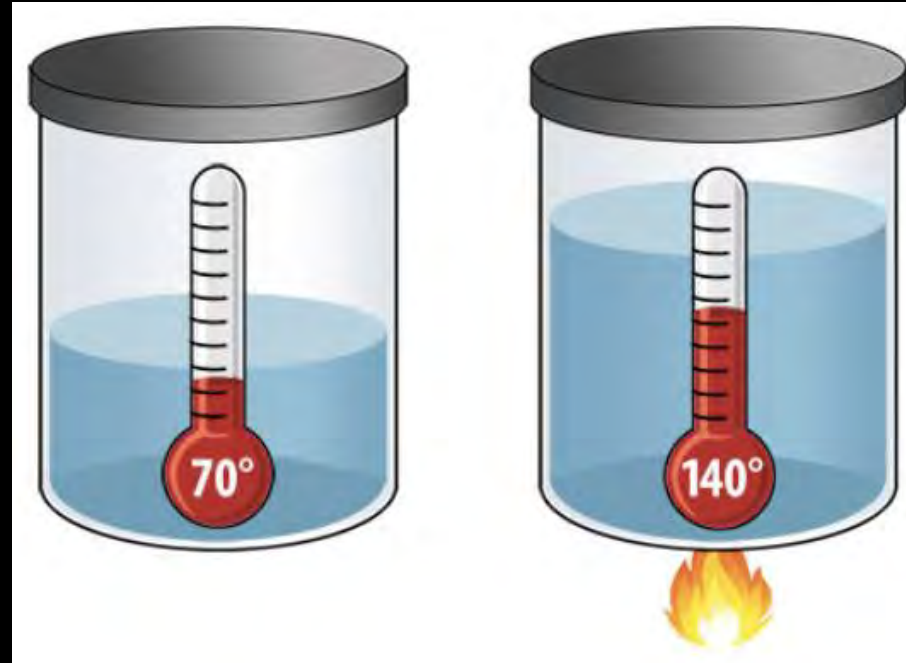
Climate Change and Flooding

- Melting of land ice is a major contributor to sea level rise



Climate Change and Flooding

- Increased temperatures are leading to sea level rise



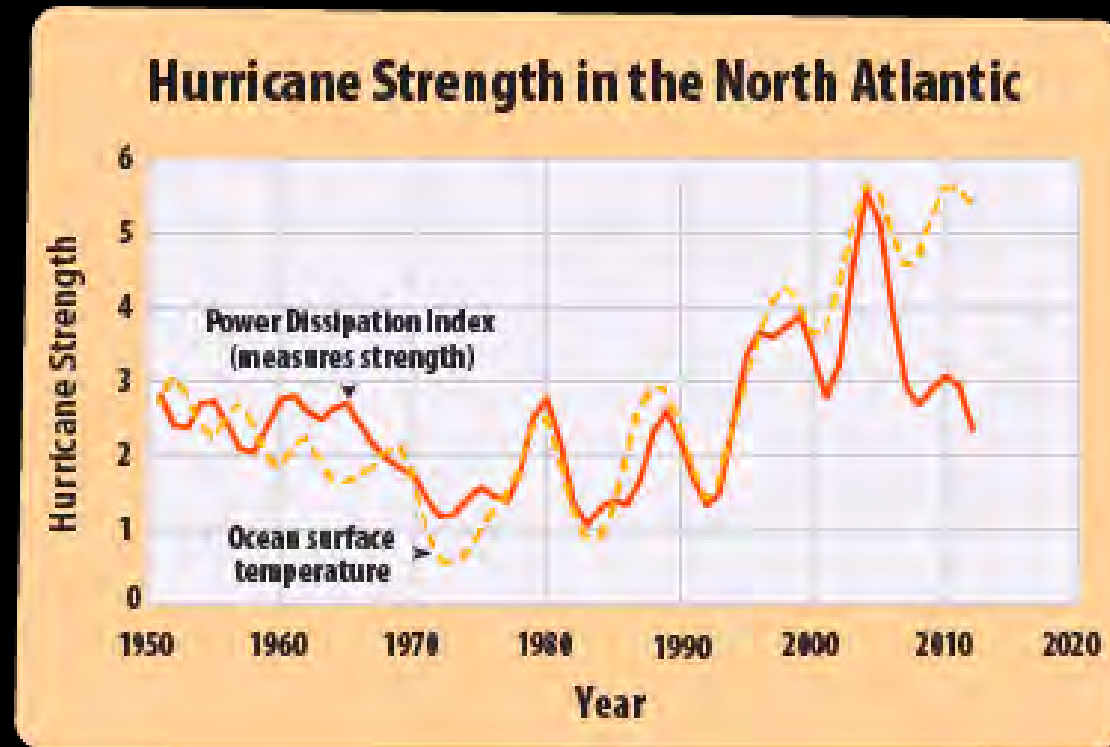
Climate Change and Snowstorms

- Increased frequency of extreme snowstorms



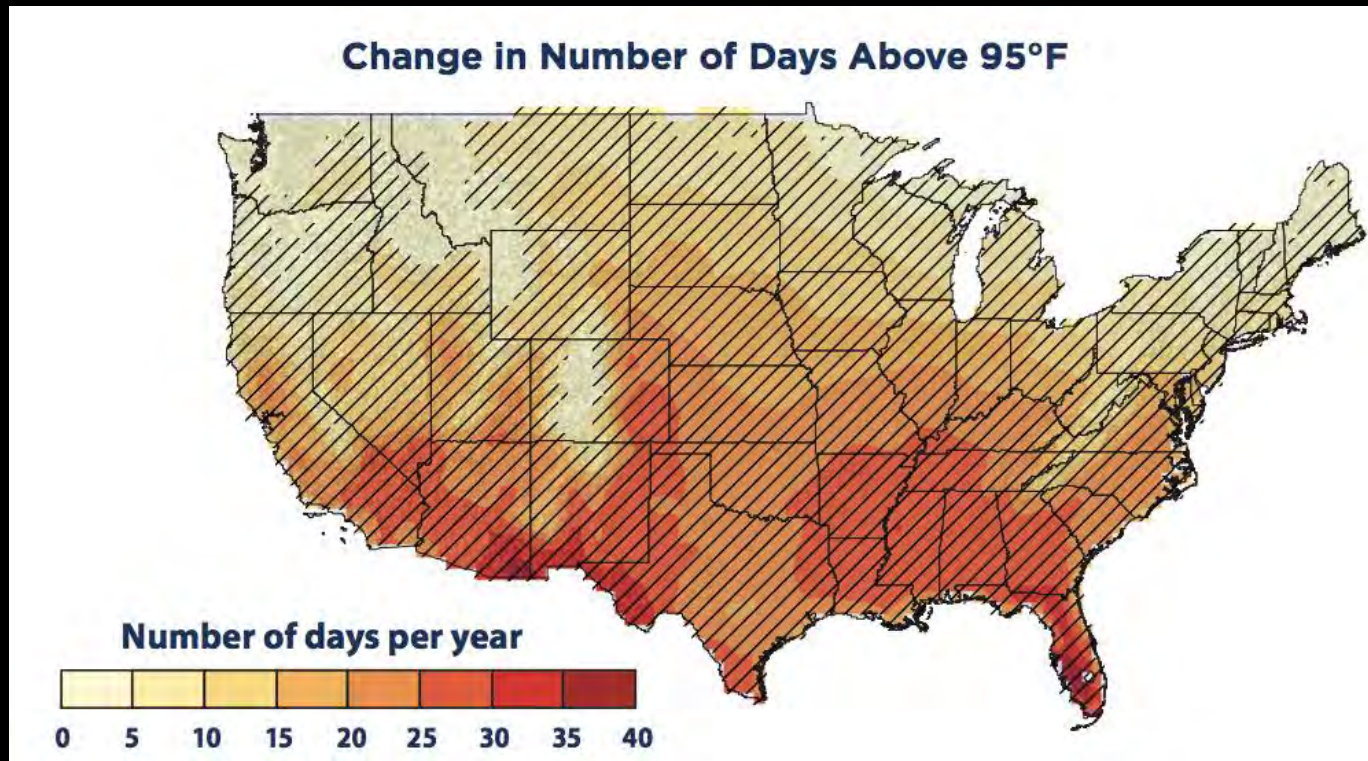
Climate Change and Hurricanes

- Increased severity of hurricanes



Climate Change and Droughts/Wildfires

- Increased risk for droughts/wildfires



Adapting to the Pandemic

- Group meetings and playing Climatopia via Zoom



Media Project Team

- Climatopia Website – Work in Progress



Creative Team

- Designed the game board, disaster symbols, Climatopia logo, and resource/character cards, made preliminary plans for fabric design



Research Team

- Generated content for resource and character cards

Vaccines

Vaccines help our bodies create protections against specific viruses. Get your vaccines and keep them up to date to protect yourself.

Can be used for...




MOVE BACK 1 SPACE

RESOURCE



The best way to find heat is to stay COOL. So, find some air conditioned space, a fan, or shade and stay put!

Can be used for...



MOVE BACK ONE SPACE



Rules Development & Cross-Team Committee

- Establishment of the super rule, using visuals, and gearing readability towards the youth.

| Character | Piece | Superpower | Disaster |
|---------------------|---|----------------------------|---|
| FEMA Representative |  | Super Beam Flashlight |  |
| Firefighter |  | Fire Freezing Fire Hydrant |  |
| CDC Official |  | Protective Purple Pathogen |  |
| Rescue Personnel |  | Speedy Rescue Boat |  |
| Utilities Crew |  | Rapid Repair Hard Hat |  |
| Scientist |  | Temperature Cooling Serum |  |



Final Game Rules for Climatopia

- Through collaboration and using resource/character cards to overcome climate-related disasters, the first player to reach Climatopia wins

CLIMATOPIA
Building Resilient Communities, 2-4 players Ages 8-88

To reach Climatopia, you will have to embark on a dangerous journey through climate change disasters. Use your character Superpowers and the Resource Cards you collect along the way to protect yourself, your friends and communities! By working together, we can create a more resilient world for tomorrow.

Objective: Be the first player to reach Climatopia.

Contents: 1 Cloth Game Board, 6 Game Markers, 6 Character Cards, Resource Cards, 1 Die

| CHARACTER | PIECE | SUPERPOWER | DISASTER |
|---------------------|-------|----------------------------|----------|
| FEMA Representative | | Super-Beam Flashlight | |
| Firefighter | | Fire Freezing Fire Hydrant | |
| CDC Official | | Protective Purple Pathogen | |
| Rescue Personnel | | Speedy Rescue Boat | |
| Utilities Crew | | Rapid Repair Hard Hat | |
| Scientist | | Temperature Cooling Serum | |

Character cards describe your character and their Superpower that protects them from one disaster throughout the entire game.

Resource cards are collected by landing on treasure chest spaces! These cards allow players to "buy" strategies through a space penalty that protect from disaster space penalties. You can use any resource card you have only once. Discard to the bottom of the resource card pile after use.

SETUP

- Lay the game board on a hard, flat surface.
- Shuffle and deal each player a Character Card that describes their disaster Superpower.
- Place your Character Piece on the START space.

GAME PLAY

All players roll the number die and the player with the highest roll goes first. Play continues in a clockwise fashion. The first player will roll the number die and move the indicated number of spaces.

THE SPACES: There are three different colored zones on the game board.

BLUE spaces represent coastal areas, **ORANGE** represent urban areas & **GREEN** represent rural areas.

IF YOU LAND ON A TREASURE CHEST, DRAW A RESOURCE CARD FROM THE DECK!





Sydney Thomas

BeAM Training, COVID limitations



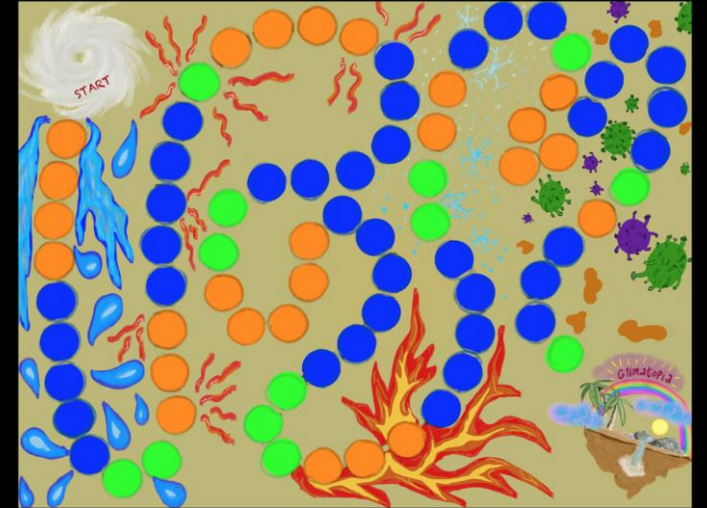
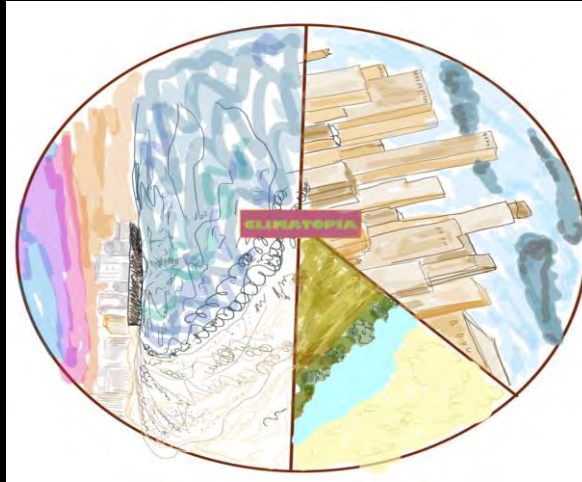
3D Printer



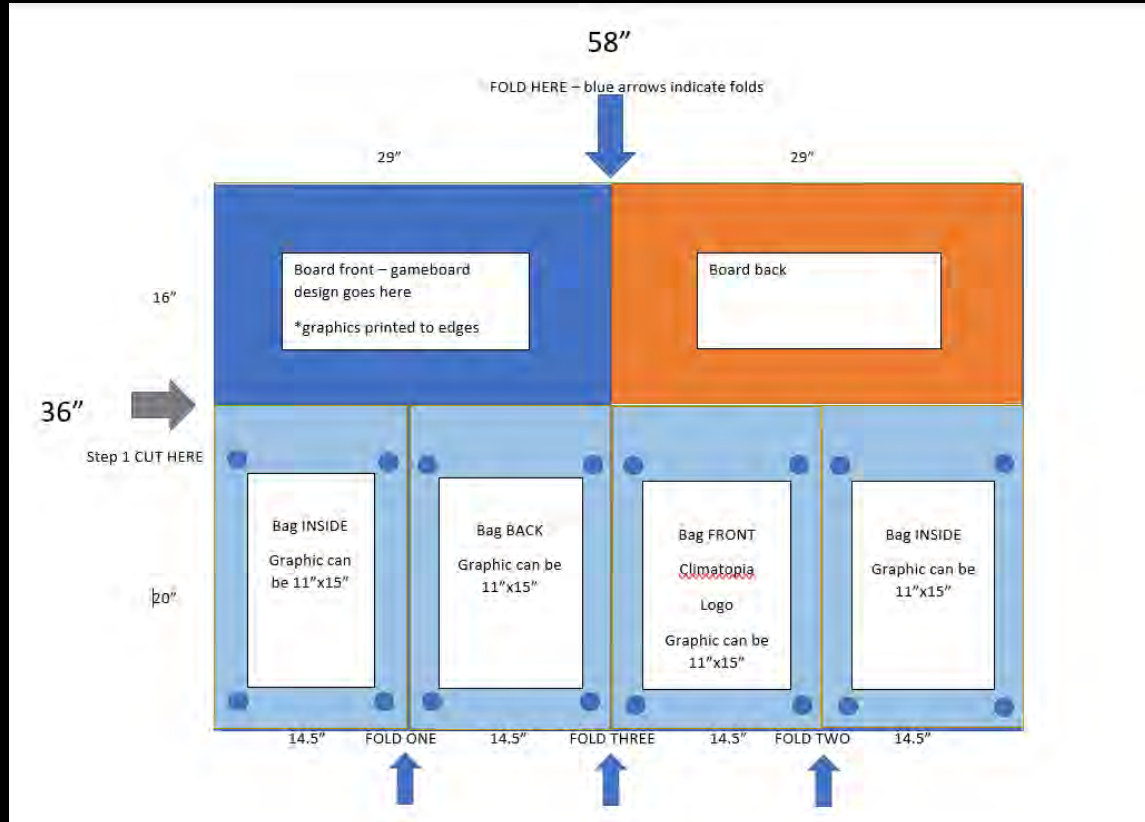
Sewing



Creative – Game Board



Creative – Backpack and Fabric Design



Creative/Research: Character Cards

Center for Disease Control (CDC) Official

Superpower: Protective Purple Pathogen

Infection from the protective purple pathogen prevents infection from other germs! The purple pathogen protects you from all disease events and you can use it to protect all players if you land on a purple pathogen disaster space.



CDC officials help manage regulations and laws that govern public health. They can make recommendations on policy and have the most up-to-date information on public health crises.


Character Card



Federal Emergency Management Agency (FEMA) Representative


Superpower: Super Beam Flashlight

The light from the super beam flashlight is powerful enough to halt the hurricane-force winds and heavy rain during hurricanes. The super beam flashlight protects you from all hurricane events and you can use it to protect all players when you land on a gray hurricane space.



FEMA Representatives come in after Hurricanes to provide disaster assistance for individuals and families. They can help with emergency shelter and access to clean water and supplies.

Character Card



Research - Resource Cards



Red Cross

The Red Cross helps after ALL disasters, with medical and emergency food sources. Know the best way to contact the Red Cross in your area.

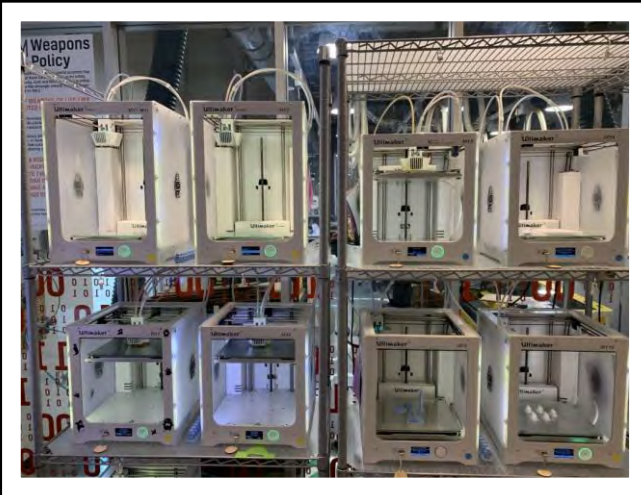
Can be used for...



MOVE BACK **3** SPACES



Digital – 3D Printing Makerspace



Digital – Maps of River Basins & Major Roads



Media - Website (WIP)



Resources

[Evacuation Routes Map:](#)



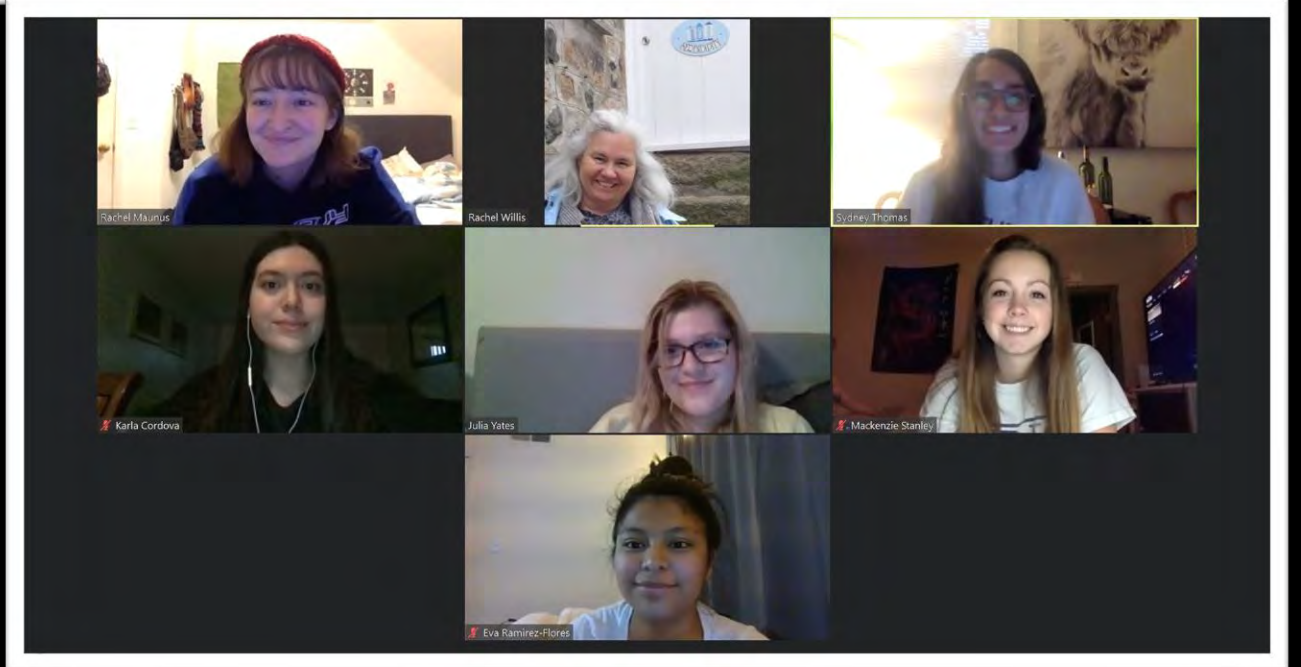
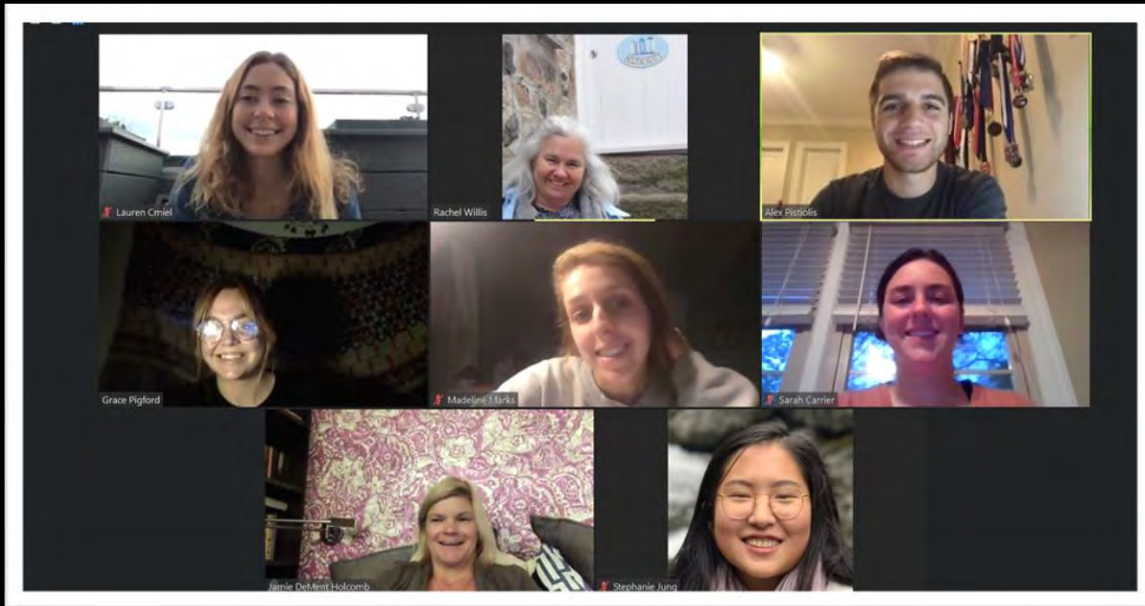
Click the "Evacuation Routes Map" for link or scan the following QR code:



Media - Videos (WIP)



Team Collaboration & Game Testing



| | |
|---|--|
|  <p>Federal Emergency Management Agency (FEMA) Representative</p>  |  <p>Firefighter</p>  |
|  <p>Utilities Crew</p>  |  <p>Scientist</p>  |
|  <p>Rescue Personnel</p>  |  <p>Center for Disease Control (CDC) Official</p>  |

RESOURCE



The best way to find heat is to stay COOL. So, find some air conditioned space, a fan, or shade and stay put!

Can be used for...



MOVE BACK **ONE** SPACE



BeAM Kits and Class Project



Fall 2020 – Game Design & Sewing Small Bags



Resource Links

CLIMATOPIA was designed and produced by

Sydney.Thomas@unc.edu, Alex.Pistiolis@unc.edu, Karla.Cordova@unc.edu & Professor Rachel.Willis@unc.edu

In collaboration with creative UNC-Chapel Hill seminar students from:

Spring 2020 graduate seminar AMST 641- Using the Visual and Performing Arts to Communicate Climate Science
Fall 2020 AMST 460 - Rising Waters: Strategies for Resilience to the Challenges of Climate and the Built Environment
Grant support and training for CLIMATOPIA provided by UNC's Service-Learning Program at ccps.unc.edu/apples/
and the BeAM.unc.edu and Makerspace Staff

Updates to the game, resource cards, and new links on climate change science info at tarheels.live/climatopia
Instructions to order CLIMATOPIA fabric from Spoonflower.com and sew your own backpack & game board are also on the website!

CLIMATOPIA RESOURCE LINKS ORANGE links especially good for kids!

Understanding Climate Change Science

- The United Nations "Intergovernmental Panel on Climate Change" has the latest scientific information, assessment reports, and recommendations for global action ipcc.ch
- National Oceanic and Atmospheric Administration (NOAA) is responsible in the US for climate info noaa.gov/climate
- NOAA also has lots of education resources noaa.gov/education
- The most recent United States Climate Assessment nca2018.globalchange.gov/
- Independent organization of scientists and journalists communicating climate science facts climatecentral.org
- Environmental Education Games kidsagainstclimatechange.co/start-learning/#games

Preparing for Climate Disasters and Emergencies

- READY is a national public service campaign designed to educate and empower the American people to prepare for, respond to and mitigate emergencies, including natural and man-made disasters ready.gov
This site has detailed info on more than two dozen types of disasters including CLIMATOPIA'S 6 climate change related disasters
See *** Extreme Heat * Floods * Hurricanes * Pandemics * Wildfires * Winter Weather** for help in playing the game!
- Kid-friendly games on climate change and the environment <https://www.ready.gov/kids/games/data/bak-english/index.html>

Building More Resilient Communities (Planning and recovering from disasters!)

- Federal Emergency Management Agency mission is helping people before, during and after disasters. fema.gov/
- US Fire Administration's Fire prevention and public education usfa.fema.gov/prevention/
- Elementary through college-aged students can access opportunities and resources enabling them to respond environmental challenges monitored by NOAA. oceanservice.noaa.gov/education/planet-stewards/

Finally, our five favorite sites to learn about...

- **FLOODING:** a free online tool created by nonprofit First Street Foundation that makes it easy for Americans to find their property's risk of flooding and understand how flood risks are changing because of a changing environment. floodfactor.com/
- **OCEANS:** formal and informal opportunities for elementary through college-aged students to respond to environmental challenges monitored by NOAA. oceanservice.noaa.gov/education/planet-stewards/
- **HEALTH VULNERABILITIES:** Information to identify and address the impact of extreme weather and climate events by Carolinas Integrated Sciences and Assessments at the Southeast Regional Climate Center convergence.unc.edu/
- **EDUCATION RESOURCES:** The CLEAN Collection of Climate and Energy Educational Resources has 700+ free, ready-to-use learning resources reviewed by educators and scientists suitable for high school through higher education classrooms. cleanet.org
- **ENVIRONMENTAL INFO:** National Centers for Environmental Information, the world's largest climate data archive ncei.noaa.gov/






Karla Cordova Araujo



BeAM Makerspace 3D Printing



A progress bar with five stages: IDEA (lightbulb icon), DIGITAL DESIGN (computer monitor icon), TOOL SOFTWARE (code icon), TOOL OPERATION (3D printer icon), and QUIZ (100% icon). The QUIZ stage is highlighted in red.



A banner with the BeAM logo on the left, the text "3D Printer" in the center, and a circular inset image of a 3D printer on the right.

You've made it to the end of the online 3D Printer training!

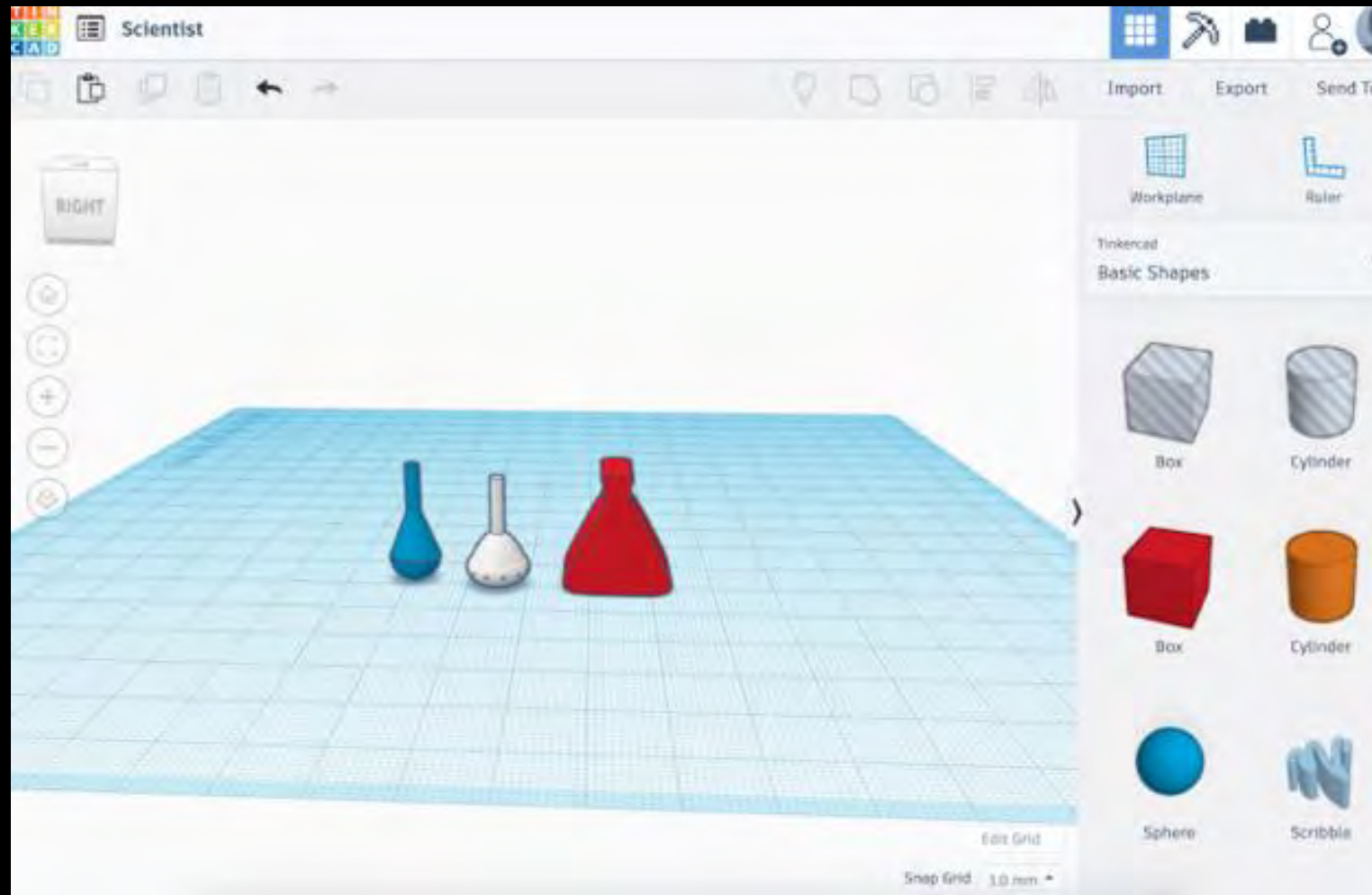
Click on the link below to take the final quiz - this assessment links directly to the BeAM database and will update your training record once you get all of the answers 100% correct. Then, you'll need to complete a self-guided practice project to finish your certification. More information about the project will be available after you finish the quiz.

If you see a message that says you are not registered or authorized to take the assessment, you may not have answered all the practice questions in the previous pages. Go back and double check that you've completed all of them before trying the link again. Still having trouble? Email beam@unc.edu for help.

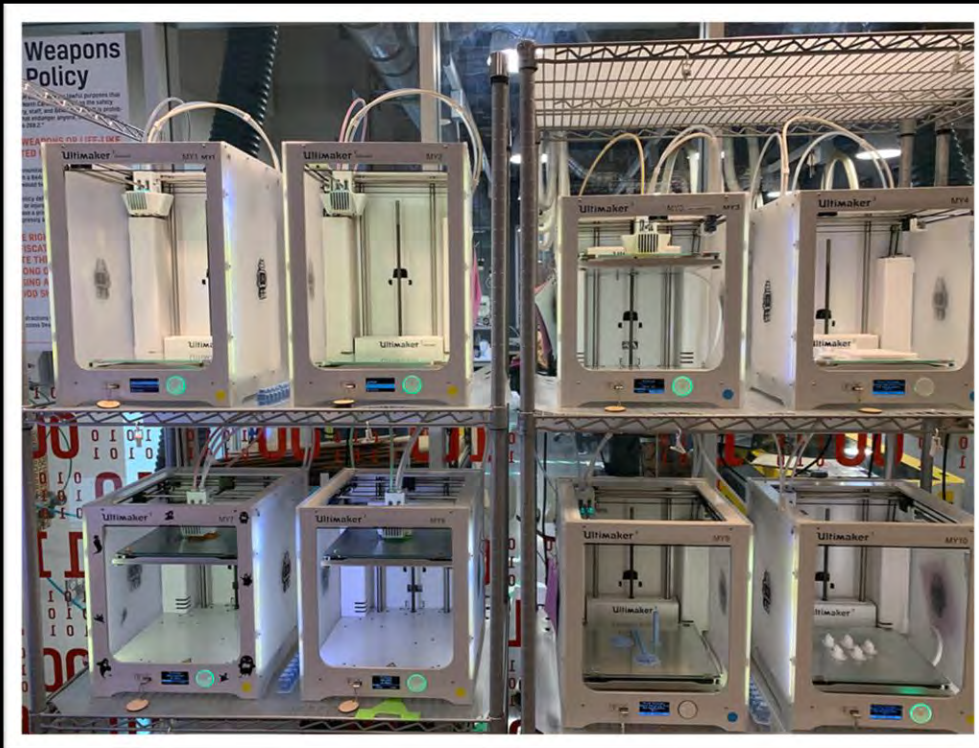
[Click here to take the 3D Printer Final Quiz!](#)



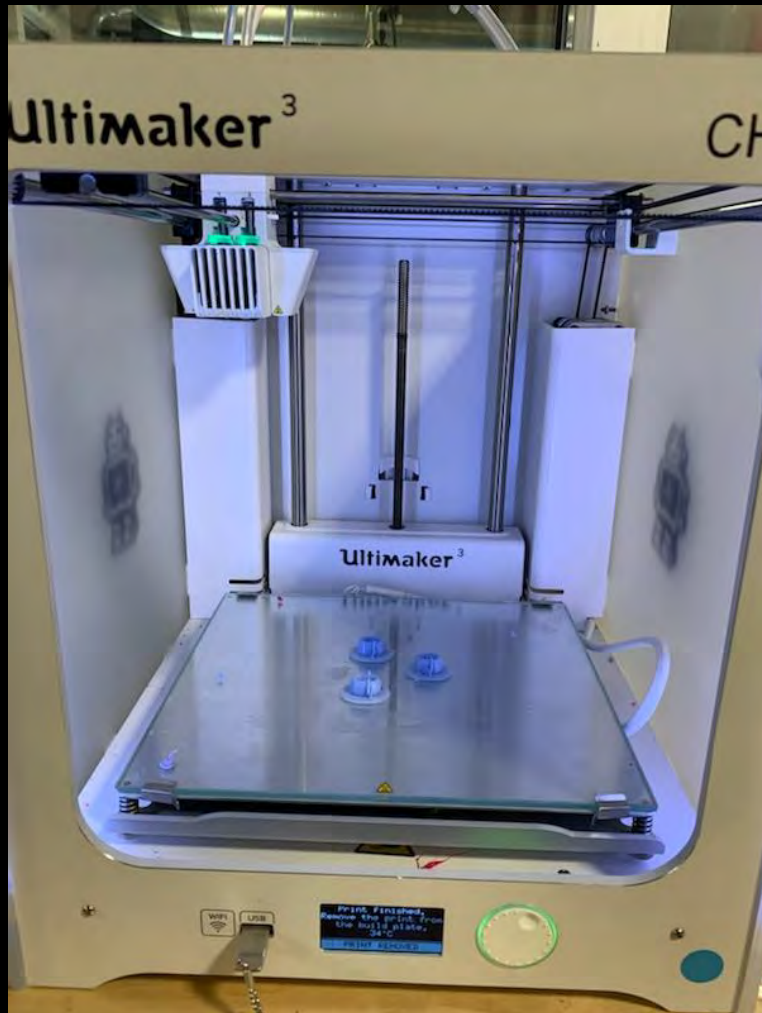
3D printing of characters begins with CAD



CAD Drawings go to 3D Printer



3D printing of characters



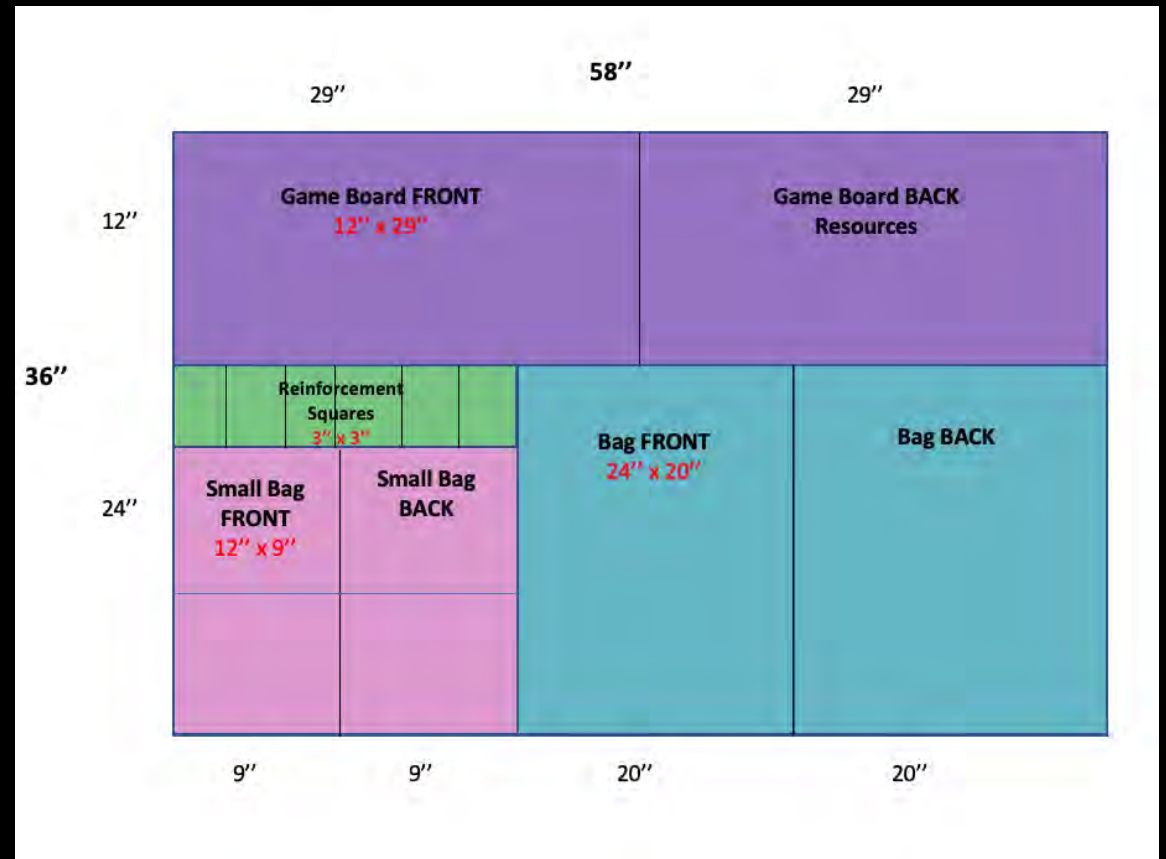
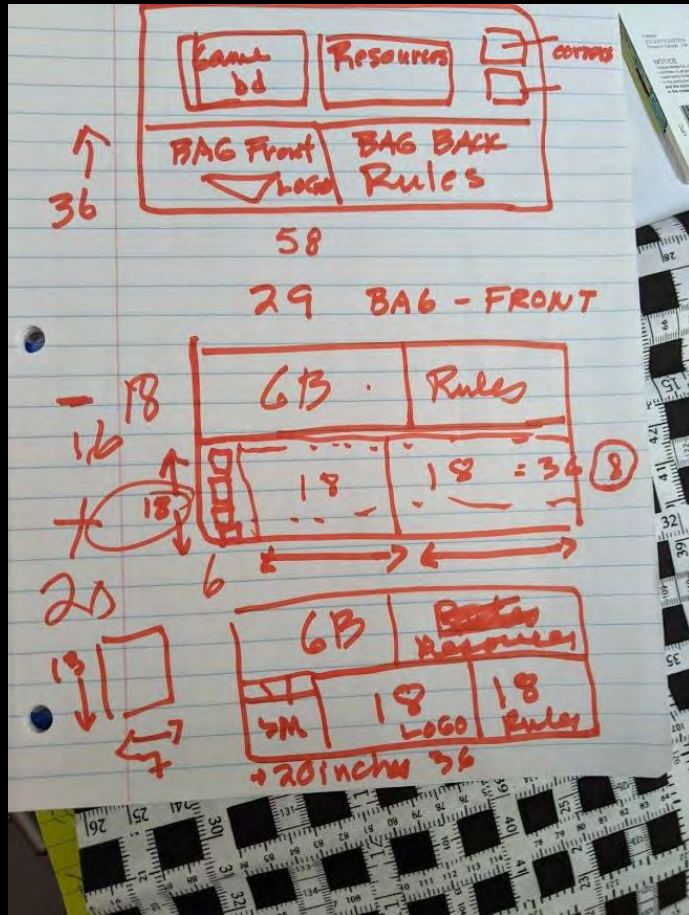
Independent Study – Spring 2021 Expanded to Sewing and Fabric Design



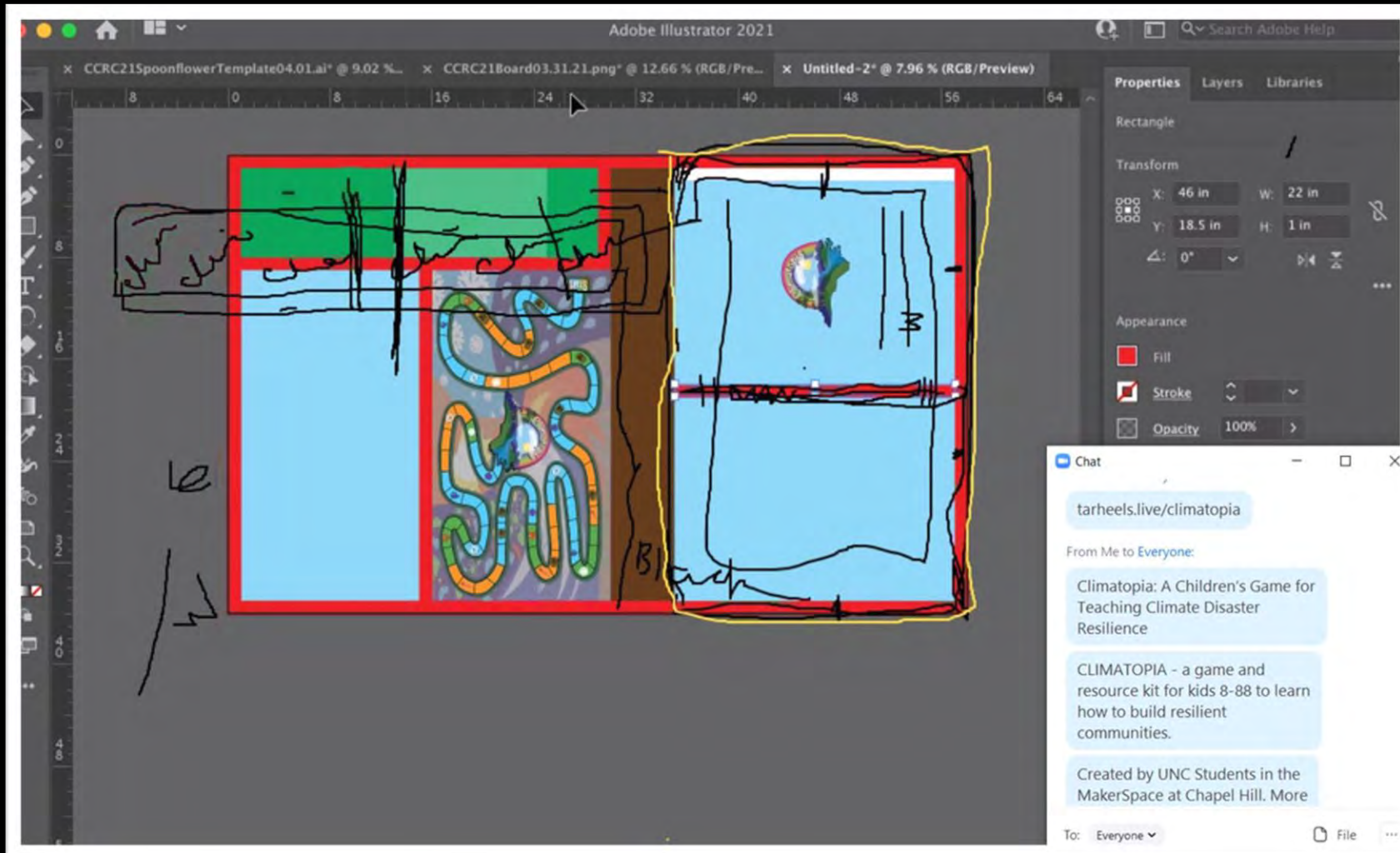
Machine Sewing Small Parts Bag



Designing Fabric Layout



Creating Fabric Design on Adobe Illustrator



Spoonflower Order

Job: 8987393 - Design: 11491858 - tb

Designed by:
climatopia

Custom printed on
Lightweight Cotton Twill - 1 of 1



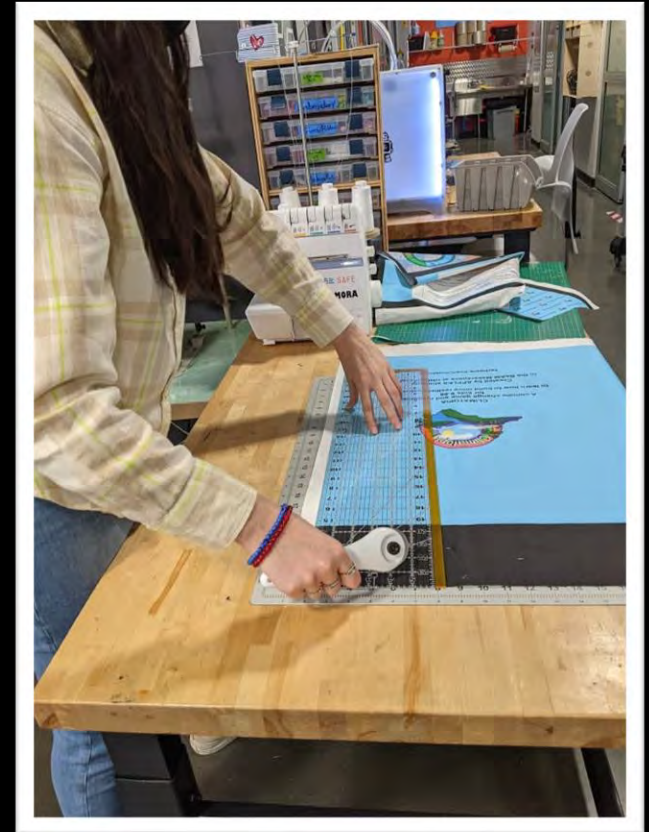
Order: 58261306 Item: 33860638



Printed Fabric Arrives from Spoonflower!



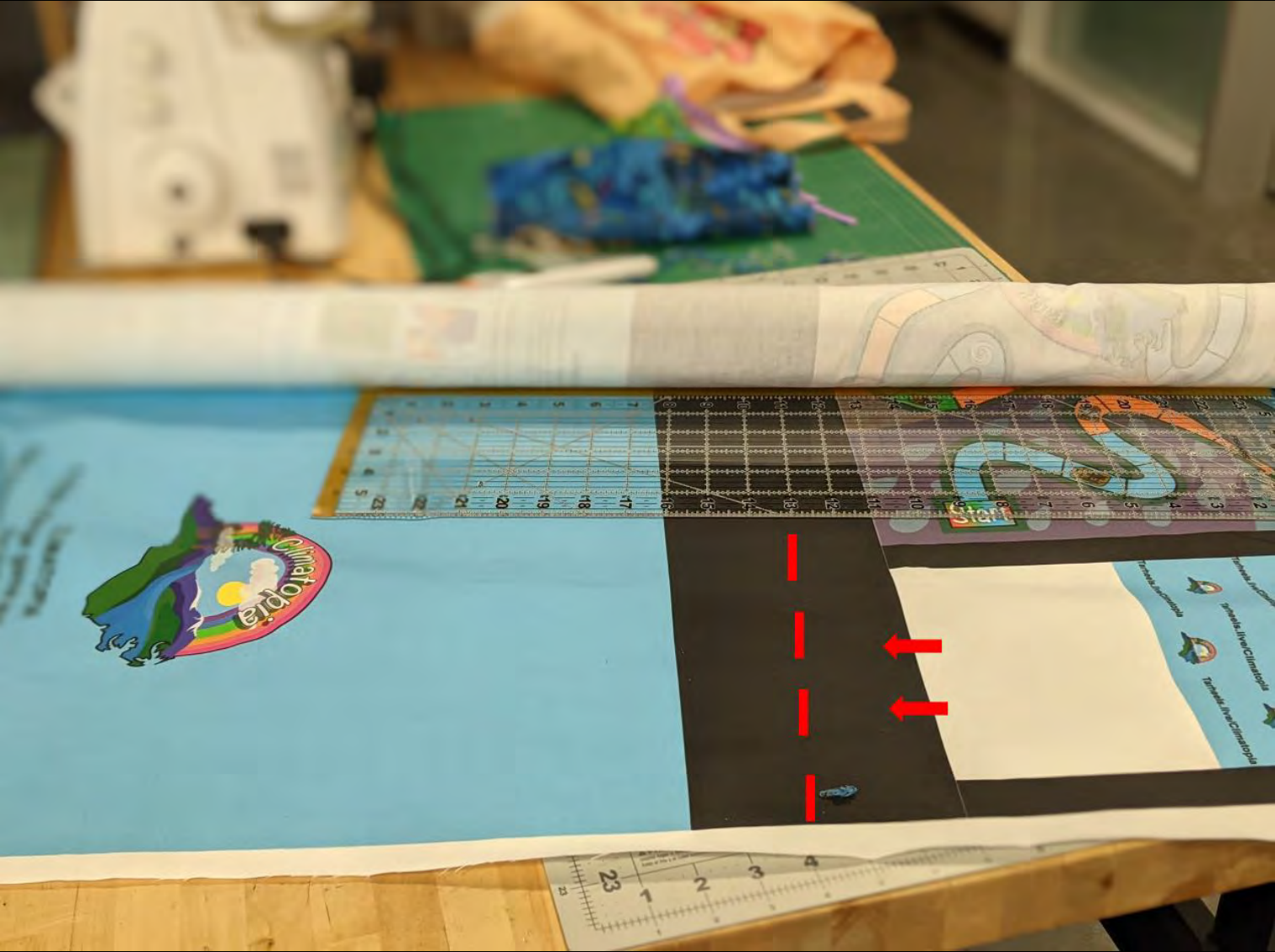
FROM: (919) 886-7885 SHIP DATE: 10APR21
SHIPPING DEPARTMENT ACTWGT: 1.95 LB
SPOONFLOWER, INC. CAD: 0107077/CAFE3409
3871 S. ALSTON AVE
DURHAM NC 27713 BILL SENDER
US
TO **RACHEL WILLIS**
56BC2/SEF2/05A2



Cutting and Sewing Game Board & Backpack



Future Design Improvements



Fall 2021 Rising Waters 460





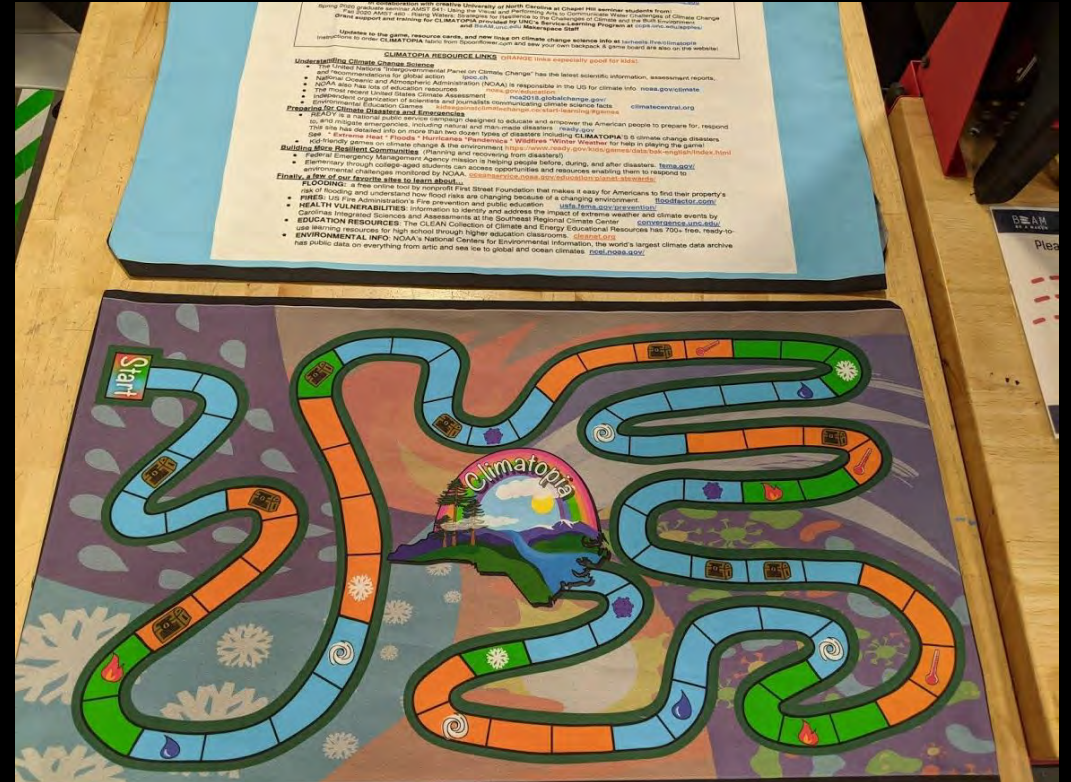
Dr. Rachel Willis

Next Steps for CLIMATOPIA

- SUMMER 2021 FIELD TESTING
- FALL 2021 AMST 460 - RISING WATERS SEMINAR
- IMPROVING CLIMATOPIA
 - Game board
 - Resource cards
 - Links
 - Website
 - Fabric design and sewing instructions
 - Producing complete games including board, parts, cards, and backpacks in BeAM Makerspace
- SPRING 2022 – AMST 398 SERVICE – LEARNING SEMINAR
 - Partner with environmental education sites
 - Introduce and distribute climatopia



FACE CLIMATE CHALLENGES BUILD RESILIENT COMMUNITIES

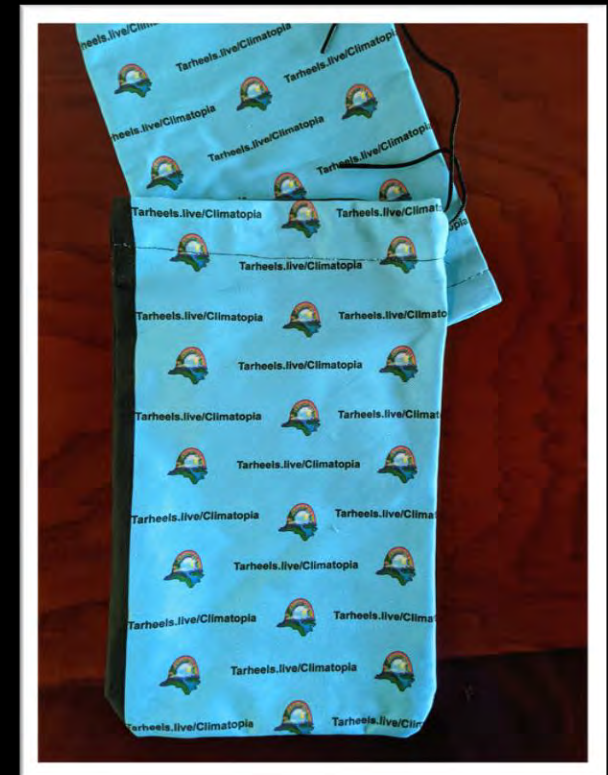
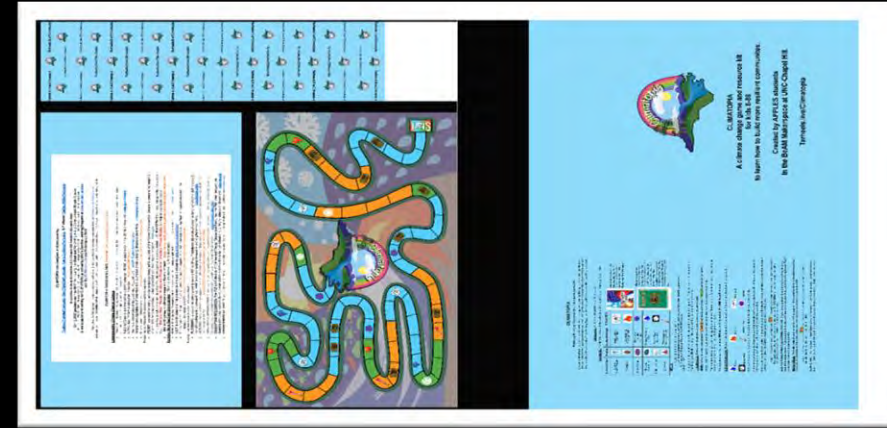


SUSTAINABILITY AND COMMUNICATION GOAL: TO MAKE CLIMATOPIA SHAREABLE

SEW YOUR OWN: Buy a yard of fabric from SPOONFLOWER.COM
Make your own CLIMATOPIA Backpack & Game!

USE THE CLIMATOPIA WEBSITE:
Sewing instructions
Print cards
Get ideas for character markers

*** Hotlinks to new accessible information to understand climate science, implement strategies for building better communities, and obtain updated resource information.



QUESTIONS?
SUGGESTIONS?
ADVICE?

Contact: Rachel.Willis@unc.edu

Professor of American Studies and Economics
The University of North Carolina at Chapel Hill
CB#3520, 414 Greenlaw Hall
Chapel Hill, NC 27599-3520

