

I don't think that anyone would dispute that it's lovely to sit under a shady tree on a hot day! Obviously the trees block the direct heat of the sun, but they also help to cool us by a process called 'transpiration cooling'. Water passes from the soil and through the plant before eventually exiting via leaves and branches. This helps to cool the plant, just like when we sweat. But as the water leaves the plant as gas or water vapour, this helps cool the air around it as well – by up to 5°C! Misting fans work in a similar way. This transpiration cooling effect causes plant shade to be cooler than building shade.

So how cool do you think your school is?

We can use freely available online tools and geospatial analysis to work this out!



## LEARNING OBJECTIVES

- To qualitatively evaluate the difference in thermal comfort levels in the presence and absence of tree shade;
- To create a map of your school with basic image analysis;
- To calculate the % shade on your school grounds; and
- To understand how spatial data is used to address environmental challenges.



## PREPARATION

- Have a computer with an internet connection!
- Join the She Maps Chat Facebook Group <https://www.facebook.com/groups/1512427928825311/>

## REQUIRED RESOURCES



Activity Sheets



Hats



Suncream



Thermometers  
(extension)

## SESSION/S PLAN

WHAT TO DO	WHAT YOU NEED	WHAT TO TALK ABOUT	DURATION
<p>Discuss with your class their perceptions around thermal comfort</p>	<p>Activity sheet 1 Option to watch video <a href="https://youtu.be/OuQUf2th15E">https://youtu.be/OuQUf2th15E</a></p>	<p>Importance of shade. How shade affects where students hang out at school. How much shade do they think they have - get them to record their estimate, and keep a copy for you</p>	30 min
<p>Walk around the school and observe hot vs. cool areas (preferably on a hot day).</p> <p>If you have a thermometer, ask the students to take measurements rather than just make observations as part of their activity sheet</p>	<p>Activity Sheet 2</p>	<p>How does building shade compare to tree shade? Are concreted areas hotter than grass? Estimate again the % shade and make sure they keep a copy and you do as well</p>	40 min
<p>Digitise features on your map and calculate shade <a href="https://www.scribblemaps.com/">https://www.scribblemaps.com/</a></p>	<p>Computer with internet</p>	<p>Compare initial estimate to measured amount. Compare student calculations - what causes the differences? How could this be improved?</p>	50 min
<p>Discuss the Wisdom of the Crowd (60 min video option <a href="https://www.abc.net.au/catalyst/how-to-be-lucky-the-maths-of-chance/11017380">https://www.abc.net.au/catalyst/how-to-be-lucky-the-maths-of-chance/11017380</a>)</p>		<p>What was the class range, average, max, min etc values for shade?</p>	15 min / 75 mins with video
<p>Create a printworthy map</p>	<p>Computer</p>	<p>Critical map elements - title, author, scale bar, north arrow, legend</p>	20 mins
<p>Design an alternative shade plan. Present to school council????</p>	<p>Computer or drawing materials</p>	<p>Where would it be good to have more shade? Constructed (e.g. shade sails) or grown (trees - and what type?)? How much additional area of shade is needed? How much would that cost?</p>	75 mins



## TAKE IT TO THE NEXT LEVEL

If you would like to extend the duration of this work and/or stretch the more advanced students, we recommend:

- Place a thermometer in a shaded and non-shaded area and monitor the temperature differences in set periods over the course of the day. Students can graph their findings.
- Watch the following video and discuss other options for active cooling in outdoor spaces [https://www.ted.com/talks/wolfgang\\_kessler\\_how\\_to\\_cool\\_outdoor\\_spaces?utm\\_campaign=tedsread&utm\\_medium=referral&utm\\_source=tedcomshare](https://www.ted.com/talks/wolfgang_kessler_how_to_cool_outdoor_spaces?utm_campaign=tedsread&utm_medium=referral&utm_source=tedcomshare)
- Beyond shade, trees also have a huge role to play in reducing air pollution. Watch the following video and consider the added benefits of trees! <https://youtu.be/aKyvGHycngM>

Our Map My School GIS package follows the same concept as this work, but with more advanced geospatial analysis and the opportunity to learn how to use the industry standard ArcGIS Pro. So if you are up for the challenge, check it out!

