School Heatwave Vulnerability and Adaptation Fieldwork

This resource has been developed by Rob Gamesby (Cool Geography) for the Royal Meteorological Society and the Field Studies Council for the National Festival of Fieldwork.

Age range

Aimed at 11-14 but could be used for older or younger students with appropriate adjustment.

All resources are editable to fit the context of your school. I have attempted to make generic resources that can be adapted, I had my own school in mind (in the North East of England) when creating them, but they should fit most schools.

The resource is best used during a period of warm, sunny weather in the summer when the school heating is off.

Overall Rationale

All schools in England have to produce a Climate Action Plan, and part of that action plan involves assessing the schools vulnerability to extreme weather, such as heatwaves, and taking actions to reduce the risk of extreme heat.

These fieldwork options are designed to get students in our schools to explore how vulnerable their school is and what can be done to adapt to that risk.

“The DfE Sustainability and Climate Change Education Strategy (2022) states that young people can participate in the implementation of climate adaptation measures.

A Climate Action Plan should typically cover four areas, to align with DfE’s sustainability and climate change strategy: including adaptation and resilience, such as taking actions to reduce the risk of flooding and overheating.

For many schools, the risks of extreme heat – heat waves, are higher than the risks of climate-related flooding.

Heat-related illness can range from mild heat stress to potentially life-threatening heatstroke. The most common risk from heat is dehydration (not having enough water in the body) and sunburn. If sensible precautions are taken, children are unlikely to be adversely affected by hot conditions. However, all staff should look out for signs of heat stress, heat exhaustion and heatstroke.

However, even without causing illness, heat can have an adverse impact on student’s ability to learn and wellbeing.

In 2022, temperatures of 40°C were recorded for the first time. By 2100, the UK could see 40°C every three to four years unless we as a global community take very rapid action to limit the amount of greenhouse gases in the atmosphere.”

Prof Sylvia Knight, Head of Education, Royal Meteorological Society

June 2024
**Overall objectives**

- Students should understand what extreme heat events are and the potential risks and challenges they pose to schools in particular.
- Students should explore a range of different ways to collect data in a fair and representative manner including sampling.
- Students should be able to design a simple sampling plan to collect data around their school.
- Students should investigate how vulnerable their school is to extreme heat, they can explore external surfaces and environments, the importance of tree cover, and/or which rooms inside the buildings pose the most risk.
- Students should be able to present their collected data results in a range of different ways either by hand or on Excel.
- Students should consider these results and establish options for how their school can be improved to cope with Extreme Heat events.

I have framed the scheme around one central question – “Can my school adapt to and resist a heatwave?” This puts the key geographical concepts of adaptation and resilience at the heart of the scheme, not mitigation. Schools cannot mitigate climate change enough to prevent heatwaves on their own. So, students and teachers are focussing upon what can be done to protect the members of their school community during such events.

**The lessons**

As well as background information for teachers and the school’s Sustainability Lead, there are four lessons available to you, a launching lesson with some questionnaire options, then three fieldwork options.

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**Launching lesson, "what is extreme heat" then 3 fieldwork options**

1. **OUTSIDE** – what impacts do micro-environments have on temperature?
2. **OUTSIDE** – what impact do trees have on temperature?
3. **INSIDE** – Which rooms are most vulnerable to extreme heat?

You may want to follow these lessons up with a lesson researching adaptation options for your school and designing a plan to cope with extreme heat. This could include behaviour options (changing the start and finish of the school day, relaxing uniform requirements etc.), planting trees, putting in water features, light coloured surfaces, green roofs, shades and blinds, etc. Students could consider logistics, cost, effectiveness etc.
Lesson 1 – Introduction and Background

Resources

PowerPoint – Introduction and Background
Word document – Reminiscences Sheet
Word Document – School classrooms heat questionnaire OR Microsoft Forms Questionnaire

Aims and objectives.

Students should understand what extreme heat events are and the potential risks and difficulties they pose to schools in particular.

Students should start to consider what risks extreme heat events pose to their school community.

Tasks and guidance

1. Students are to watch the weather forecast for 2050 and consider what that would be like for them.
2. The background to Heat and Climate Change – slides 4 to 9 covers past heat wave events in the UK and the impacts those have had. They also consider the impact the climate crisis is having on extreme heat within the UK. The students should work through slide by slide. Some slides will promote discussion, such as slide six.
3. Slides 11 to 18 cover climate change and its impacts, plus what other countries such as France are doing to deal with increasing summer temperatures. The intention is not to go into the detail of climate change (excellent resources are available at the RMetS Weather and climate teaching guide for a more in depth study) but to offer an overview and link it to extreme heat.
4. Slides twenty to twenty-two introduce the students to the concepts of adaptation and resilience, which underpin the whole fieldwork rationale. The tasks will help the students think about these key Geographic ideas.
5. You could then introduce the fieldwork element that will follow in the next couple of lessons.

Homework – You could use the reminiscence questionnaire resource to get the students to investigate public memories and experiences of heat waves and extreme heat. The reminiscences responses could be collected and displayed on a map or timeline, or collected as ‘positive’ or ‘negative’ memories of past heat waves – do people just tend to remember that the weather was good, and not that people died because of it?

Alternatively, you could use the school classrooms questionnaire to collect data from a sample of students about which classrooms in the school are most or least comfortable when the weather is warm. The responses could again be collected together.
<table>
<thead>
<tr>
<th>Fieldwork Option 1 – The school grounds and micro environments</th>
<th>Fieldwork option 2 – What impact do trees have on temperature.</th>
<th>Fieldwork option 3 – Which classrooms are most vulnerable to extreme heat?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>External Surfaces Fieldwork data Sheet – Excel File</td>
<td>External TREES Fieldwork data Sheet – Excel File</td>
</tr>
</tbody>
</table>

Aims and objectives.
- Students should be able to design a simple sampling plan to collect data around their school.
- Students should investigate how vulnerable their school is to extreme heat, they can explore external surfaces and environments, the importance of tree cover, and/or which rooms inside the building pose the most risk.
- Students should be able to present their collected data results in a range of different ways either by hand or with Excel.
- Students should consider these results and establish options for how their school can be improved to cope with Extreme Heat events.

Tasks and guidance

### Sampling plans
- Go through the idea of sampling approaches and get the students to design their own simple sampling plan. They could present their plans together and in front of the whole class. What are the positives and negatives of those plans?
- **Launch the fieldwork** – explain how the simple fieldwork equipment like light meters and thermometers work. Get the students to understand which different areas of the school they will visit.
- **Collect the data** - the students can put their results on the Word document or directly onto the Excel spreadsheet.
- **Present the data** – use the Excel spreadsheet to produce prepopulated graphs and maps or get the students to draw their graphs by hand.
- **Write about the graph**, with particular reference to “Can my school adapt to and resist a heatwave?” The PowerPoint takes the students through this process.

### Sampling plans
- Go through the idea of sampling approaches and get the students to choose between the radial plan and the transect plan. What are the positives and negatives of those plans?
- **Launch the fieldwork** – explain how the simple fieldwork equipment like light meters and thermometers work. Get the students to understand which trees they will visit. Mature trees will yield better results.
- **Collect the data** - the students can put their results on the Word document or directly onto the Excel spreadsheet.
- **Present the data** – use the Excel spreadsheet to produce prepopulated graphs and maps or get the students to draw their graphs by hand.
- **Write about the graph**, with particular reference to “Can my school adapt to and resist a heatwave?” The PowerPoint takes the students through this process.

### Sampling plans
- There are two approaches here – room sampling or a few rooms through the day. I have not put the sampling information on this PowerPoint but it could be moved into this lesson to get the students to think about WHICH rooms they sample across the school.
- **Choose an approach** – there are four different ways to do this. It would be an idea to select one for your classes. For the room sampling prewarn your colleagues that they might get a visit from your students to do this fieldwork.
- **Launch the fieldwork** – explain how the simple fieldwork equipment like light meters and thermometers work. Get the students to understand which different areas of the school they will visit.
- **Collect the data** - the students can put their results on the Word document or directly onto the Excel spreadsheet.
- **Present the data** – use the Excel spreadsheet to produce prepopulated graphs and maps or get the students to draw their graphs by hand. They could draw heat maps for the rooms.
- **Write about the graph**, with particular reference to “Can my school adapt to and resist a heatwave?” The PowerPoint takes the students through this process.