WATER IN ALL ITS FORMS - Suggestions of Activities (Apprendix 3)

Water - a „...liquid substance“, according to the Dictionary. For us - the human beings - water is much more than just a liquid. It is the base of almost everything. But not only people‘s lives depend on water, all animals in our environment need water to survive.
Most of the earth‘s surface is covered by water. For a good reason our planet is called „The blue Planet“. We take the existence and availiability of water for our daily consumption for granted.
However, the planet is dynamic. Especially in times of the anthropogenic climate change which becomes more and more a challenge for the society. The climatic consequences become visible every year: extreme weather phenomenons and temperatures, long drought periodes... .

Our this year‘s topic focuses on Water and all its forms. The aim is to get in touch with the mountainous environment and to experience the role of water.
In this sheet you will find suggestions for activities. At the beginning there are some questions (for example an icebreaker question) and three estimation activities. For the following questions you will need some equipment which is always written in the instructions.

Icebreaker Question:

Introduce yourself by saying your name, age and your motivation to participate at this event.
What do you associate with Water and Mountains?

Some Questions for the beginning

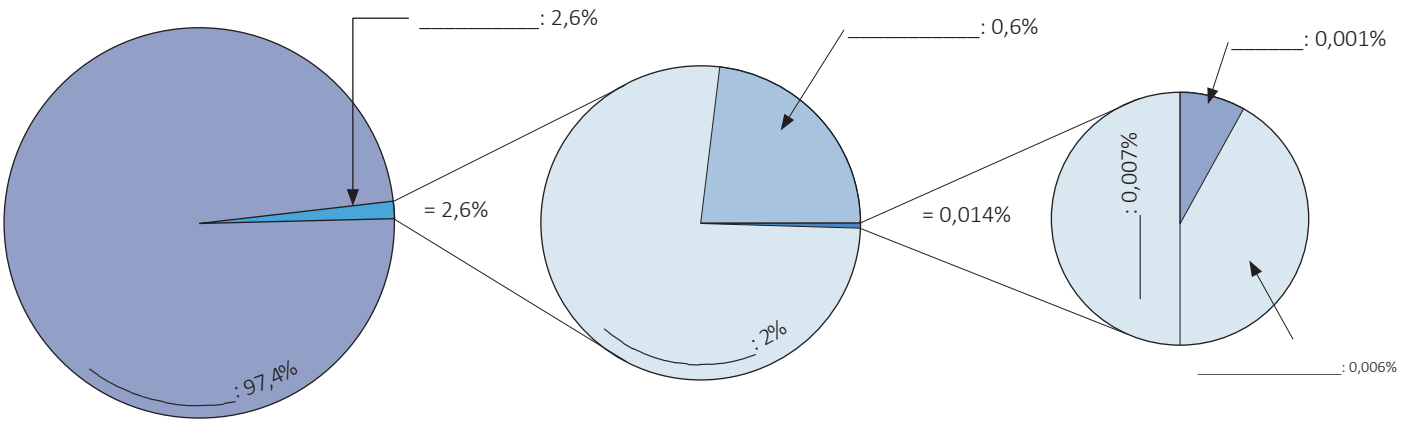
- In which forms does water exist in the Alps?
- In which physical states can water transform (liquid,..)? Does water occur naturally in all these states in the mountains?

Task 1: Water Covering on the earth

Below you can find three charts illustrating the water covering on the earth in percent values.
In a group, guess together which of the following water bodies fit in the empty white space:

Ground Water|Rivers|Plants and Animals, Water Vapour, Soil Moisture|Oceans and Seas|Glaciers, Ice Caps| Fresh Water|Lakes

The solution is in the annex.



Part 2: Water - the human being's elixir of life

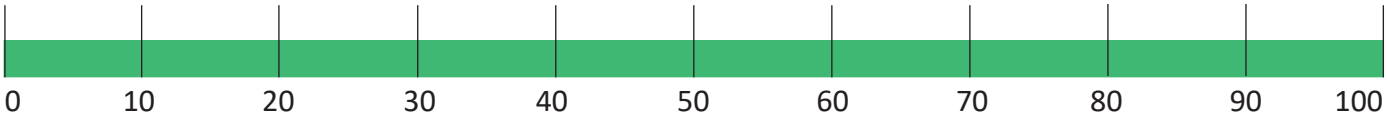
Water is our most important resource. We could not survive without it.
But why do we need water? What is the main function of water in our body?
Discuss together in a group about this topic.
In this chapter we want to discuss the importance of water, especially our water consumption.

To introduce this issue, please keep an eye on your drinking behaviour and especially the quantities you drink while hiking. Estimate together the following questions.

- How much do you drink in one hour/how many liters in one day?
- Can you notice a huge difference to your daily water consumption?
- How many liters of water should we drink every day?
- How many days could we survive without water?

Task 2: Estimating the importance of water for the body and our daily consumption

Below there is a chart going from 0 to 100. Each participant gets a coloured pencil. The task is to estimate how much water (in %) in our body is.



The solution is in the annex.

Our daily water consumption

We consume water every day. It starts by the first cup of coffee or tea, taking a shower, using the toilet and so on. So our daily activities imply a high water consumption.
In terms of numbers, this means an average consumption of 120 Liters per day/Person.

Task: Estimation of water consumption

In order to facilitate the estimation, we calculate with 100 Liters of water consumption. The goal of this game is to estimate the percentage of different usages at the total water consumption.
These 6 usages consist of:

- Toilet flush, • Doing the laundry, • Drinking and cooking, • Washing dishes, • Cleaning, • Hygiene

You need: 1 liter of water, 6 goblets per group (each group consists of 5-6 persons), 6 pieces of paper with the usages written on each paper. In small groups, fill in the goblets by the proportionate usage. Each group has to tell in which goblet they filled the highest and lowest quantity in. Compare the results.

Full game instruction (FR-Activité 2):
https://www.droledeplanete.be/fiche/44

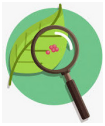
Part 3: Water and Biodiversity

Water is life. Our well-being, food security, health, sanitation and most economic activities directly depend on it – but it is nature that makes it possible for us to use it. Moreover, up to one million species need freshwater habitats. If ecosystems worsen, biodiversity gets lost.
Aquatic biodiversity is the rich and wonderful variety of plants and animals that live in watery habitats. It is important to sustain this biodiversity for the health of our environment and the quality of human life. The water quality is crucial for an effective biodiversity and ecosystem.

Task 3: Measuring the quality of water and Forming Nets

Before you investigate the water in a group, it is absolutely necessary to check the the water and the environment! The water body (lake, river) must be easily accessible without very deep spots. Local rangers usually know the environment very well.

Information about the water quality:
Several indicators can give us information in order to assess the water quality. For example the animals living in the water have specific needs (a certain content of oxygen) which can be helpful for our study. Scientists measure this with a special index called *saprobity index*. The aim is to measure the oxygen content and the availability of nutrition for the animals. There are lots of aquatic species that are adapted to nutritious water or even like muddy areas. We would rarely see these species in uncontaminated clear water bodies.
Several quality levels were developed in order to determine the water quality.



Aim:
• Looking for Animals and determination of the water quality • handling with magnifying glasses, binoculars and informative books • Raising the attentiveness in the nature (treating animals carefully) and the awareness of changes due to the human being (for example water pollution)

Material you need:
• Binocular; Magnifying glasses • Plastic bowls; Brush • Landing net • Cards for assessing the water quality (There is an english example in the Annexe) • Cord

Structure:
Divide into small groups of 3-4 persons. Each group gets 1-2 landing nets, brushes, plastic bowls, magnifying glasses and an above-mentioned card. The groups are ready for the research. Many underwater species hide under bigger stones. Slowly brush the organisms from the stone on to the magnifying glass. Put some water on it before. With the support of the binocular and a book for animal determination, the children can find out which animals they found. Notice the name and let the animals free. You should do this several times for a respresentative result. At the end, you can determine the water quality with the Card (See in the **Annexe**). Compare your results with the other groups.

Forming Nets

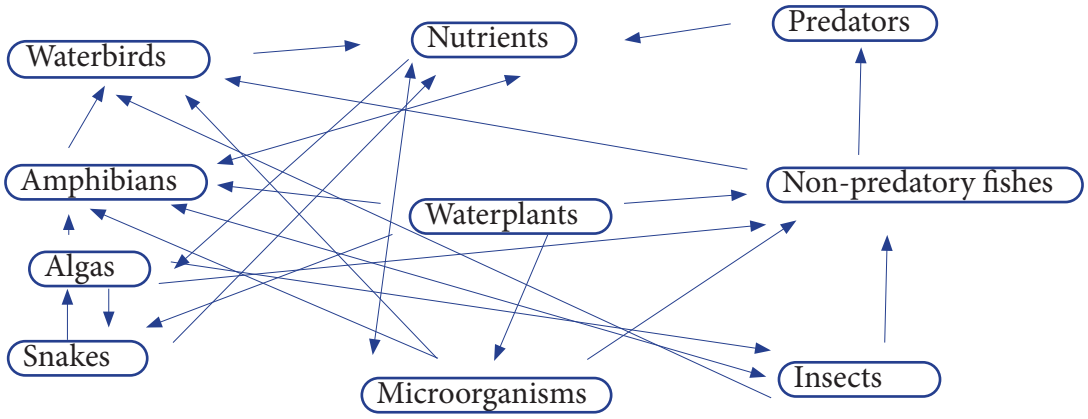
After having examined the wildlife and the plants in the water it is time to understand the inter-dependencies of the animals each other and the role of biodiversity. You only need a cord for this experiment.

Structure:
The participants form a circle. The leader/ranger stands at a corner holding a ball of cord in the hand: The game starts with the question: „who can name an animal that lives in the water?...Answer (example): „The dragonfly larvae“, the person naming that animal holds the cord at the beginning. „Who eats dragonfly larvaes?“ -> „Frogs“. The person saying frog goes to the end of the cord. The game continues this way and the animal eating the frog goes to the end of the cord. The children learn how animals are related to each other building a network. They create a simplified ecosystem.

You find the entire instruction on the following link (only in German): https://www.oekoprojekt-mobilspiel.de/download.php?file=download/download_64/0604_Leit_H2O_Screen.pdf (Page 17 ff.)

Illustration: Aquatic Food Web

The next illustration shows you the food web in the water. The arrowhead shows in the direction of the consumer. For example: Predators eat non-predatory fishes. If the arrowhead shows in both directions, a substrate transport can lead to these organisms and away.



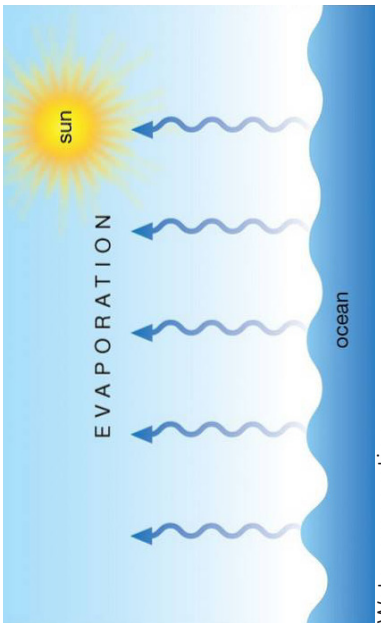
Part 4: Climate Change and its consequences for the glaciers

The French Alpine river Rhône illustrates how global warming could influence river flow, not only through changes in precipitation but also through the effect on snow and glaciers. These are essential elements of the hydrological cycle in mountain regions such as the Alps. Scientist predict an increase in winter precipitation and a decrease in summer rainfall. The amount of snow will reduce and glaciers will melt. The consequences of this change are immense:
rising sea levels, oceans become warmer, long and intense droughts lead to crop losses, wildlife and freshwater supplies are threatened ...

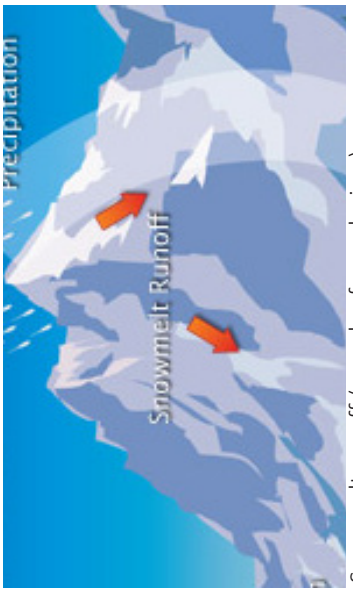
In this part we want to discuss the climate change and how it effects the hydrological cycle. Therefore, we prepared maps from the Alps and the Carpates including rivers, lakes and glaciers (only in the Alps).

Task 4.1: Hydrological Cycle - Pictures

This task is about to determine picture describing the hydrological cycle. Describe with your leader what you can see on these pictures. Afterwards, try to bring these pictures in the right order.

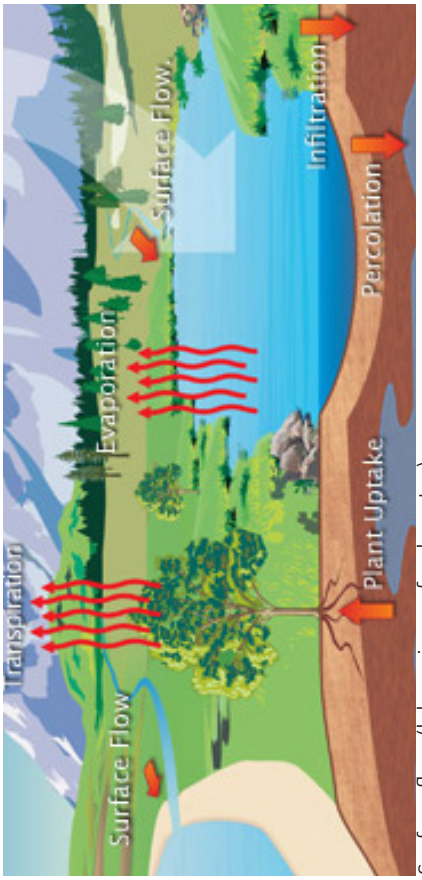


Water evaporation



Snowmelt runoff (e.g. also from glaciers)

Water condensation and transportation



Surface flow (lakes, rivers- fresh water)

Task 4.2: Hydrological Cycle - Cards

In this step we want to discuss the hydrological cycle of water more precisely. Below, you find disordered cards. The goal of this game is to put these cards in the right order to describe the hydrological cycle. You can cut these cards out.

When meeting warmer air they start to condense and come back to the earth as precipitation

The evaporated water rises in gaseous form as water vapor into the atmosphere; Water droplets and ice crystals accumulate there and form clouds or fog

Back flow of groundwater – water from various layers of soil flows away and reaches "receiving water" (rivers or streams flow into lakes or seas)

The accumulation of water in the air can be transported by the wind

Water can seep in different options: snow and ice in cold regions or it collects in lakes and rivers. When falling on land areas it drains and acts as a water supplier for the vegetation

The evaporation process starts again

The sun heats water in seas, lakes and rivers and it evaporates

Only fresh water evaporates, salt remains in the seas

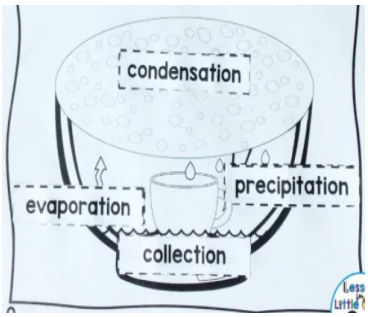
When drops grow, they become too heavy and start to sink

Task 4.3: Hydrological Cycle - Do it on your own

Now we put our knowledge into practice by create the effect of a hydrological cycle in a simplified example.

Material you need: Large bowl, mug or small cup, plastic wrap, string or large rubber band, water, (salt), SUN :) (the sun and salt accelerate the process)

1) Place the mug/small cup in the center of the bowl. Fill the bowl with water about 2/3 of the way up the cup (Note: don't put water inside the cup!) and add some salt (3-5% of the water quantity)
2) Cover the bowl with plastic wrap and either tie it with string or place a large rubber band around it to fix the plastic wrap.
3) Place it outside in a sunny area as long as possible
4) Observe the bowl after a couple of hours. The pllastic wrap will have condensed and some of the condensation will have fallen into the cup/mug



You can find more information on this website:
https://lessons4littleones.com/2015/04/15/water-cycle-rain-cycle-science-experiments/

Task 5: Illustrating the greenhouse effect

Without the greenhouse effect, life on Earth as we know it would not be possible. The greenhouse effect is a very natural and essential process. It has been around for millions of years.
During the day, the sun shines on planet Earth. But only about one half of the sun's energy actually reaches the Earth (26% of the solar energy (energy from the sun) is lost in space, and 19% is absorbed by atmosphere/cloud).
At night, most of the sun's energy escapes back into space. Most but not all. Thanks to the greenhouse effect, some of the heat is trapped in the atmosphere, and it protects us from the chill of space. The greenhouse effect is what keeps the Earth's temperature stable.

Let's see how it works with this easy outdoor experiment.

Material you need: • two thermometers, • a clear bowl, jar, or vase and something to cover it

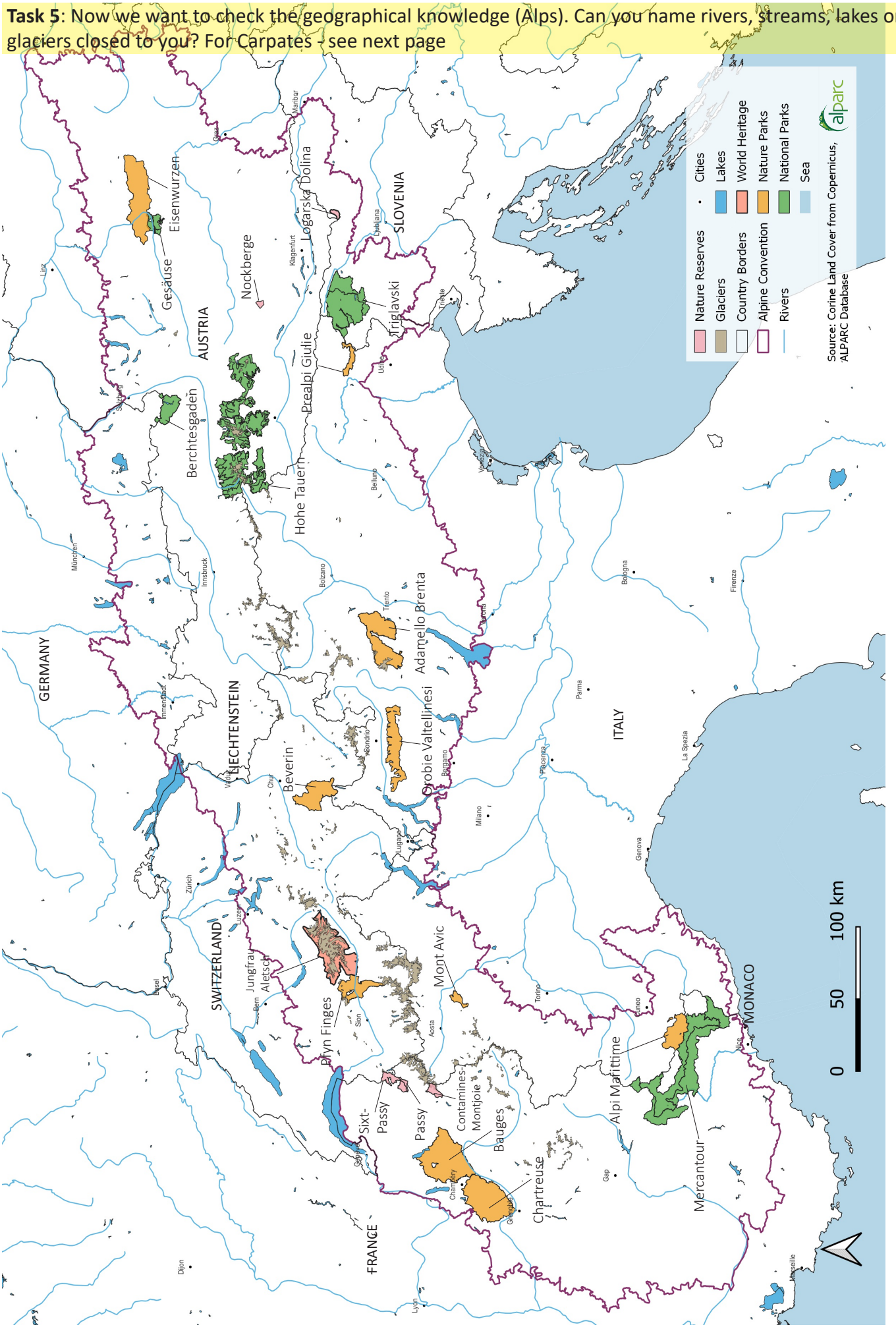
What to do:

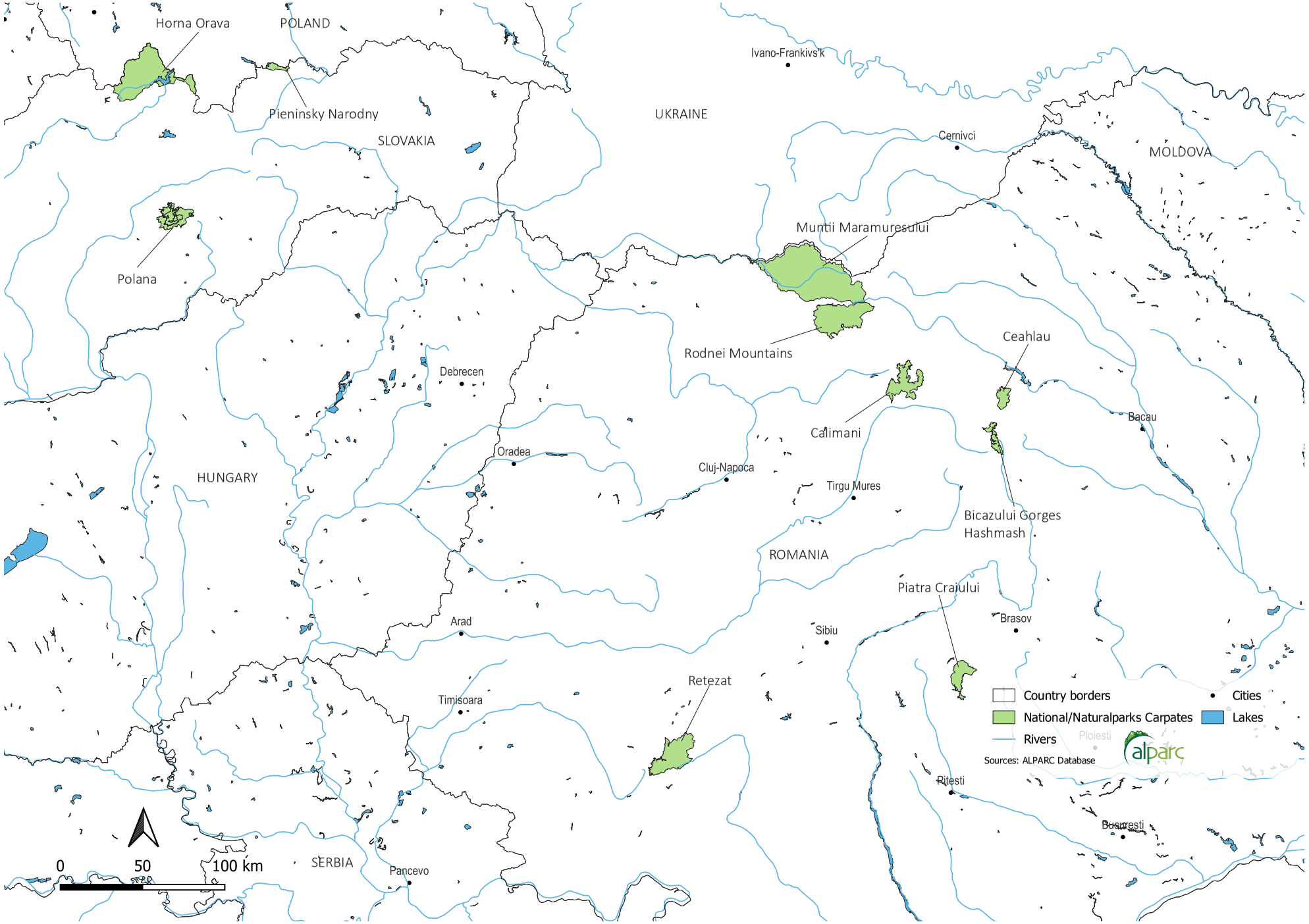
1) Lay both thermometers for a few minutes outside in a sunny area.
2) Mark down the time and the temperatures of both thermometers on your record sheet (link ours).
3) Place a vase in the sun with a thermometer in it. Cover it with a plastic wrap or a dark t-shirt.
4) Place the second thermometer next to the bowl (not in the shade).
5) Record the temperatures on both thermometers every 5-10 minutes.

Why are the temperatures inside and outside of the vase different?

Record your observations in a notebook or just a sheet of paper.

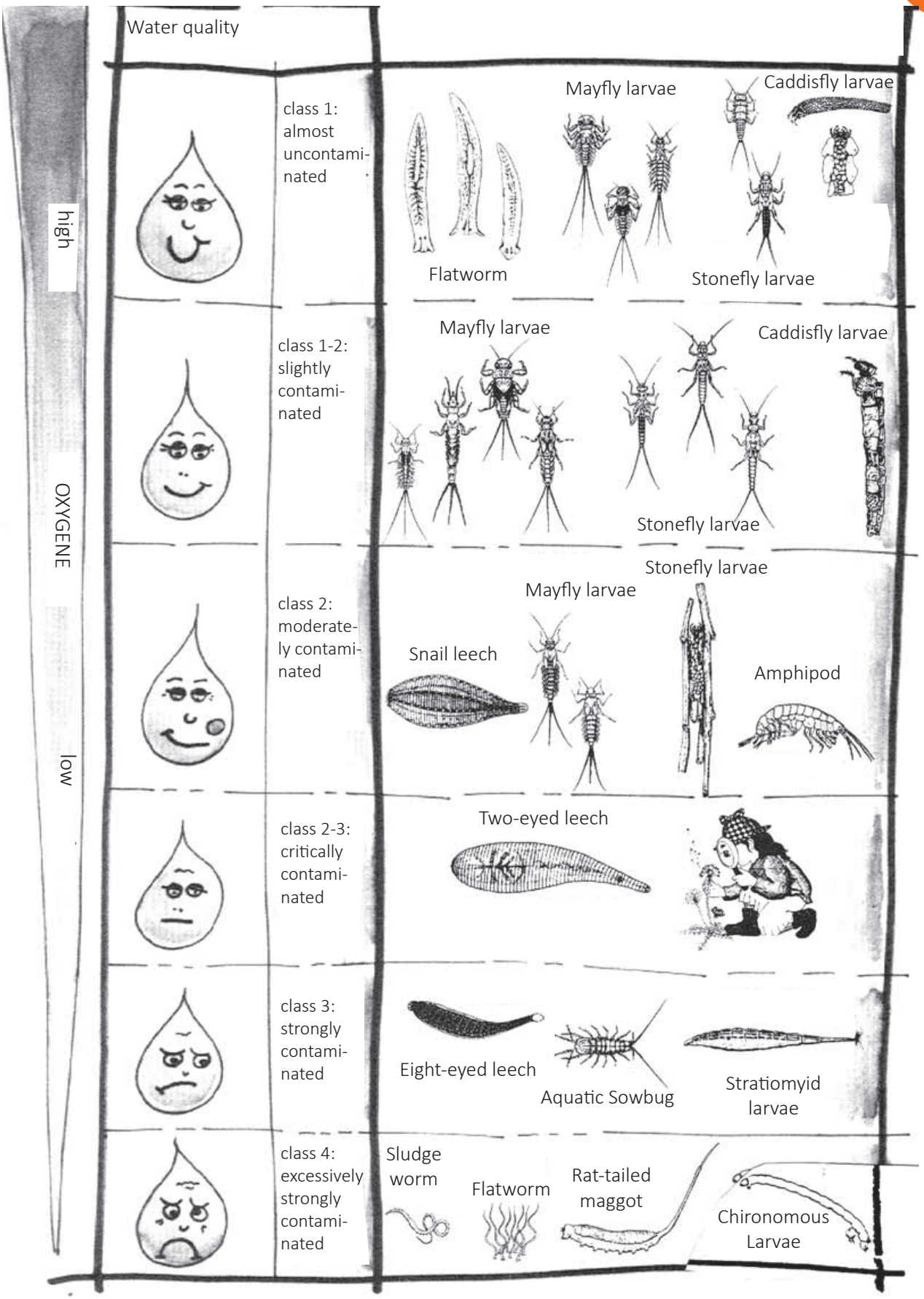
Task 5: Now we want to check the geographical knowledge (Alps). Can you name rivers, streams, lakes or glaciers closed to you? For Carpates - see next page



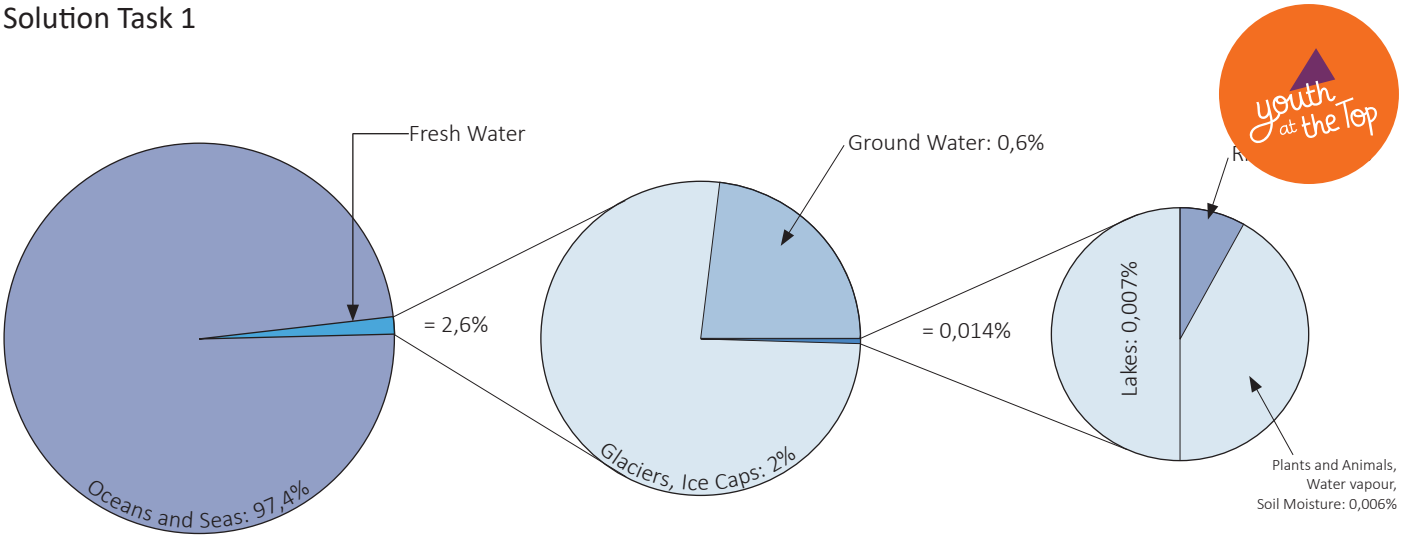

Horna Orava
POLAND
Pieninsky Narodny
SLOVAKIA
UKRAINE
Ivano-Frankivs'k
Cernivci
MOLDOVA
Muntii Maramuresului
Polana
Rodnei Mountains
Ceahlau
Debrecen
Calimani
Bacau
Oradea
Cluj-Napoca
Tirgu Mures
HUNGARY
Bicazului Gorges
Hashmash
ROMANIA
Piatra Craiului
Brasov
Arad
Sibiu
Retezat
Timisoara
Country borders
Cities
National/Naturalparks Carpates
Lakes
Rivers
Ploiesti
Sources: ALPARC Database
alparc
Ritesti
Bucuresti
SERBIA
Pancevo
0
50
100 km

ANNEX

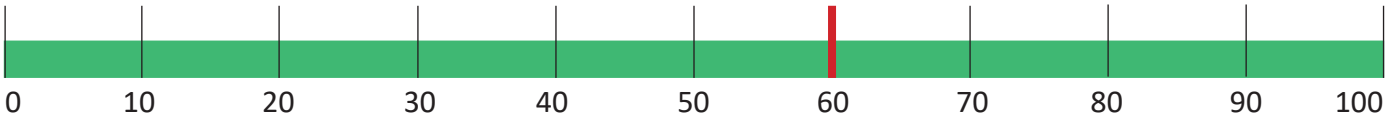
Card to determine the water quality



Solution Task 1



Solution Task 2



Up to 60% of our body consists of water. The brain and the heart are composed of 73% water, and the lungs are about 83% water. The skin contains 64% water, muscles and kidneys are 79%, and even the bones are watery: 31%.
Functions: Ogygen Delivery, needed by the brain to produce hormones, regulates body temperature (sweating, respiration), converts food to components needed for survival, keeps mucosal membranes moist, allows body cells to grow, major component of most body parts

Solution Task 4

1: The sun heats water in seas, lakes and rivers and it evaporates; 2: Only fresh water evaporates, salt remains in the seas;
3: The evaporated water rises in gaseous form as water vapor into the atmosphere; Water droplets and ice crystals accumulate there and form clouds or fog; 4: The accumulation of water in the air can be transported by the wind;
5: When drops grow, they become too heavy and start to sink; 6: When meeting warmer air they start to condense and come back to the earth;
7:Water can seep in different options: snow and ice in cold regions or it collects in lakes and rivers. When falling on land areas it drains and acts as a water supplier for the vegetation cipitation;
8: Back flow of groundwater – water from various layers of soil flows away and reaches “receiving water” (rivers or streams flow into lakes or seas); 9: The evaporation process starts again

References

- https://www.usgs.gov/special-topics/water-science-school/science/water-you-water-and-human-body
- https://www.droledeplanete.be/fiche/44
- https://www.globalwaterinstitute.unsw.edu.au/expertise/aquatic-ecosystems-and-biodiversity
- https://lessons4littleones.com/2015/04/15/water-cycle-rain-cycle-science-experiments/

Contact
ALPARC - The Alpine Network of Protected Areas
Daniel Meister (trainee)
daniel.meister@alparc.org
+33 (0)4 79 26 55 09 03

with the financial support oft