

**Cross-Reference of Program Lessons**

In-Class Lessons	Distance Learning Lessons	
	Online*	Off-line "printables"
<b>Issue Introduction</b>		
Teacher presentation (I1)	Teacher presentation (I1)	
Option: Crumple Paper Watershed activity	Option: How's my Waterway (Updated EPA site <a href="http://www.epa.gov/waterdata/hows-my-waterway">www.epa.gov/waterdata/hows-my-waterway</a> )	
	Video: Why It's Usually Hotter In A City (NPR, )	Handout: Keeping Your Cool (EPA\CDC)
	Video: Throwing Shade (TedTalk for Youth, 8 min)	
Researching the Issue (I2)	Researching the Issue (I2)	
Inventory your School's Land Use (I3 Part 1) Inventory your School's Land Uses (I3 Part 2)	Inventory your School's Land Uses (I3 Part 1)	Inventory Land Use at School\Home (with printable School Map)
<b>Surface Temperature Module</b>		
Teacher presentation (S1)	Teacher presentation (S1)	
Albedo & Land Cover Lab (S2)	Video: Climatebits - Albedo	Surface Temperature Fact Sheet
	Take your class outside via video: Student direct surface investigations	
Measure Surface Temp Data (S3)	Option: MyNASADData Worksheet: Creation of UHI (Engage, Explore, & Explain sections)	
Analyze & Interpret Surface Temp Data (S4)	Analyze & Interpret Surface Temperatures previously collected by earlier classes (Surface-DL)	Analyze & Interpret Surface Temperatures previously collected by earlier classes (Surface-DL)
<b>Air Temperature Module</b>		
Teacher presentation (A1)	Teacher presentation (A1)	
Understanding Impacts of Extreme Heat –Guided Research (A2)	Understanding Impacts of Extreme Heat –Guided Research (A2) with printable or link to PDF "Climate Change & Extreme Heat" by EPA & CDC	Understanding Impacts of Extreme Heat –Guided Research (modified) (A2) with printed "Climate Change & Extreme Heat" by EPA & CDC
Measure Air Temps (A3)	Compare City Air temps (Air_CityTemps_onlineDL)	
Analyze & Interpret new and seasonal schoolyard Air Temp Data (A4 & A5)	Analyze Air Temp Data with online access (Air_LocalVSRef-DL) <i>use newly uploaded or previously collected data</i>	Analyze Air Temp Data with printed datasheet (Air_LocalVSRef-DL)

In-Class Lessons	Distance Learning Lessons	
	Online*	Off-line "printables"
<b>Water Temperature Module</b>		
Teacher presentation (W1)	Teacher presentation (W1)	
Explore Local Stream Info (W2)	Explore Local Stream Info (W2)	
	Take your class outside via video: Visit your local stream, view its surrounding land use, and locate your water logger.	
Water Temp Mixing Lab (W3)	Complete this lab virtually with students conducting the calculations.	
Measure new and past Water Temp Data (W4)	Teacher manages and uploads new logger data (use lesson W4)	
Analyze Stream Temp Data (W4)	Analyze Stream Temp Data with online access (Water_StreamTemp_DL)	Analyze Stream Temp Data with printed data sheet (Water_StreamTemp_DL)
Seasonal Water Temp Lesson Option (W5)		
<b>Reflection and Action</b>		
Teacher presentation (R1)	Teacher Presentation (R1)	
Overall Schoolyard Urban Heat Score (R2)	Reducing Heat in Your Community Research Worksheet with video questionnaire (R-DL)	Reducing Heat in Your Community – interview decision makers on local projects (R-DL)
Selecting an Action Project (R3)	Alternative Community Outreach (Speaker, Interview, Presentations)	

\*requires internet access (#) indicates lesson number in digital folders

## Resources and References to Enhance Distance Learning

### ➤ Distance Learning ideas

- Principles for distance learning. Tips and tricks to have an outdoor experience.  
<http://beetlesproject.org/principles-for-distance-learning/>
- Take your class “outside” via video: Have students direct you to make observations and complete investigations, collecting data along the way. Students can record what they are seeing, journal observations, and reflect on results of their experience.

### ➤ Beyond the Classroom into your Community:

**Host a speaker or have students interview a professional (or a panel) in your online classroom.** Identify scientists, experts, decision makers (school administration, politicians) to discuss local impacts to air, water, surface temps and/or human health. Have students develop questions as a group.

**Have students present their findings to decision makers in your online classroom:** Live or creation of pre-recorded video

**Students interview others in their community** by phone or online to offer a presentation to the class or report to teacher.

### ➤ “Printables”

Climate Change and Extreme Heat, USEPA/CDC Booklet (20 pages – page 14 discusses UHI)

<https://www.epa.gov/sites/production/files/2016-10/documents/extreme-heat-guidebook.pdf>

Fact Sheet: Keeping Your Cool: How Communities Can Reduce the Heat Island Effect (PDF)(4 pp, 814 K)

[https://www.epa.gov/sites/production/files/2016-09/documents/heat\\_island\\_4-page\\_brochure\\_508\\_120413.pdf](https://www.epa.gov/sites/production/files/2016-09/documents/heat_island_4-page_brochure_508_120413.pdf)

*“Printables” requiring online resources:*

Student sheet for use with MYNASAData UHI StoryMap. Students investigate surface heat, albedo, creation of urban heat islands, and earth’s energy balance under the Engage, Explore, & Explain Tabs. <https://arcg.is/1zvUkV>

### ➤ Videos:

*UHIs*

- UHI Overview (includes images in DC) Why It's Usually Hotter In A City, Let’s Talk by NPR (2:30 minutes)  
<https://www.npr.org/2018/07/24/631560598/watch-why-its-usually-hotter-in-a-city>
- Throwing Shade on Climate Change | Jeremy Hoffman | TEDxYouth@RVA (8:00 minutes) presented in Richmond VA <https://youtu.be/31f0e13bwk0>
- ClimateBits: Albedo <https://www.youtube.com/watch?v=d1U7X1k3d0Y>
- Podcast\Video: “How to Save the World”, episode: “Urban Heat Islands: The Secret Killer You’ve Never Heard Of” featuring Dr. Jeremy Hoffman, April 2018. (51 minutes) Available from several sources.
  - ApplePodcasts <https://podcasts.apple.com/us/podcast/how-to-save-the-world/id1209792818>

- Search the for the title wherever you get your podcasts
- YouTube <https://www.youtube.com/watch?v=2EHG67HKMjg>

### *Mitigation of Urban Heat*

- Chicago Fights Extreme Urban Heat With Greener Ideas, PBS News Hour <https://www.youtube.com/watch?v=ukGN4PyeNoU> (10:30 minutes)
- (Trees) See How Texas Trees Foundation and Alliance Data are working to reverse Dallas' Rising Temps (Dallas Urban Heat Island Mitigation Study): <https://www.texastrees.org/projects/dallas-urban-heat-island-mitigation-study/> (4:11 minutes)
- Resources on Urban Heat from Dr. Jeremy Hoffman <http://jeremyscotthoffman.com/>
- (SmartGrowth) 7 principles for building better cities | Peter Calthorpe TED Talk <https://www.youtube.com/watch?v=IFjD3NMv6Kw>

### ➤ **Other Sources of useful data:**

Air Temperatures around United States <https://www.usclimatedata.com/climate/united-states/us>

Creation of Urban Heat Islands Story Map (Teacher Info: <https://mynasadata.larc.nasa.gov/lesson-plans/creation-urban-heat-islands-story-map>)

<https://nasa.maps.arcgis.com/apps/MapSeries/index.html?appid=44b9c8738f0e47e68d9e8ae2c530ed08>

*How's My Waterway* Interactive mapping tool with good overview of watershed health, monitoring, and impairments, including temperature for some local streams. <https://www.epa.gov/waterdata/how-s-my-waterway>

Water Temperatures in the Middle Atlantic Region <https://www.weather.gov/marfc/WaterTemperatures>

GLOBE Data of worldwide air and surface temperatures collected by students. Found under the ATMOSPHERE PROTOCOL menu item <https://www.globe.gov/globe-data/visualize-and-retrieve-data>