

## Climate Map

### **Abstract**

How is your community doing in terms of climate change? Do you have any operational adaptation or mitigation measures in place? Explore the risks and vulnerable sites that should be noted by the local people and local government. Take advantage of this minilesson and get a locally created thematic map showing sources of climate risk as well as existing adaptation and mitigation measures. Based on a set of orientation questions, students explore their community in depth and draw links between local topics and contexts. They map their knowledge using a unique set of graphical symbols. The resulting map describes the climate situation of the community. The minilesson helps students to realise that climate problems exist in their community, too, and to find out how it is doing in terms of climate change.

### **Unit type and duration**

Six consecutive 45-minute lessons; can be implemented as a day-long programme.

### **Target group**

Grades 8–9, upper secondary programmes; if necessary, the minilesson can be adapted for Grades 6–7.

### **Context and cross-curricular links**

Above all, the minilesson integrates the following subjects: Geography; Biology; Civics education; and Arts.

### **Goals and outputs**

Goal: The students examine the current situation of their community with regard to climate. They find out that climate change is also a local phenomenon, one related to their lives, and realise how climate change affects themselves, their community, and local nature.

Outputs:

- Students create a basic local map.

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- Students gather concrete information about existing adaptation and mitigation measures in their community.
- Students identify a few places that are either vulnerable to climate change or worsening the impacts of climate change.
- Students summarise their findings and evaluate the situation of their community in terms of climate change.

## **Outline of the activities**

### **Activity 1: Creating a local map**

Duration: 5–30 minutes depending on map type.

Location: classroom

Materials: crayons and colour markers, flipchart sheets, alternatively access to computer and the Green Maps app.

Activity description:

Start by inviting students to create a large-scale map of the community or a local area of interest. Make sure the map is large enough to fit the necessary symbols during subsequent activities. The method of creating the map is up to the students. We recommend, for example, drawing the map on several connected flipchart sheets or using an existing set of symbols denoting typical local infrastructure. Alternatively, download an online map and print it out (large enough) or use the [Green Maps](#) app to create your entire Climate Map.

Now inform the students they are going to gradually add climate information, namely climate risks and existing adaptation and mitigation measures.

### **Activity 2: Mapping risks and adaptation/mitigation measures**

Duration: 45 minutes for instructions, approx. 60–90 minutes for teamwork

Location: outside in the community

Materials: [Climate Map](#) student worksheet, [Printable Symbols](#) worksheet.

Activity description:

We recommend dividing class into small teams (each with approx. 4 students). Each team obtains the worksheets to guide the focus of their local investigation. The students will investigate three phenomena:

- climate risks
- adaptation measures
- mitigation measures

Choose as necessary between either gathering all information during a single walk or teaching several thematic lessons, first on risks, then adaptation, and finally mitigation.

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Similarly, choose between assigning all three phenomena to each team or creating specialised teams (some for adaptation, others for mitigation, etc.) Either all teams will investigate the entire community or different local areas will be assigned to the different teams.

Now clarify to students what we mean by sources of climate risk, namely either sites that are vulnerable to climate change or sites that worsen the impacts of climate change (e.g. make the place even warmer). Present the typology of sites (see table below) to look for in the community. For each type, try to give an example what it can look like in reality. E.g.: heat accumulates in large concrete areas, resulting in higher temperatures. There are likely sites for which students will want to indicate several types of risk – that is okay. Attached is basic information on the ways each type of site contributes to the impacts of climate change.

#### Rising temperatures

- harvested fields around town
- urban areas without vegetation – typically industrial parks
- town centres – mainly concrete squares, high-traffic roads (cars warm their surroundings, especially in traffic congestion)
- housing estates – mainly new developments that are not yet sufficiently vegetated
- school compounds – concrete yards, bare sports fields
- non-permeable paving – concrete, asphalt...

#### Floods and heavy rain

- regulated rivers (those also increase the risk of drought)
- non-permeable paving
- gutters
- extensive roofs, especially in industrial parks, directing large amounts of rainwater into sewage systems and thus overloading both those systems and consequently water treatment plants, causing local floods

#### Drought

- may affect parks, urban green spaces, and forests
- is related to urban drainage through sewage and rainwater drainage systems: instead of evaporating, water is quickly directed away, hence the city is not cooled and there is no water for irrigation
  - regulated rivers
  - (non-permeable paving)

- Recap with students the different types of [adaptation measures](#) that can be implemented by local communities and under what climate conditions they might be suitable.

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- Mitigation measures – As prevention is fundamental to success, let us now consider and investigate what is helping to reduce the local production of greenhouse gasses (which are responsible for the greenhouse effect and in turn climate change). List the results on the whiteboard. See worksheets below for inspiration.
- Finally, invite the student teams to venture out to the community or selected local areas and map sources of risk and adaptation/mitigation measures as instructed in the worksheet (first go through the worksheet with class). Subsequently, ask students to gather information by not only conducting observation but also asking questions of community members. Also remind students that after returning to the classroom, they will be translating their findings (concrete measures and risks identified) into the Climate Map.

### **Activity 3: Summarising the measures identified and creating the Climate Map**

Duration: 45–90 minutes

Location: classroom

Materials: cut-out symbols of adaptation and mitigation measures, glue or pins etc., completed worksheets.

Activity description:

After returning to school, the teams take turns presenting what they found in the field and adding symbols to the map,

- stating why the given site is a source of climate risk, adding colour dots indicating the main type of impact of climate change related to the risk,
- introducing fellow students to the adaptation and mitigation measures they found and where, using symbols to indicate them in the map.

AT THIS POINT, OUR CLIMATE MAP IS COMPLETE. IT'S BETTER TO ADD A MAP KEY EXPLAINING WHAT THE SYMBOLS MEAN. THE CLIMATE MAP TELLS US WHAT KIND OF LOCAL ADAPTATION AND MITIGATION MEASURES WE HAVE IN PLACE AND WHAT KIND OF EXISTING CLIMATE RISKS THE COMMUNITY SHOULD RESPOND TO AND HOW – THAT CAN BE THE SUBJECT OF A STUDENT PROJECT.

Conclude by opening a debate in which students (in teams, individually, or together) will summarise their teamwork and individually reflect on the following aspects:

- state of risks – which sites are vulnerable and to what kind of climate situation,
- local adaptation measures (are they sufficient or insufficient, do they consist of a single type of measure, are they concentrated in one local area, etc.),
- mitigation measures – are the measures identified effective? Are there any others that are still missing but could be introduced?

### **Prerequisites and possible follow-up minilessons:**

Before implementing the minilesson, make sure students have basic knowledge about climate change, and especially its causes, impacts, and possible solutions (we recommend a mind mapping exercise with different colours assigned to causes, impacts, and solutions. This tells the teacher what students already know and what requires detailed attention). Furthermore, students should have a basic idea of the meaning of adaptation and mitigation measures; ideally, they should understand some measures or know about their strengths. We recommend playing our simulation game “Living in Clinton” or visiting selected websites, such as:

- <https://www.klimatickazmena.cz/cs/vse-o-klimaticke-zmene/mitigace-a-adaptacni-moznosti-na-zmenu-klimatu-pro-cr/>
- <http://www.opatreni-adaptace.cz/>
- <https://faktaoklimatu.cz/infografiky/adaptacni-strategie-cr>

One follow-up option is a student project to implement a concrete adaptation or mitigation measure. After a pilot presentation to the community, students could also introduce a set of recommendations and instructions on what every household can do, thus spreading awareness of climate change in the community.

### **Integrating the place and the community in the minilesson**

- the work takes place in a local area where students reside or go to school;
- while investigating the place, students should talk to local people and find detailed information, e.g. on risks – how people feel in selected local areas, what kind of solutions they would recommend; students can undertake a survey, distribute a questionnaire, etc.;
- one option is to invite experts before the minilesson to help explain adaptation/mitigation measures and risks or subsequently to evaluate/provide feedback on the new map and what students have identified and consider e.g. a risk;
- the new map is an input for decision-makers; students can present it to the local government and debate, inquire what the community is going to do about their findings, whether there are any plans in the making, or what they might implement together. The map can also be used by local people and presented in available media – a community newsletter, a bulletin board, a website, a video, etc.

### **Application of PBL principles and the PBL Rung attained**

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Principles:

**On-site learning** – As learning steps outside the school, the community and its surroundings become the classroom.

**Learning about the place** – By venturing outside, students learn new information about their community and get a new perspective on it, especially in view of local implications.

**Learning through the place** – Students learn about the implications of the global problem of climate change by examining the impact on their community and its preparedness for climate change.

**Learning for the place** – The subject students focus on is a genuine and serious one, and the outcome of their work, a climate map students understand, provides a real, tangible, and useful contribution to quality of life and environmental quality in the community while supporting its role in improving the environment globally.

**Place attachment** – The minilesson supports learning about new local places and reflecting on the ways one's community is prepared for local people to live a good life. The minilesson draws students' attention to the needs of their community and local people, thus providing an opportunity to build a place attachment.

**Adapting to local situation** – The learning process responds and is adapted to local conditions and needs. Since every place is different, the risks present in our community might be absent elsewhere. The measures that will work are designed specifically for our community (our street, our square). **Personal relevance** – Students find the learning process personally relevant, can see how it relates to their own lives. Students realise the impacts on their own lives and reflect on the ways they personally, together with others, can help prevent those risks.

**Active student involvement/participation** – While the topic is merely assigned to students, and the worksheets they are going to use are ready-made, an opportunity for active involvement does arise during summarising and the final work on creating the map: what works well in our community and what else we better get done, what to focus on.

**Community partnership** – The mapping part provides room for partnering with the community by asking questions of fellow citizens. Follow-up activities provide additional opportunities for promoting the principle.

**Interdisciplinarity** – The entire topic of climate change is interdisciplinary and cross-curricular, see section on context and cross-curricular links.

**Full-fledged teaching tool** – The minilesson integrates different areas across the curriculum. **Cooperation** – Learning occurs in the context of group work, with teamwork-based assignments.

Place-Based Learning Ladder (the rung attained by the minilesson is in bold):

Rung 1

Lessons are adapted by adding local examples to existing teaching units.

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## **Rung 2**

**Lessons are designed to include direct experiences of the place (or direct experiences of the place are added to existing teaching units).**

### Rung 3

Teaching unit is designed to use the advantages of the place and form a community partnership.

### Rung 4

Integrated teaching unit based on PBL that involves service learning and a strong community partnership.

## **Recommendations:**

- Climate risks – sometimes a site may belong to both categories (vulnerability and worsening the problem). For example, a harvested field is both vulnerable and exacerbates the problem by accumulating heat. What matters at this point, though, is for students to identify risk sites. There will be a time later to consider the type of risk involved. Clearly, this is an incomplete, partly subjective, and relatively limited analysis of actual sources of climate risk. We opted for this procedure because it is easily implemented. By discovering some types of sites, students realise that it is highly likely that some sources of climate risk exist in their community, while others may not be locally relevant.
- Mitigation measures – There are greenhouse gas reduction opportunities in all areas of human activity. Our worksheet only lists some areas and a few measures in each area. Students can be invited to individually consider mitigation measures and add to the list.
- After symbols have been added to the Climate Map, the teacher should ask follow-up questions: How was the work for you? What was surprising, what did you not know about? What did you have to ask other people about? And in contrast, what did you find clear enough and did not even have to look for outside?