

# Educational Toolkit: The polluted Arctic

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## LESSON PLAN

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### Subject

Geography, ecology, nature management

### Topic

- Polar regions (Arctic)
- Anthropogenic pollutants
- Human impact on Arctic ecosystems

### Lesson goals—students will learn:

- Pollution that reaches the Arctic has the origin in other, sometimes (very) distant places on the Earth;
- Chemical, plastic and other types of pollution are harmful either for the people or the animals living in the Arctic;
- Ocean currents and atmospheric patterns transport pollutants from lower latitudes to the Arctic;
- Presence of some pollutants in the Arctic ecosystem means big changes in traditional way of life for indigenous population.

### Pedagogical framework

- STEAM learning
- Game-based learning and gamification

### Age range of students

- 13-14 (basic material)
- 15-19 (basic + advanced material)

### Didactical hours

- Lesson + worksheet + introduction to the experiment: 1-2 didactical hours
- Follow-up lesson with experiment wrap-up: 1 didactical hour

### Teaching materials and tools

Link to additional materials are given in 'Syllabus' and 'Materials for teachers' files.

### 21<sup>st</sup> century skills

- Information literacy
- Critical thinking

## Activity plan

Activity	Description	Time	Materials
<b>1. Orientation</b>	Each student writes down <b>three keywords</b> he/she associates with the Arctic. Snap ideas only. Basing on collected phrases, a <b>mind map</b> is created. Only the ideas connected with the topic of pollution in the Arctic should be selected. What kind of keywords weren't used in the mind map? What were the reasons for creating such associations by the students? Teacher introduces the topic using given materials.	'15	<b>BASIC MATERIAL*</b>
<b>2. Conceptualization</b>	Teacher discusses with the students the following issues: <b>1. why, how and from where the pollution reaches the Arctic? 2. what impact do pollutants have on people and animals living in the Arctic?</b> Students form their own ideas how to minimize threats in terms of pollution in the Arctic.	'15	<b>BASIC MATERIAL</b>
<b>3. Investigation</b>	Students familiarize themselves with the <b>worksheet</b> and do the exercises with the teacher's support. The activity might be done <b>individually or in groups</b> .	'25	<b>BASIC/ADVANCED** MATERIAL</b>
<b>4. Conclusion</b>	Teacher sums up the topic. Each student is asked to formulate one <b>take home-message</b> , write it down and pass it to the other classmate.	'10	<b>BASIC MATERIAL</b>
<b>5. Discussion</b>	<b>Wrap-up, Q&amp;A session</b> and clarifying the exercises solutions from the worksheet.	'15	<b>BASIC MATERIAL</b>
<b>6. Homework</b>	The <b>experiment scenario</b> is discussed. Teacher explains the details and hands-on materials for students. The experiment might be time-consuming therefore the way of organizing that activity is up to the teacher.	'10	<b>ADVANCED MATERIAL</b>
<i>6a Experiment</i>	<i>Activity done by students at home in accordance with tips given in the</i>		<i>ADVANCED MATERIAL</i>

	<i>experiment scenario. The time for completing the task is up to the student, and the deadline is set by the teacher.</i>	
<b>7. Follow-up lesson</b>	Activity dedicated to complete the topic with additional materials. Students present their findings from the experiment and discuss them. <b>Playing the game</b> is an optional activity.	<b>'45</b> <b>BASIC/ADVANCED MATERIAL</b>

<p><b>* Basic material:</b></p> <ul style="list-style-type: none"> <li>• presentation</li> <li>• webinar recording</li> <li>• worksheet—student version (basic section)</li> <li>• game</li> </ul>	<p><b>** Advanced material:</b></p> <ul style="list-style-type: none"> <li>• basic material</li> <li>• worksheet—student version (advanced section)</li> <li>• experiment scenario</li> <li>• 'additional materials' section in syllabus</li> </ul>
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