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| C:\Users\bjaco\AppData\Local\Microsoft\Windows\INetCache\Content.Word\SLS-Teaching-Toolkit-Logo_Stacked-Initials.jpg | An Introduction to Climate Resilience | | |
| **Discipline:** All | **Type:** Take-home assignment; Lecture; In-Class Activity; Discussion | **Time Commitment:**  ~1 hour | **Category:** Equity, Justice & Sustainability, Climate Change & Energy, Using Data |
| **Big Ideas:** | | | |
| **OVERVIEW:**  Climate change poses numerous and multi-faceted threats to existing ecological and social systems. Climate *resilience* is the concept of anticipating climate-related stresses to these systems in order to increase their capacity to adapt to climate change, although definitions of resilience vary based on discipline and the systems being examined. Assessment of climate *vulnerability*, or the degree to which systems and communities are susceptible to the effects of climate change, informs efforts to increase resilience. This tool defines and gives examples of *climate resilience and vulnerability* through the lens of three areas of research underway at Georgia Tech. First, students will view slides explaining climate resilience and climate vulnerability. Students will then view videos featuring three Georgia Tech faculty describing how their work contributes to enhancing climate resilience. Finally, students will discuss the connections they have made between key concepts in climate resilience and the role of research in developing strategies for climate adaptation.  This tool was contributed by Bonnie Lapwood and Ben Shipley. | | | |
| **INSTRUCTIONS:**  This tool has three parts. The first consists of a slide lecture, followed by three videos from the 2019 Sustainability Showcase, ending with an in-class discussion. The slide lecture contains detailed material on differing perspectives on and components of resilience and can be edited or rearranged as needed. See below for detailed instructions. | | | |
| **SLS STUDENT LEARNING OUTCOMES & ASSESSMENT:**  The Serve-Learn-Sustain toolkit teaching tools are designed to help students achieve not only SLS student learning outcomes (SLOs), but the unique learning outcomes for your own courses. Reflection, concept maps, rubrics, and other assessment methods are shown to improve student learning. For resources on how to assess your students’ work, please review our[Assessment Tools](https://serve-learn-sustain.gatech.edu/teaching-toolkit?field_testing_tid=174&field_tool_type_tid=All&field_time_commitment_tid=All&field_big_idea_tid=All).  **This tool achieves SLOs 1, 3, and 4. See the end of this tool for further details.** | | | |

Introduction to Climate Resilience

**Want Help?**

Serve-Learn-Sustain is the contact for this tool. You can reach us at [serve-learn-sustain@gatech.edu](mailto:serve-learn-sustain@gatech.edu)

**Instructions**

1. In class, deliver the slide lecture, “Introduction to Climate Resilience.” Add, remove, or modify slides as needed.
2. Either ahead of class or in class, ask students to watch:

“[An Historical Perspective to Biodiversity Conservation Strategies](https://www.youtube.com/watch?v=ByfFOs4fPXg)” by Jenny McGuire

[“](http://grandchallenges.gatech.edu/sites/default/files/pdf_project/food_insecurity_at_georgia_tech_white_paper.pdf)[Impacts of Climate Change on Long-Term Reliability of Structures](https://www.youtube.com/watch?v=QYgCD1aRA0k)” by Iris Tien

“[’Smart Solutions for Climate Change Resilience](https://www.youtube.com/watch?v=PT-gB6v_t9g)” by Kim Cobb

1. Prompt discussion – either individually or in teams – using the discussion questions below. Prioritize questions based on the learning objectives of your course.

**Discussion Questions**

1. What are some already occurring and anticipated effects of climate change on natural systems and/or the built environment?
2. How do definitions of climate resilience differ based on their context?
3. How can biodiversity, structural reliability, and sea-level monitoring be understood in terms of the integrated sustainability framework and/or the SETS framework – where do these fit in to societal, economic, and environmental systems?
4. What are the three components of vulnerability? How can vulnerability be defined in each of the areas of research described in the videos?
5. How do research and data contribute to vulnerability assessment?
6. What is climate adaptation? How can the research described in the videos be used to develop strategies that support adaptation?
7. What other threats posed by climate change are familiar to you? How would you describe the resilience and/or vulnerability of your community or a community familiar to you?
8. The research described in the videos spans both the natural environment and the built environment. Do the concepts of resilience, vulnerability and adaptation differ in these realms? Why or why not?
9. Kim Cobb describes how the most pressing need in vulnerable coastal communities was air quality sensors to deal with current threats to health rather than sea level sensors to combat future flooding threats. Compare and contrast these needs and the significance of community input in addressing resilience.

**Resources for Further Reading**

Brand, Fridolin Simon, and Jax, Kurt. “Focusing the Meaning(s) of Resilience: Resilience as a Descriptive Concept and a Boundary Object.” (2007).

Folke, Carl. "[Resilience: The emergence of a perspective for social–ecological systems analyses](https://www.sciencedirect.com/science/article/pii/S0959378006000379?via%3Dihub)." (2006).

Holling, C.S. “[Resilience and Stability of Ecological Systems](https://www.annualreviews.org/doi/10.1146/annurev.es.04.110173.000245).” (1973).

IPCC. “[Fourth Assessment Report](https://www.ipcc.ch/report/ar4/wg1/).” (2007).

IPCC. “[Determinants of Risk: Exposure and Vulnerability](https://www.ipcc.ch/site/assets/uploads/2018/03/SREX-Chap2_FINAL-1.pdf).” (2012).

McPherson, Timon, Iwaniec, David M., and Bai, Xumei. “[Positive visions for guiding urban transformations toward sustainable futures](https://www.sciencedirect.com/science/article/pii/S1877343517300611).” (2016).

Meerow, Sara and Stuits, Melissa. “[Comparing Conceptualizations of Urban Climate Resilience in Theory and Practice](https://www.mdpi.com/2071-1050/8/7/701).” (2016).

Nelson, Donald R., Adger, W. Neil, and Brown, Katrina. “[Adaptation to Climate Change: Contributions of a Resilience Framework](http://eprints.icrisat.ac.in/4245/1/AnnualReviewofEnvResources_32_395-419_2007.pdf).” (2007).

Schroeder, Heike and Yocum, Dayna. “[Vulnerability, Resilience, and Adaptation: Response Mechanisms in an Environmental Emergency – The Asian Tsunami in Thailand and Hurricane Katrina in the United States](https://link.springer.com/chapter/10.1007%2F978-1-4020-5098-5_8).” (2006).

SLS Student Learning Outcomes

1. Identify relationships among ecological, social, and economic systems.
2. Demonstrate skills needed to work effectively in different types of communities.
3. Evaluate how decisions impact the sustainability of communities.
4. Describe how to use their discipline to make communities more sustainable.\*

\* *Note:* SLO 4 is intended to be used by upper division, project-based courses such as Capstone.