

## Teachers' Guidelines

**Title of the package:** Polar bear

### Information about the package:

**Brief Description:** The package concerns polar bear — an apex predator living in the Arctic. The material presents basic information about this animal and examples of its adaptations to cold Arctic climate.

**How does the package relate to STEAM education:** The package is focused on science and technology.

In terms of science there are polar bear's characteristics and possible scenarios of its evolution in the dynamically changing Arctic climate.

The technology issues are presented by the scientific activities of the Polar Bears International organization, which uses satellite transmitters in "Polar Bear Tracker" — monitoring program to track the routes of polar bears. The tracks created this way are visualized on the website. Basing of the presented data, students are asked to observe one polar bear and write down their comments for 30 days as one of the tasks available in the package.

**Keywords:** polar bear, adaptation, bear family, Arctic, apex predator.

**Age Range:** 14-16

**Didactical Hours:** 3 hours + 30 days individual student project of tracking a selected polar bear using the website: <https://polarbearsinternational.org/polar-bear-tracker>.

### Learning objectives:

The student will:

- know basic information about polar bears;
- describe the polar bear adaptations developed to survive in the Arctic;
- explain how changing climate could affect the future of polar bears;
- list representatives of the bear family and explain the term hibernation and relate it to polar bear's behaviour.

### Content of the package:

Link to the package: <https://graasp.eu/s/5mg7gt>

#### 1. Let's start

- basic information about polar bear;
- map of 19 polar bears populations distribution in the Arctic;
- exercise in which a student is asked to name the species from bear family;
- information about pizzly and short video, that shows the differences between pizzly and polar bear.

#### 2. Bet you didn't know that

- graphics and video with examples of polar bear adaptations to life in the Arctic;

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EDU-ARCTIC 2: from polar research to scientific passion – innovative nature education in Poland, Norway and Iceland receives a grant of ca. 245 000 EUR received from Iceland, Liechtenstein and Norway under EEA funds. The purpose of the EDU-ARCTIC 2 project is to: enhance the knowledge about nature, geography, natural resources, political specificities concerning polar regions and increase awareness of environmental issues and climate change, increase of interest in pursuing STEM education and careers due to enhancement of knowledge about scientific research, and their place in the modern world, familiarizing young people with scientific career opportunities; introduce innovative tools by way of an e-learning portal and effective methods of teaching science in schools

- definition of apex predator;
  - mind map exercise to create a food chain in which polar bear occupies the top position;
  - definition of hibernation with information if polar bears are able to hibernate/ sleep during winter;
  - exercise in which a student is asked to indicate whether selected representatives of the bear family might hibernate.
- 3. Track a bear**
- information about “Polar Bear Tracker” project organized by Polar Bears International;
  - description of 30 days project in which a student notes observations of one polar bear;
  - exercise in which a student is asked to create a few scientific hypotheses based on collected observations.
- 4. Your turn**
- description of polar bear’s diet;
  - exercise in which a student is asked to prepare two polar bear’s "menus": in the period of repletion and hunger;
  - information on what polar bears can eat when they have not enough food;
  - film about microplastic and plastic that can be found in Arctic waters;
  - activity in which a student is asked to explain why plastic is a threat to polar bears.
- 5. Design scenarios**
- exercise in which a student is asked to explain what the polar bears use the sea ice for;
  - film about shrinking the sea ice surface in the Arctic;
  - activity in which a student is asked to prepare two scenarios (positive and negative ones) concerning chances for polar bears to adapt to changing Arctic climate.
- 6. Wrap-up**
- the most important information about polar bears to test the student's knowledge presented in the form of separate graphics and presentation to download.

#### Guidelines for teachers:

**1. Let’s start – SLIDES 2-5**

Read about polar bear – ask your students to pick up ca. three facts about that animal and discuss them together. Do the exercise concerning bear family – why are those animals different? Check the meaning of word “hybrid” and discuss about advantages and disadvantages for such kind of animals.

**2. Bet you didn’t know that – SLIDES 6-9**

Learn about polar bear adaptations. Watch the film and create with your students a list of adaptations don’t mentioned in the presentation. Explain terms: food chain and apex predator and make together a mind map of Arctic food chain.

Discuss about hibernation: what’s this, what is its aim, and how it helps animals to survive in the Arctic (focus especially on pregnant female polar bears). Make a quest if brown bear and giant panda go to sleep during winter.

**3. Track a bear – SLIDE 10+ EDU-ARCTIC2 polar-bear-worksheet-1**

Carry out an experiment with your students. The aim is to track individual polar bear via Polar Bears International website for 30 days and make some notes. Full instruction you will find in EDU-ARCTIC2 polar-bear-worksheet-1 .PDF file.

*Please note:* That part of the activities may be treated as additional project for the students.

**4. Your turn – SLIDES 11-13 + EDU-ARCTIC2 polar-bear-worksheet-2**

Prepare with your students a few propositions of polar bear menus. Use for that EDU-ARCTIC2 polar-bear-worksheet-2 .PDF file. Discuss main threats to polar bears focusing on microplastic problem. Watch short film on that topic.

**5. Design scenarios – SLIDES 14-15 + EDU-ARCTIC2 polar-bear-worksheet-3**

What would be the future for polar bears? Watch with students a film about Arctic sea ice and read the story from Polish Polar Station Hornsund. Do you hear about similar situations to that one presented? Create two scenarios concerning polar bears future using EDU-ARCTIC2 polar-bear-worksheet-3 .PDF file.

**6. Wrap-up** — Check what your students learn about polar bears. You can download presentation in .PDF file as well.

Additional resources and links, references:

**1. Additional resources:**

- *The official website for the Polar Bear Specialist Group of the IUCN Species Survival Commission*, <http://pbsg.npolar.no/en/>
- *WWF Arctic, threats to polar bears*, <https://arcticwwf.org/species/polar-bear/threats/>

**2. Definitions from Polarpedia – an online encyclopedia of the Arctic – used in the package:**

- *Polar bear*: <https://polarpedia.eu/en/polar-bear/>
- *Apex predator*: <https://polarpedia.eu/en/apex-predator/>
- *Hibernation*: <https://polarpedia.eu/en/hibernation/>

**3. Films used in the package:**

- *Pizzly bear*: <https://www.facebook.com/bbcearth/videos/2387712701337884/>
- *Polar bear adaptations*: <https://youtu.be/Xbx6bqCjTOE>
- *Arctic Sea Ice Reaches 2019 Minimum Extent*: <https://youtu.be/2XKYdSsqf2ss>