

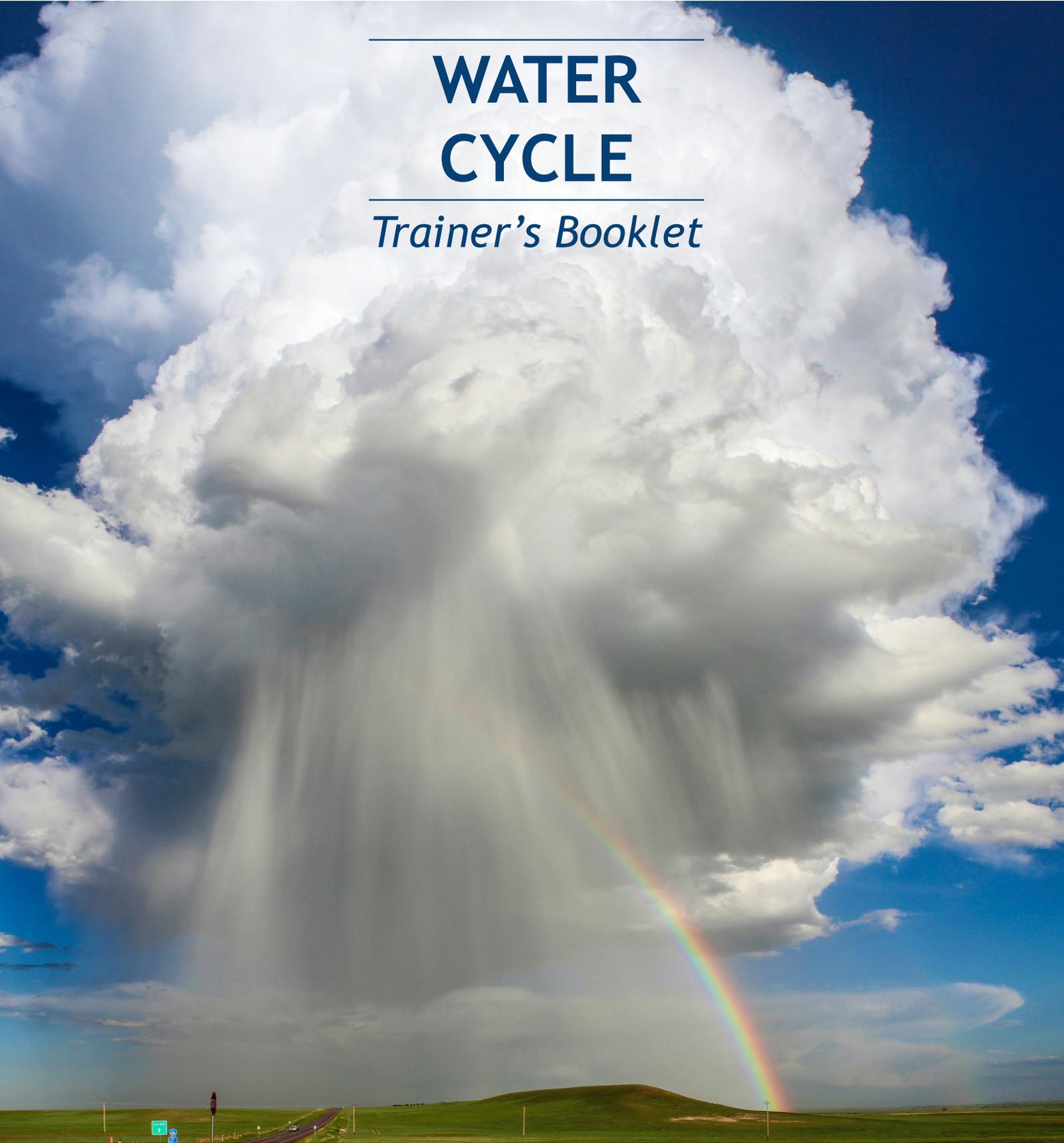


Project funded by
EUROPEAN UNION



WATER CYCLE

Trainer's Booklet



Common borders. Common solutions.

www.blacksea-cbc.net



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**BIOLEARN-BSB142
ECO-CONSCIOUS MINDS TO STOP POLLUTION
IN THE VALUABLE WETLANDS OF BLACK SEA BASIN**

WATER CYCLE

Trainer's Booklet

Target Audience: 8-14 years old



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District Government of Enez

Gaziömerbey Mahallesi
Cumhuriyet Meydanı Hükümet Konağı
Enez / Edirne
Phone: +90 284 811 6006
E-Mail: enezkaymakamligi@gmail.com

Prepared By

Bilgesu Güngör Tural
Tora Benzeyen

Design

OmaOma Medya ve Yayıncılık
Erden Gümüşçü / Creative Director
Emirhan Demirci / Graphic Designer

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About The Project

BIOLEARN (Eco-Conscious Minds to Stop Pollution in the Valuable Wetlands of Black Sea Basin - BSB142), which was initiated on 01.01.2020 within the scope of the first call for proposals of “Joint Operational Programme Black Sea Basin 2014-2020” where the Directorate for EU Affairs is the national authority, is led by District Government of Enez.

Representatives of the following partners are as follows:

1. District Government of Enez-Turkey
2. Division Directorate of Edirne under First Regional Directorate under General Directorate of Nature Protection and Nature Parks of Ministry of Agriculture and Forestry - Turkey
3. Foundation Caucasus Environment - Georgia
4. Agricola NGO - Ukraine
5. Green Balkans / Stara Zagora NGO - Bulgaria
6. Management Body of Evros Delta and Samothraki Protected Areas - Greece

The overall objective of the project is to provide information, experience transfer and capacity building training between partners and develop a common environmental protection and education approach, methodology and organizing campaigns that will raise awareness in the society to reduce pollution in important wetlands in the Black Sea Basin.

The main activities to be carried out within the scope of the 26-month project are as follows:

1. Establishment of a total of 4 environmental protection and training centres, one of which is on the shores of Gala Lake, and providing environmental protection training to visitors and especially to students. By providing equipment for the other 6 existing centres, there will be a network of 10 activity and training centres.
2. Workshops to be held in Bulgaria and Greece, focusing on discussions about examples of

successful training and awareness-raising campaigns for the protection of wetlands, sharing experiences and preparing the materials to be used in training which will be applied in all centres. Capacity building training for trainers.

3. Organizing massive and synchronized cleaning campaigns to reduce pollution in wetlands.
4. Award-winning photo contest and exhibition focused on wetland protection.
5. Organizing a wetland pollution-based painting contest and exhibition in primary and secondary schools.

Outputs of the Project:

1. “Stop Pollution” and “Save Nature” environmental education and activity centres, one of which is mobile, will be established in 5 countries and will sustainably carry out training and awareness-raising activities.
2. A report will be prepared on the nature and rate of pollutants in 5 wetlands in the Black Sea Basin.
3. A guide with examples of good practices consisting of training and campaigns focused on protecting wetlands will be prepared.
4. A wetland protection training set consisting of 12 sections will be prepared especially for students. Training sets will also be shared on the internet.
5. After 10 people from 2 each partner country received trainer’s training, they will train 25 people in each region (totally 125 people) and the sustainability of training activities will be ensured in the established centres.
6. A painting competition on environmental protection will be held in at least 15 primary and secondary schools and paintings selected by the jury will be exhibited.
7. Pictures taken in 5 regions with the participation of professional photographers will be exhibited. With the mobile ‘Stop Pollution’ vehicle, the exhibition will travel to 5 countries.
8. An environmental cleaning campaign will be held simultaneously with the participation of 1500 people in 5 regions.
9. With the international conference to be held in Georgia, the outputs of the project and future action plans will be shared with the public.

For more information, you can visit the project website: www.bio-learn.org



About The Booklet

This training booklet is a part of the training set prepared under the “BIOLEARN-BSB142 / Eco-Conscious Minds to Stop Pollution in the Valuable Wetlands of Black Sea Basin” project. The booklet is prepared to attract the attention of the countries in the Black Sea basin to the importance of wetlands, to prevent pollution in wetlands and to develop ecological literacy of the participants accordingly.

This training material targets groups age 8-14 and consists of two parts which are the educator booklet and participant booklet. The trainer booklet has detailed activity application instructions, necessary information on the subject, assessment questions and recommendations to enrich the activity.

Application Notes

 Before starting the activity, it is recommended to view the entire booklet and to get ready for the topic by using the information in the booklet.

 At the beginning of the activity, necessary materials and worksheets should be distributed to the participants.

 When activities are applied, it is important to undertake a facilitator/guide role and to ensure the active participation of the participants.

 The activities in this booklet are planned to be completed in a short time. All of these activities can be applied consecutively or one or two of the activities can be applied in desired order depending on the development stages and interest levels of the participants.

 Presenting the activities with a natural narrative rather than reading the information text in the instructions and keeping the interest of the participants with questions and answers would present positive benefits.

 The activity instructions can be followed exactly or adapted based on participants' ages, development stages and interest levels without diverging from the activity purposes.



Water Cycle

The water cycle is extremely important for the health of living and non-living beings on our planet.

What Is the Water Cycle?

Water is the source of our life and the most fundamental thing to survive. Such that, when astronauts travel to other planets, they try to find water as their first mission. They think that if there is water, there would be living beings. Just like our world!

There is water in every corner of our planet from oceans to the atmosphere and this water is continuously moving in a never-ending cycle. Sometimes it exists in liquid form in oceans, rivers, lakes and underground waters and sometimes it is stored as snow and ice on the poles and mountains by freezing into a solid form. Sometimes it evaporates



 This photograph was taken from the Apollo 17 space shuttle in 1972. Due to the large size of oceans and seas, the astronauts call our planet “The Blue Planet” since the first day they have seen it from space.

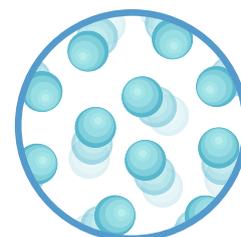
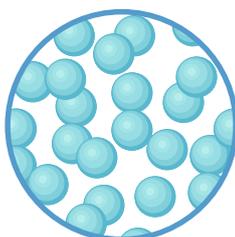
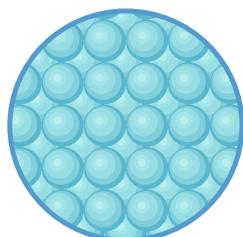
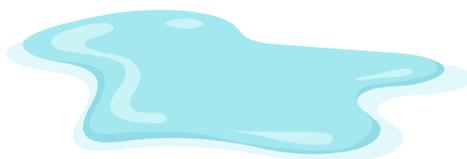
and mixes to the atmosphere in gas form to create clouds. The entire movement of the water is called the **water cycle**. This cycle has been working for 4.5 billion years without any interruption. The water that we drink today might be the same water drunk by mammoths or dinosaurs that lived thousands of years ago! The water we put in our glass and drink might be 4.5 billion years old... Have you ever thought about it like that?

The water cycle is extremely important for the health of living and non-living beings on our planet. First of all, water is the most fundamental thing for all living organisms to sustain their lives. For example, a human needs to drink 2-3 litres of water per day on average. In addition to humans, all other living beings need water as well. Water plays an important role in the climate of our planet. The formation of clouds, rain and snow or the formation of glaciers are the results of the healthy functioning of the water cycle.

Did You Know?

72% of the Earth's surface is covered with water. Most of this water is formed from seas and oceans and only 3% is freshwater. The majority of the freshwater is frozen in glaciers. Therefore, only 1% of the entire water on our planet is usable.





 The water will transform from solid to gas as the temperature increases.

Did You Know?

The water can directly transform from solid to a gas without a liquid state. This is called **sublimation**. In this way, the icebergs evaporate without melting and mix with the atmosphere.

Solid, Liquid, Gas: The Three States of Water!

Water has 3 different states on our planet: solid, liquid, gas.

The snow and ice formed by water freezing at low temperatures represent the solid form of water. The glaciers and snow that cover the top of the mountains, giant glaciers in the North and South Pole are the main places where the solid form of water exists.

The most frequently encountered form of water which is liquid can be found in every corner of our planet. Oceans, lakes, rivers, streams, wetlands and even underground

water are the main places that store the water in liquid form.

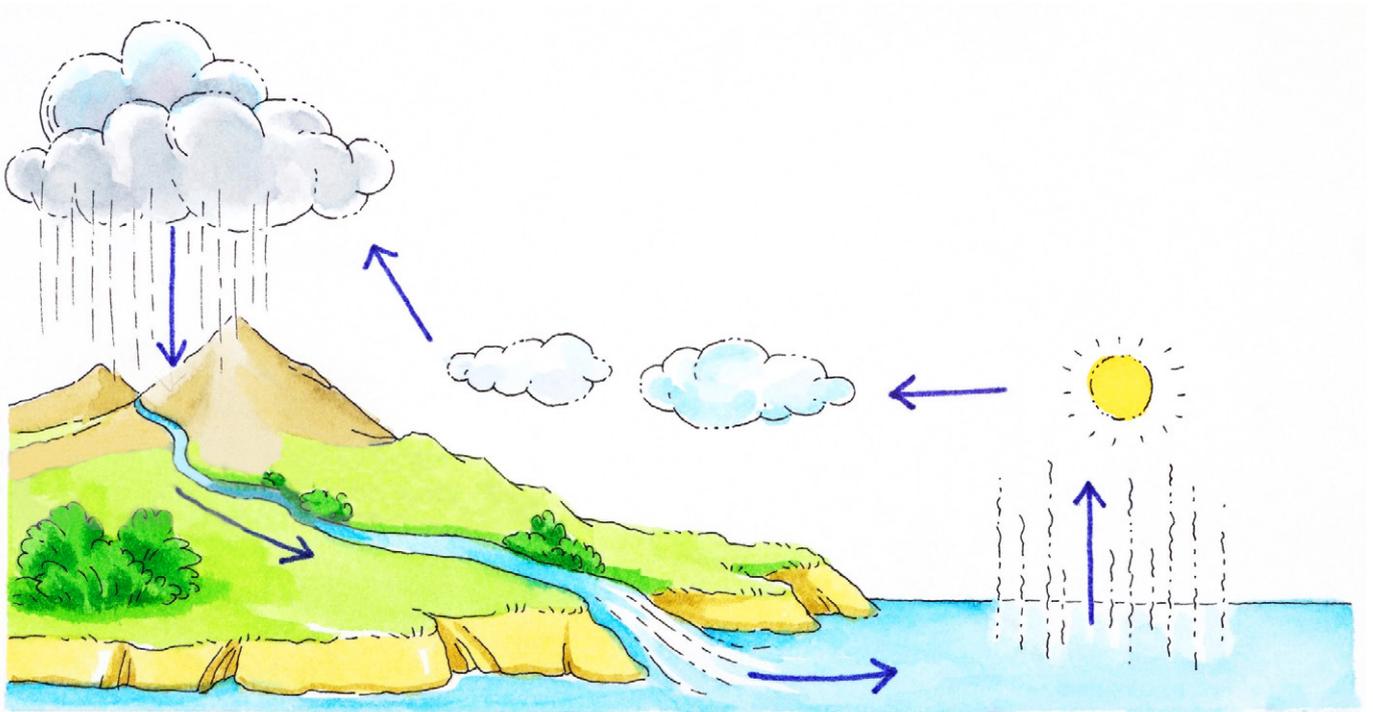
Lastly, there is the gas state of water. Water molecules, distributing to the atmosphere as water vapour, surround the entire planet. The atmosphere consists of approximately 4% water vapour. This ratio might change depending on the location and time. For example, while this ratio is almost 0% in a dry area, it could be 4% in a tropical region.

From Water Drop to Rain Cloud

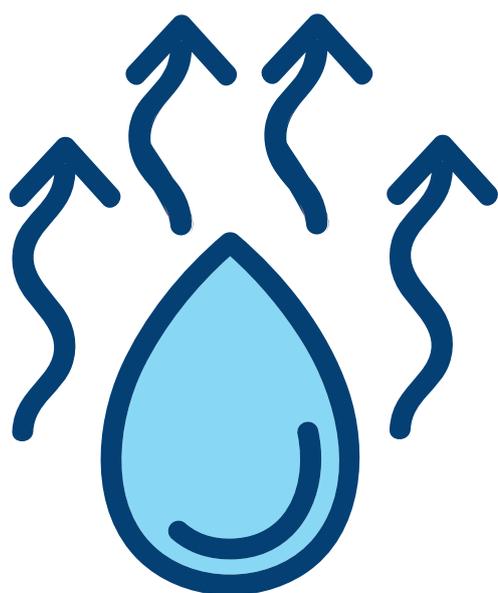
How can the glaciers on top of the mountain transform into the clouds in the sky?

The water cycle begins when the Sun rays reach the surface. These rays that reach our planet both provide light and radiate heat.

Water exists in every corner of our planet in solid, liquid and gas form and continuously changes place with the water cycle. The water cycle has continued for 4.5 billion years without any interruption.



Water cycle



In this way, the surface heats up slowly. As the water mass in the oceans, lakes and rivers heat up, the water **evaporates** and rises to the atmosphere in water vapour form. At the same time, plants and trees lose water from their leaves and this water is released to the atmosphere in water vapour form. This is called **transpiration**.

Water vapour reaching to the atmosphere raises to the upper layers. It gets colder as it goes higher and it transforms back to the liquid form to create the clouds. This is called **condensation**. The clouds formed by this event, which is the opposite of evapora-



tion, circles around the world in the sky. As the water amount in the clouds increases, the size and weight of the clouds increase. When the air cannot take any longer, the excess water drops to the ground as **precipitation** in rain, snow and hail form.

This precipitation that falls to the ground **flows** to oceans, seas, lakes, rivers, wetlands and underground. The melted snow from the peaks of the mountains reaches the streams and rivers. In the end, some of the water here evaporates with the sun and gets ready to become clouds. Thus, another cycle in the water cycle begins. This cycle uninterruptedly continues on our planet.



Wetlands play important roles in the water cycle. It both stores the water from precipitation and contributes formation of new precipitation with evaporation.

The Roles of Wetlands in the Water Cycle

Wetlands play important roles in the water cycle. First of all, the existence of wetlands decreases floods caused by precipitation and prevents destructive effects. Water that reaches the ground with precipitation is stored in wetlands such as marshes, bogs and swamps. Thus, they act as barriers in front of human settlements and prevent the destructive effects of floods.

Water masses in the wetlands enable cloud formations with evaporation and contribute to the functioning of the water cycle. On the other hand, wetlands act as a filter and send some of the stored water to the underground by filtering it. In this way, it feeds the underground water sources and the freshwater basins become always full.



 *Wetlands have important tasks in the water cycle.*

What did we learn?

 Only 1% of the entire water on the planet is usable freshwater.

 Water exists in every corner of our planet in solid, liquid and gas form and continuously changes place with the water cycle.

 The water cycle has continued for 4.5 billion years without any interruption. The water that we drink today might be the same water drunk by mammoths or dinosaurs that lived thousands of years ago!

 Wetlands play important roles in the water cycle. It both stores the water from precipitation and contributes formation of new precipitation with evaporation.





Activities



Water Cycle



Objective

To define the stages of the water cycle and to animate the water cycle with movements.



Target Audience

8-14 years old



Learning Outcomes

- ✎ S/he will perceive that the water is moving in a continuous cycle.
- ✎ S/he will name and explain the stages of the water cycle.



Duration

40 min.



Method

Drama,
question-answer



Materials

Water Cycle Diagram,
computer, projector

Application

1. Take a glass of water and bring it to the children. Then, discuss the following questions with them.
 - Where do you think I took the water in this glass?
 - How do you think the water came to that source?
 - How old do you think this water is?
 - What will happen if we heat this water? Will it disappear? What will happen if we cool it?
2. After attracting the attention of the children to the water with these questions, do the following explanation.

*Water on Earth moves in a continuous cycle. Water exists in liquid form in oceans, rivers, wetlands and underground waters. Sometimes it freezes and transforms into solid and stores in snow and ice form at the peaks of the mountains and in poles. Sometimes it evaporates and mixes to the atmosphere in gas form to create clouds. It comes back to the surface from the clouds as snow and rain. The entire movement of the water is called the **water cycle**. This cycle has continued for 4.5 bil-*

lion years without any interruption. The water that we drink today might be the same water drunk by mammoths or dinosaurs that lived thousands of years ago! The water we put in our glass and drink might be 4.5 billion years old... Have you ever thought about it like that?

3. Project the Water Cycle Diagram to the board and ask the children to open the Water Cycle Diagram. Give them 2 minutes to correctly place the mixed words. Then, get their answers and do the following explanation.

Answer Key:

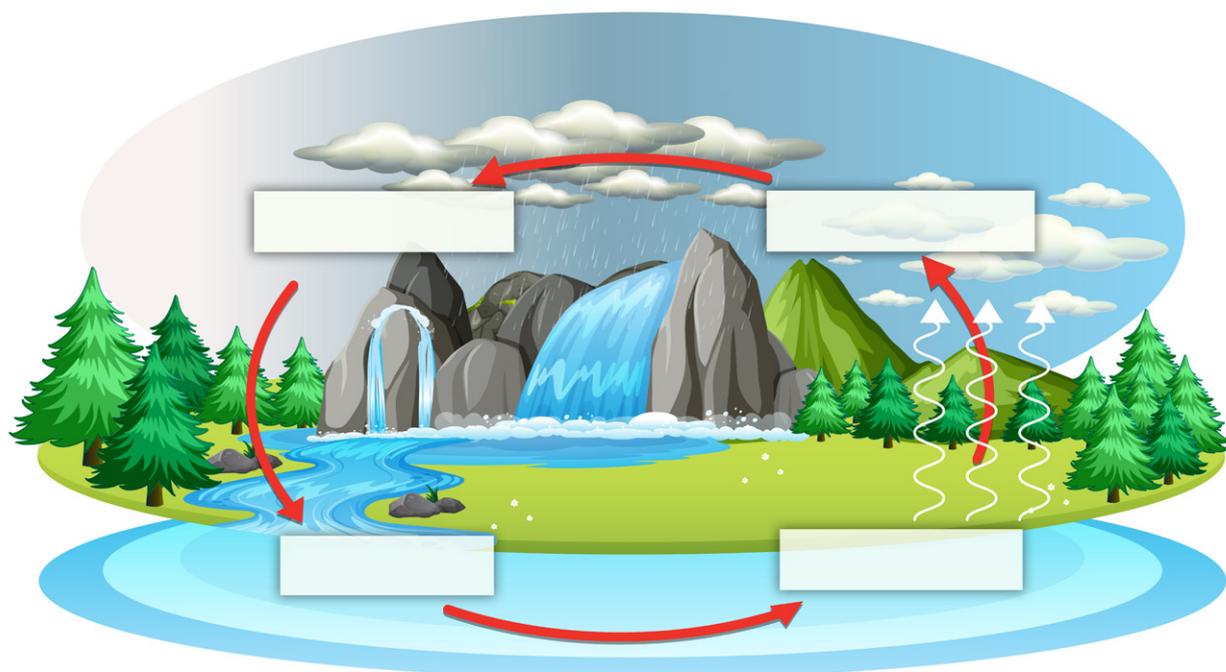
Top left: Precipitation

Bottom left: Flow

Bottom right: Evaporation

Top right: Condensation

In the water cycle, the Sun heats the surface water on Earth and as the water masses in the oceans, lakes and rivers heat up, they **evaporate** and rise to the atmosphere in water vapour form. At the same time, plants and trees lose water from their leaves and this water is released to the atmosphere in water vapour form. Water vapour reaching to the atmosphere raises to the upper layers. It gets colder as it goes higher and it transforms back to the liquid form to create the clouds. This is called **condensation**. The clouds formed by this event, which is the opposite of evaporation, circles around the world in the sky. As the water amount in the clouds increases,



*the size and weight of the clouds increase. When the air cannot take any longer, the excess water drops to the ground as **precipitation** in rain, snow and hail form. Then, this water that comes in the form of precipitation is temporarily stored in lakes, glaciers, wetlands, underground or living organisms. The water goes back to the seas and oceans from these places via rivers, streams or underground water. This event is called **flow**. The water is re-used by plants and animals and goes back to the atmosphere as it evaporates with sun rays. The cycle moves on like this.*

4. Then, divide the children into 4 groups for the drama activity. Write the words **evaporation**, **condensation**, **precipitation** and **flow** on a paper and make sure that the groups randomly draw these words. Or silently tell each group which stage they are going to animate. Make sure that the groups do not know which word the other groups will animate.
5. Give each group time to think on how to animate the event. Carry out the drama activity when they are ready and ask the children to guess which stage of the water cycle does the group belongs.

Assessment Questions

You can ask the following questions to the children during or at the end of the activity.

- ▶ Where does the water running down the tap come from?
- ▶ How are clouds formed? How does rain occur?
- ▶ What changes could happen in the water cycle if it does not rain?

Extensions

- ▶ You can divide the children into groups and ask them to write and perform a song about the solid-liquid-gas states of the water or water cycle.
- ▶ If you have time for long-time observation, you can prepare a water cycle model with the children.

WATER CYCLE MODEL

Materials: A transparent jar, cling film or airtight transparent layer, tape, soil, seed, water

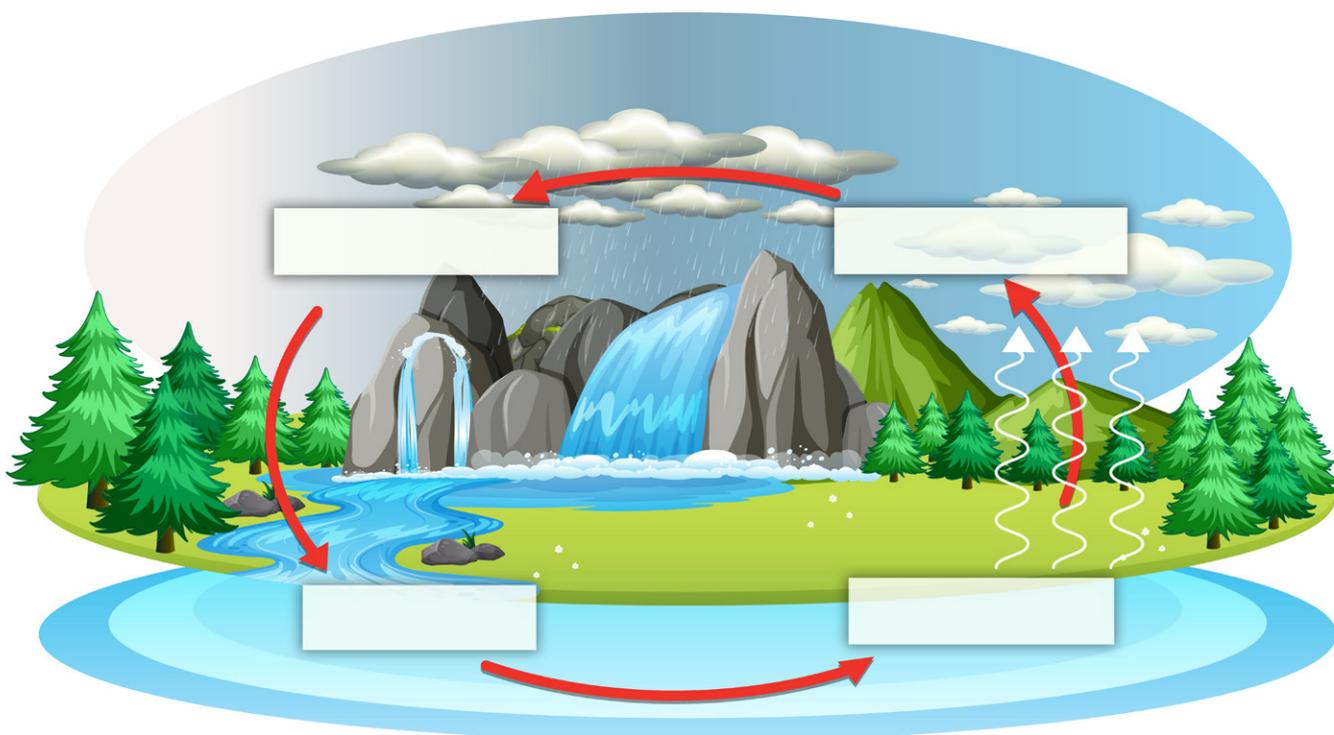
Preparation:

You can prepare a common jar for the class or have every child prepare their own jars.

1. Put 2 cm soil to the bottom of a transparent jar.
2. Add half a teaspoon of seeds to the soil and cover the seeds with 2 cm soil.
3. Slowly pour water on the soil. Make sure that you pour the water equally on the soil.
4. Cover the jar with a cling film or transparent layer and fasten it with tape.
5. Place the jar next to the window or somewhere that directly gets sunlight. Ask the children to observe the jar every day for one week and record their observation notes. You can ask the following questions during observation:
 - What changes happened in the jar?
 - Did droplets form inside or outside the jar?
 - Where did the droplets come from? What is the role of the Sun?
 - What happened to the seeds? May the seed have used the water?



WATER CYCLE DIAGRAM



Where Is The Water Now?



Objective

To notice the places that the water might exist and to understand the water cycle.



Target Audience

8-14 years old



Learning Outcomes

- ✎ S/he will realise the importance of water in the life of living beings.
 - ✎ S/he will distinguish the states of water.
- ✎ S/he will rank the movement of water from one place to the other.
- ✎ S/he will perceive the movement of the water on the Earth.



Duration

30 min.



Method

Question-answer



Preparation

Print the cloud, animal, plant, river, sea, wetland, glacier, soil, underground water images from the internet on A4 size.



Materials

A4 size cloud, animal, plant, river, sea, wetland, glacier, soil, underground water images, tape, board, board pen

Application

1. Put the images you have printed before the activity on the board in a circle by creating a gap in the middle. Then, ask the children what these images are and what kind of connection these images have.
2. Later, tell the children that you are going to play a game that represents the journey of the water on our planet. Tell them that the pen in your hand represents water and it leaves a mark behind it when it travels from one place to the other. Tell them the water is now in the river. Ask the children where the water goes from

the river and how would the water change while going there. Get the guesses of the children. Here, you can guide the children with the following recommendations.

- The weather is sunny. Some of the water in the river evaporated. The water left the river in water vapour form and turned into a cloud.
 - A deer came and drank water from the river. The water passed to the deer.
 - The water passed from the deer to the soil with urine.
 - The water is absorbed by the soil and mixed with the underground water.
 - With a current from the underground water, it is mixed with the sea.
 - It evaporated from the sea and turned into a cloud.
 - Water went back to the soil as snow.
 - Water precipitated, froze and mixed with glaciers.
 - Glaciers melted and flowed to the sea.
3. Depending on the answers from the children, create the water route. In the end, attract the attention of the children to the web created between the imag-

es. Tell them the water is continuously moving around the planet in a cycle and do the following explanation.

The water cycle is extremely important for the living and non-living beings on our planet to exist healthily. For example, a human needs to drink 2-3 litres of water per day on average. In addition to humans, all other living beings need water as well. Water plays an important role in the climate of our planet. The formation of clouds, rain and snow or the formation of glaciers are the results of the healthy functioning of the water cycle. During this journey, water circulates in different places and different sources of the Earth but it does not exist everywhere in the same duration. For example, water can stay frozen in glaciers or liquid form in underground waters without moving for years. Water in the clouds is stored for a short time. When the cloud meets a cold air layer, the water vapour in the clouds turns into precipitation as snow or rain.

4. At the end of the activity, you might ask the children to do a drawing activity on the water cycle.



Assessment Questions

You can ask the following questions to the children during or at the end of the activity.

- ▶ Will there be any change in this web if one of the elements that the water visits is missing? For example, what would happen if the soil did not exist? What would happen if the river did not exist?
- ▶ Where did the water evaporate, freeze, condense or melt?
- ▶ Do you think all these stages have the same duration? Can some might take shorter and others might take longer?
- ▶ What might be the conditions that prevent the journey of the water?

Extensions

- ▶ You can play this activity by creating a circle and with the help of a ball of yarn by giving the names in the images to the children. In the end, you can assess by using the web that will be created between the children.

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The Editor of the Material
District Government of Enez
Address: Gaziömerbey Mahallesi, Cumhuriyet Meydanı
Hükümet Konağı 22700 Enez / Edirne
Phone: +90 284 811 60 06
E-Mail: enezkaymakamligi@gmail.com
Website: www.enez.gov.tr

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The Editor of the Material
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