



# WATER

Using The Seven-Steps Methodology

[www.ecoschools.global](http://www.ecoschools.global)



# Credits

## W5 PROJECT |

### **Warming-Waste-Water-Watts-Wildlife (W5)**

Supported by Alcoa Foundation, the W5 project is a global K-12 environmental literacy initiative focused on Green STEM and the Sustainable Development Goals implemented in Eco-Schools. The project educates children about environmental issues through science, technology, engineering and math skills.

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# Introduction

## THE SEVEN STEPS |

Using a Seven Step framework and a whole-school approach, Eco-Schools students engage in hands-on, project-based learning to drive solutions to address environmental challenges. The framework can be applied in any educational institution and adapted to their local context. The elected Eco-Committee led by students coordinates the process with the stakeholders and ensures that each step is completed and improved every year.

Using a whole-school approach ensures that Education for Sustainable Development (ESD) is embedded across the curriculum, the institution, and beyond. As such, the school becomes a hub from which new environmental practices, behaviour, and culture develop. The key is that everyone in the school understands why environmental actions are carried out in order to actively support them.

You can find an online course about the Seven Step methodology on FEE Academy: [www.feeacademy.global](http://www.feeacademy.global)



Eco-Schools Seven Step Framework



# Introduction

## THE SUSTAINABLE DEVELOPMENT GOALS

In 2015 the UN Sustainable Development Summit adopted “Transforming My World: The 2030 Agenda for Sustainable Development”. The Agenda contains 17 Goals with 169 Targets, covering a broad range of sustainable development issues. The Goals and Targets demonstrate the scale and ambition of this universal and global agenda to plan the course of action for the people, the planet and prosperity. It is expected that all countries and stakeholders, acting in collaborative partnership, will implement this plan and contribute in achievements of the Targets. The Goals aim to secure a sustainable, peaceful, prosperous and equitable life on Earth for everyone now and in the future

ESD is reflected in Target 4.7: “By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture’s contribution to sustainable development.”

### SUSTAINABLE DEVELOPMENT GOALS





# Introduction

## LEARNING SEQUENCE |

**NOTE TO READER:** Before carrying out the Sustainability Audit, it is highly recommended that the Eco-Committee establishes a basic understanding of the theme of Water. This foundation will help ensure a more in-depth engagement with the theme throughout the Seven Steps. You can find the three suggested lessons at the end of this publication, which we recommend using after Step 1 - Establishing an Eco-Committee and before Step 2 - Conducting a Sustainability Audit.

**Step 1 - Eco-Committee**

**USE LESSON PLANS HERE**

**Step 2 - Sustainability Audit**

**Step 3 - Curriculum Links**

**Step 4 - Action Plan**

**Step 5 - Monitor & Evaluate**

**Step 6 - Inform & Involve**

**Step 7 - Eco Code**

**Lesson Plan 1 - Water on Earth**

**Lesson Plan 2 - Water Cycle**

**Lesson Plan 3 - Water Use**



# Step 1

## ECO-COMMITTEE |

The Eco-Committee is the driving force of the Eco-Schools programme. The ability to lead and direct the programme implementation and plan activities throughout the Seven Steps is crucial for the Eco-Committee. The Eco-Committee acts as a link between students, teachers, senior management, and the whole school community.

### Skills to be developed

- Leadership
- Democratic Values
- Empathy
- Negotiation
- Cooperation
- Decision-making

Students are the most important members of the Eco-Committee. They should make up at least 50% of the Eco-Committee members, representing as many year groups as possible. Students should fill all executive roles of the Committee with adult support as required.

Adult Committee members could be constant members or invited as temporary members for the implementation of a certain task or project. These include teachers, senior management, non-teaching staff, parents, and community representatives.

The Eco-Committee should be elected by other students or be (self) nominated – ideally at the beginning of the school year. Electing Eco-Committee members will not only place the Committee in high esteem but also serve as an important lesson in democracy.

Candidates may deliver a talk to the school on why they want to be part of the Eco-Committee and present their plan of action. Alternatively, it is possible to ask students to complete an 'application form' explaining why they would like to be considered for the Eco-Committee.







# Step 1

## ECO-COMMITTEE |

The Eco-Committee can take different forms depending on the size and age groups of the school. For example, the Eco-Committee could be a sub-group of an existing Student Council.

Eco-Committees should meet at least eight times per year and keep records of their decisions in the form of minutes. Minutes should be shared at school management meetings, with all classes/year groups, on the Eco-Schools noticeboard, on the school website and/or Facebook group. Key issues could be raised at school assemblies or Parent Council meetings

It is very important that the Committee informs the whole school on decisions and actions taken by the Eco-Committee, as well as ensuring that all students who are not part of the group have opportunities to suggest ideas.

Elected students should remain on the Eco-Committee for 1.5-2 years to ensure continuity and a smooth handover into the next cycle. Ideally, one-third of the Eco-Committee members continue to their second year. This allows for simplified organization and development of projects that span more than one school year. It also means students who are genuinely passionate about the environment can remain in the group, developing their skills and interests.

### Acknowledgement

An end-of-year treat could be arranged for the Eco Committee to reward them for all their hard work e.g. a fieldtrip, excursion or a fun activity on the school grounds. The students could also receive certificates to acknowledge their contribution.



Eco-Schools USA

# Step 2

## SUSTAINABILITY AUDIT |

The Sustainability Audit helps you identify the school's current environmental and educational impact through surveys, interviews, observations, measurements etc. The results of your Sustainability Audit will highlight areas of both excellence and improvement, and it will ultimately inform your Action Plan and the themes you will focus on.

### Skills to be developed

- Curiosity and Inquiry
- Scientific Investigation
- Data collection and analysis
- Issue identification
- Sensitivity to the environment

The students on the Eco-Committee should take the leading role in the Sustainability Audit while teachers help guide the process. Students can delegate tasks to other stakeholders. Ideally, all year groups and stakeholders actively participate in the audit by performing at least one task each.

### The Sustainability Audit allows you to:

- Assess the environmental and educational situation of the school through specific themes.
- Involve experts from the wider school community that can contribute to the depth of the audit, but also give the students an experience of future careers.
- Identify areas for improvement and prioritise the actions to be taken.
- Help students and the rest of the school community understand the impacts.
- Follow your progress in the Eco-Schools Programme by doing the audit at the beginning of every school year.



### ECO-SCHOOLS MAIN THEMES



### ECO-SCHOOLS CROSS-CUTTING THEMES







# Step 2

## SUSTAINABILITY AUDIT | WATER

Prior to conducting a Sustainability Audit, we highly recommend that students have a basic understanding of the chosen theme i.e. water. You can find the three suggested lessons at the end of this publication. Once ready, you can use the points below or the checklist on the following page to help you audit the theme of Water and identify the areas that need further research and action.

- **Investigate the lifecycle of water in your school.** Find out where the water is sourced, where it is treated, and where is the wastewater treated. Create a poster on the water cycle or on the water treatment to display on the school noticeboard.
- **Conduct a water-use survey.** Carry out a survey amongst students, staff, and families to assess and increase awareness around water conservation. Following the survey, talk with school staff (cleaner, gardener, canteen staff) about their use of water and review the use of detergents and cleaning agents in the school that may be hazardous. Keep the survey questions and answers for the following years.
- **Calculate your school's water usage.** Direct water usage can be measured most precisely by reading the water meter, but you can also calculate it by reading the water bills. You can also consider your school's indirect water usage, looking at what products require the biggest amount of water to be produced (e.g. school uniforms, lunch meals, electronic equipment etc.)
- **Conduct a manual water audit.** Start by looking at the ways in which the school currently uses water. What areas have the greatest potential for wastage of water? Count all toilets, urinals, taps, dishwashers, washing machines, showers, air conditioners etc. Check for any leaks or drips. Mark these items on a map of the school grounds.
- **Check if your school is ready for heavy rainfall and cloudbursts.** Locate drains and water catchment areas and assess if they can be improved.
- **Make a table of your results.** Decide on clear metrics, units of measurement and performance indicators. Explain your methods for measurement in detail.
- **Compare your metrics to what the standard performance is in your area.** Are you consuming more or less water than other schools in your area or compared to what your municipality expects?

Check Your  
National Water  
Footprint:





# Step 2

## SUSTAINABILITY AUDIT | CHECKLIST FOR WATER

<i>Feel free to add your own questions!</i>	YES	NO	NOT SURE
Do you know where the school's water comes from?			
Do you know where the wastewater goes?			
Can you drink the tap water?			
Do students or teachers bring drinking water in single-use plastic bottles?			
Does the school have a policy on water and water conservation?			
Does the school have a water meter? If so, is water consumption monitored?			
Have you reviewed the number of taps/urinals/toilets in the school?			
Are dripping taps reported and repaired quickly?			
Is the water pressure adjusted to be enough without being excessive?			
Have students visited the local water treatment facility?			
Is there a nearby pond/lake/river/beach suitable for school visits?			
Do students, teachers and staff know how to save water and why?			
Does the school have a policy for using non-hazardous cleaning products?			
Is rainwater harvesting possible in the school?			

# Step 3

## CURRICULUM LINKS |

The prioritized themes that you have identified as part of the Sustainability Audit should be integrated at all grade levels and across disciplines in order to ensure that Eco-Schools as an educational programme is truly integrated within the school community.

### Key Competencies for Sustainability defined by UNESCO:

- Systems thinking competency
- Anticipatory competency
- Normative competency
- Strategic competency
- Collaboration competency
- Critical thinking competency
- Self-awareness competency
- Integrated problem-solving competency

[Link to UNESCO publication.](#)

In this particular step, teachers are the ones playing a key role, but a discussion with students to make learning outcomes visible is encouraged. This will help them understand and appreciate that the Eco-Schools projects are not add-on, but are an integral part of their development. This will also help parents to understand the academic and societal needs of environmental literacy.

Mapping the actions based on the Sustainability Audit with subjects and skills outlined in the curriculum is important. The students should be provided with an opportunity to set their targets for sustainability as they do for any subject or behaviour.

To avoid curriculum overload, it is important that the actions are embedded within the existing curriculum in a meaningful way so that all students benefit from both deeper learning experiences and quality learning in the core foundations of the issues they explore.

The interdisciplinary nature of the subjects creates an opportunity for making a holistic and balanced perspective possible. This requires that the teachers identify key concepts over subjects, explore the connectedness of these subjects and integrate themes by encouraging project-based learning. The action orientation of the ESD curriculum helps in the development of critical thinking and problem-solving skills.





# Step 3

## CURRICULUM LINKS | WATER

Research has shown that knowledge alone is not enough to shape behaviour. It is our attitudes that have higher predictability of environmentally responsible behaviour. This requires deeper engagement over a longer time. The behavioural aspect can be incorporated by first mapping them and then identifying the specific issues at your school - such as the access to clean water, the use of water, the water infrastructure, waste water etc.

Behaviour change requires personalization of the information, reflections and discussions. Using the lesson plans that are part of this publication can help achieve some of the learning outcomes for SDG 6 listed below.

### Learning Outcomes

#### SDG 6 – Clean Water and Sanitation

- Does not pollute water.
- Does not waste water.
- Handles drinking water in hygienic ways.
- Washes hands at critical times – after using the toilet, before handling food, after handling pets etc.
- Does not waste anything, recognising that water is a resource used to produce everything.
- Practices water saving techniques.
- Practices principles of waste management.
- Participates in actions for rainwater harvesting.
- Takes action to stop loss of water – dripping tap, burst pipelines.
- Reports on good practices and technologies for saving of water.
- Investigates and reports about different issues of water and likely future scenarios due to climate change.
- Protects trees and green spaces that are an important part of the water cycle.
- Supports products that have a lower water footprint, use water responsibly and ensures wastewater treatment.
- Clears standing water/puddle.



[Link to "Positive Actions for the Sustainable Development Goals"](#)



# Step 3

## CURRICULUM LINKS | WATER

Below are some examples of how you can connect the theme of Water to the curriculum.

### Math

- Charts and graphs
- Statistical analysis
- Measuring volume/capacity

### Geography

- Distribution of water on Earth
- The water cycle and the impact of climate change
- Water consumption in different countries
- The water treatment process

### Languages

- Reading news articles on the theme
- Debates
- Writing essays and reports

### Sciences

- Types of water
- Pollution
- Water quality sampling
- Properties of water
- Experiments

### History

- Change in water quality and consumption over time
- Relate to changes in lifestyle and society

### Computers / Technology

- Carrying out research
- Making presentations and posters
- Diagrams and graphs
- Using spreadsheets
- Making online surveys

### Art

- The creation of posters, murals, or collages about water
- Contributing to the Eco-Code
- Awareness raising campaigns

# Step 4

## ACTION PLAN |

The results from your Sustainability Audit are used to develop your Action Plan. The plan should provide a comprehensive description of the identified problems, the actions that need to be undertaken to improve or solve the issue, the people responsible for each task, and specific timeframes for completion to achieve the stated goals.

### Skills to be developed

- Critical Thinking
- Planning and Budgeting
- Creativity and Innovation
- Goal Setting
- Time Management
- Teamwork
- Lots of patience!

The students in the Eco-Committee play a key role in the creation of the Action Plan. Teachers can help facilitate discussions around the feasibility of ideas coming from students. Having these discussions are important for learning!



Make sure that your Action Plan is:

- **Developed in collaboration with all committee members** and that you engage as much of the school community as possible in its implementation. Consider how different age groups can participate.
- **SMART** (specific, measurable, attainable, realistic and timely). Keep your monitoring and evaluation steps in mind.
- **Made up of short and long-term measurable goals**, including proposed deadlines that demonstrate tangible progress. Achieving success will boost confidence and enthusiasm for setting new targets!
- **Comprehensive**, indicating areas of action for environmental, social, economic and cultural elements of sustainability.
- **Publicly available** on the school website, social media, school noticeboard, etc.
- **Includes a communication strategy**. Plan how you share the key outcomes from meetings, how to disseminate the Action Plan, Monitoring, the Eco Code...
- **Continuously updated**. Look at your monitoring and evaluation! Does your Action Plan need adjustments?





# Step 4

## ACTION PLAN | WATER

Remember that your Sustainability Audit will inform the specific actions that you will need to take at your school. Below are some ideas you can consider and adapt to your context:

- **Consult your canteen staff, cleaner, gardener, and/or caretaker to identify ways to save water**, e.g. by adjusting the water flow in taps, repairing leaks, using water displacement devices in toilet cisterns, harvesting rainwater, installing a drip-irrigation system etc.
- **Organize an awareness-raising campaign** based on the survey you did as part of the Sustainability Audit. Carefully consider what behaviours and habits need to change.
- **Create leaflets or posters with tips for saving water.** Remember to include relevant data from your school! It is always a good idea to laminate the signs if they are going to be placed near water.
- If clean and safe, encourage everyone to **drink tap water** to stay hydrated.
- **Create more green spaces** in your school that can help divert water from heavy rainfalls.
- **Switch to environmentally friendly cleaning products** or make your own.
- **Organise a clean-up at a nearby lake/river/beach** and add some curriculum work, such as identifying flora and fauna, doing a water sampling test, identifying invertebrates etc.
- If a **renovation of the bathrooms** at your school is planned, consider installing water-saving taps, dual-flush toilets and/or using grey water for flushing.
- **Use school assemblies, newsletters, websites etc.** to inform and involve the school and wider community about the actions you are taking.





# Step 4

## ACTION PLAN TEMPLATE | WATER

Issue & Target	Action to reach target	Person or group responsible	Timeframe	How is progress measured?	Did things turn out as expected?	Curriculum Links

# Step 4

## MONITOR & EVALUATE |

The step of Monitoring and Evaluating is important to assess progress made towards achieving the targets identified in the Action Plan and to identify areas that require corrective action. Evaluating the success of your activities will allow you to make changes to your Action Plan if required.

### Skills to be developed

- Investigation and evaluation
- Problem solving
- A growth mindset
- Resilience
- Reflection
- Giving and receiving feedback

Students or specific classes should undertake monitoring and evaluation in collaboration with teaching staff and/or the school management.

The monitoring methods that you use will depend on the targets and measurement criteria decided on in your Action Plan for the topics you wish to look at. When delegating monitoring tasks, remember to take into account the age and ability of the students and other individuals helping out.



Eco-Schools The Bahamas

### To achieve good monitoring, consider the following:

- What are we monitoring?
- How will we measure it?
- Who will do it?
- What are the baseline metrics and what is our target?
- What tools and methods will we use?
- When are we collecting the data?

In this step, make sure that:

- A monitoring tool is created – fill in the values at least every quarter.
- There is a clear comparison to Sustainability Audit units.
- Progress charts and infographics are made, illustrating changes over time.
- Targets are achieved or illustrate positive progress. If that is not the case, use Eco-Committee meetings to revise your targets.
- The findings from your Monitoring & Evaluation are regularly updated, displayed, and communicated to the whole school. Sharing success with everyone improves engagement!

Remember, what is monitored is done and students do better when they know what is expected!



# Step 5

## MONITOR & EVALUATE | WATER

Your specific Monitoring & Evaluating strategy will depend on your Sustainability Audit and Action Plan. Below are some ideas to get you started.

- **Monitor your school's water consumption** by taking regular readings of the water meter or by looking at the water bills. Note down your readings on a weekly/monthly basis.
- **Form a "Water Watch Group"** who are particularly engaged in the theme of water. They can act as role models and help ensure that the awareness campaign is successful. They can also report back on leaks or other water-related observations.
- **Carry out a follow-up survey** to see if attitudes and levels of awareness have changed. Share the survey with students, staff, and community members. Carrying out this type of measuring complements whole school involvement.
- **Share your findings!** It can be highly motivational to know if your joint efforts have been successful! How much water did you save in the past month? Are you using less water compared to other nearby schools?
- **Review your Action Plan** to see if you are achieving the goals you had set. If some of your goals have not been reached, remember to consider it as a learning opportunity, not a failure! Discuss why the goals were not met (perhaps they were too ambitious or the actions were not realistic) and amend the Action Plan accordingly.
- **Place a Suggestion Box** in front of the notice board where students outside of the Committee can share their ideas and suggest improvements.





# Step 6

## INFORM & INVOLVE |

This means getting the whole school on board, including the local community! "Informing & Involving" is a cross-cutting step that should be integrated into all of your activities. The positive actions you are taking should be shared and celebrated - it can help raise awareness, change behaviour, and create new norms!

### Skills to be developed

- Public speaking
- Communication
- Leadership
- Collaboration
- Media & Technology
- Facilitation

The Eco-Committee should make a Communications Plan for the school year in order to have an overview of key dates, communication channels and target groups. It is important to share your Action Plan, Monitoring Results and Eco-Code. You may also want to include awareness-raising campaign activities.

Simply remember that we live in a time of information overload so your messages need to be clear, concise and, most importantly, positive! Avoid spreading doom and gloom and instead focus on the solutions people can contribute to.

### Communication Channels:

- School assemblies
- School notice board
- School newsletters, magazines, and annual report
- School intranet, website and social media platforms
- Local and national press, radio and television
- School events e.g. sports tournaments, school plays, exhibitions, community service days or International Days

### Target Groups:

- Students
- Teachers, staff and school management
- Students' families and friends
- The wider community, e.g. local council officers, local businesses, environmental organisations, neighbouring schools etc.
- Eco-Schools in other countries





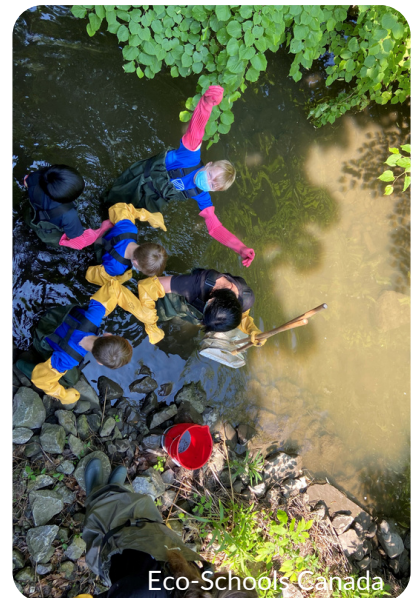
# Step 6

## INFORM & INVOLVE | WATER

Informing and involving the whole school and local community in every step is crucial to achieving the Whole School Approach which is essential for creating sustainable development. Once you are more familiar with the Seven Step methodology, you will become more confident in ensuring widespread participation and regular communication - both internally and externally.

In order to inform the school and wider community about your water projects, you could:

- **Regularly update the Eco-Schools noticeboard** with your newest data, actions and results.
- **Map out the areas to be improved** on the school campus and display them in a prominent location.
- **Make short weekly announcements** with water facts or water conservation tips through social media.
- **Use assemblies to announce success** in achieving targets or for students to present their research and results.
- **Organise exhibitions of project work**, both in school and in the wider community.
- **Write letters to the government and local and national press** using your findings on water.
- **Create surveys** on water awareness and behaviour.
- **Send leaflets** with water-saving tips home to families.
- **Organise a Community Action Day** around the theme of water and invite parents, grandparents, and other members of the community



### Ideas for Community Action Days

- Inviting guest speakers
- Project displays and presentations
- Tour of water treatment plant or watershed
- Beach/river clean-up
- Photography competition
- Low-water lunch day



# Step 6

## ECO CODE |

The Eco Code reflects the values the school aspires to and is a statement of the school's culture. The Eco Code is your mission statement. It should show – in a positive, clear and imaginative way – your school's commitment to sustainable development.

### Skills to be developed

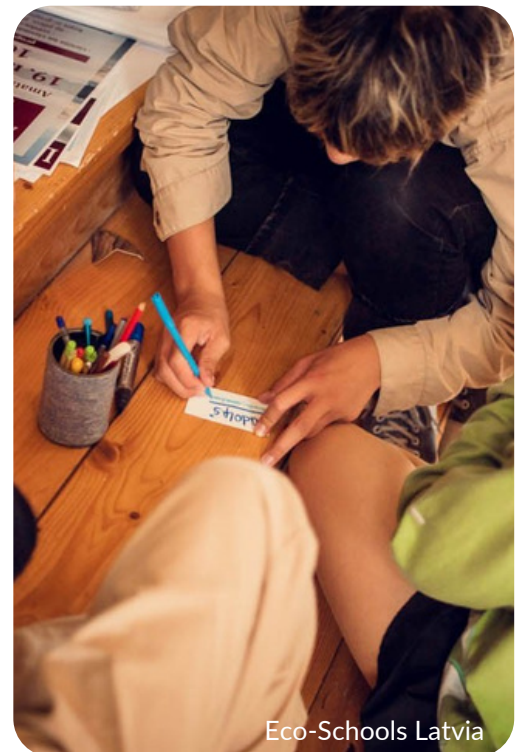
- Creativity and Design
- Synthesis
- Communication
- Teamwork
- Empathy and Respect

Students collaborate to devise a statement that represents the school's commitment to the environment. It is essential that, with input from the whole school, students play a key role in the development of the Eco Code as this will give them a greater sense of responsibility towards the values the Eco Code represents.

The format of the Eco Code is flexible - it can be a song, drawing, model, poem, mural etc.

Make sure that your Eco Code:

- **Integrates suggestions from the whole school community.** Some schools run competitions to write up the Eco Code, others collect suggestions from different stakeholders!
- **Is memorable and familiar.** This means it should be clear and understandable for everyone in the school.
- **Lists the main objectives of your Action Plan.** But don't go into too many details.
- **Is positively framed.** Focus on solutions and positive actions.
- **Is prominently displayed** throughout the school. Put the Eco Code in a prominent space on your school website and social media! Let everyone know about it!
- **Is updated regularly.** Ideally once a year.






# Step 6

## ECO CODE | WATER

Reflect on the past school year and the activities you have done related to the water theme. What key messages do you want to include as part of your Eco-Code? Below are a few examples from Eco-Schools in Ireland.



Water is Life  
Life Needs Water



Whenever I wash my hair or brush my teeth,  
And scrub my hands or face or feet,  
To clean myself or just freshen up,  
Either at home, school or bath tub,  
Remember to conserve water and shut off that tap!



Don't let the drip drop!

# Lesson Plan 1

## WATER ON EARTH |

### AIM

To build students' understanding of water on Earth and the limited availability of fresh water.

### OBJECTIVES

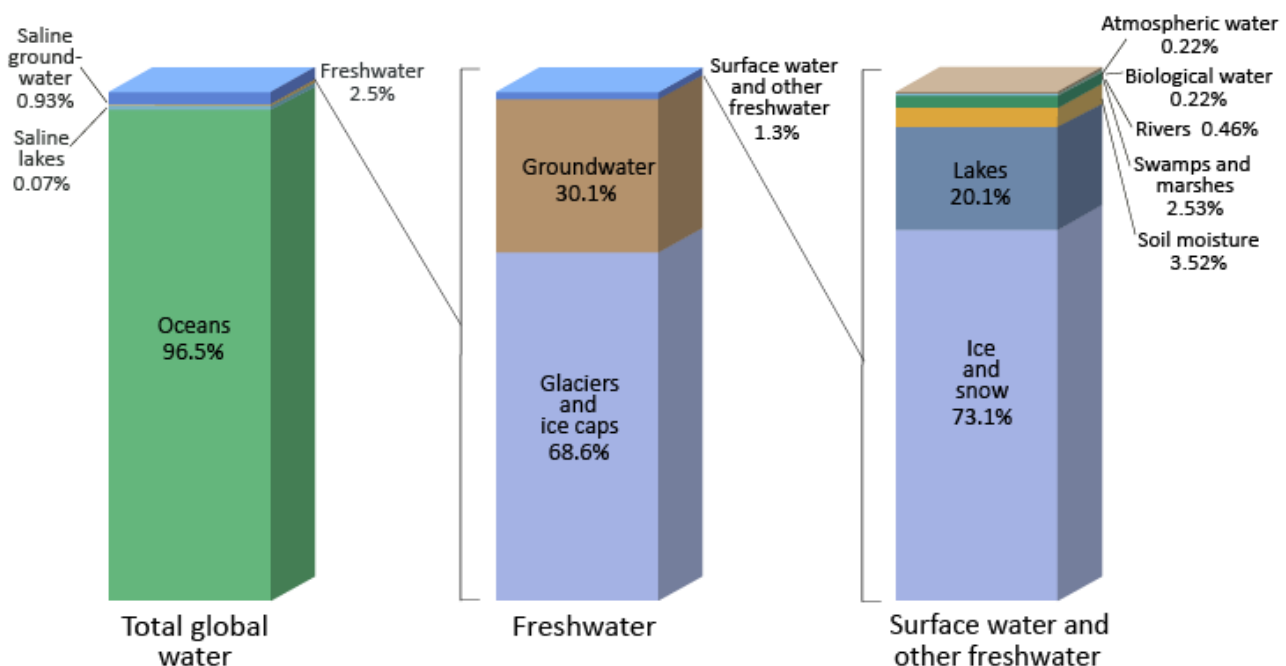
Students will be able to:

- Learn and analyze the distribution of water on Earth
- Identify different sources of water
- Conclude that the amount of fresh water available is limited

Around 70% of our planet's surface is covered by water. However, as visualized in the chart below, only 2,5% of all water on Earth is freshwater.

The majority of the freshwater, approximately 69%, exists in the form of glaciers and ice caps while only 1.2% can be found in its liquid form on the surface – for example in lakes and rivers. This basically means that 99% of the world's water cannot be used because it is either saline or locked up in glaciers and ice sheets!

In 2020, the proportion of the world's population with access to secure drinking water services reached 74%, marking an improvement from 70% in 2015. Despite this progress, approximately two billion individuals continue to lack access to safely managed drinking water services, and among them, 1.2 billion people do not even have access to basic water services.[1]



## CLASSROOM ACTIVITIES - 45 MINUTES



**Brainstorm Session.** Use the questions below to facilitate an open discussion in the classroom. Feel free to add your own!

1. **Where can we find water on Earth?** For example: ocean, rivers, lakes, glaciers, groundwater, swamps, ice caps, clouds.
2. **How many percent of all water on Earth do you think is freshwater?** Correct answer: Around 2,5% (Most of this fresh water is in the form of ice!)
3. **What do we use water for?** Direct uses could be drinking, cooking, cleaning, bathing. Indirect uses is all the water needed to produce different goods and services.
4. **How many liters of (direct) water do you think you use per day?** Compare this to the average amount of water used pr. capita in your country.
5. **What could be threats to clean water?** For example: pesticides and fertilizers from agriculture, untreated human wastewater, industrial waste, micro-plastics, poor sanitation.

**Conceptualizing the Amount of Freshwater.** The following activity can help students visualize and understand that freshwater is a limited resource.

### Instructions

- Add **1 liter** of water to a container (representing all water on Earth)
- Use a measuring cup to take out **25 ml** of water from the container. This amount represents all the Earth's fresh water.
- From this 25 ml, use the other measuring cups to distribute the liquid accordingly (representing different fresh water sources):

Ice: **17.25 ml**

Groundwater: **7.5 ml**

Lakes: **0.05 ml**

Swamps: **0.01 ml (roughly 5 drops)**

Rivers: **0.002 ml (roughly 1 drop)**

Ocean: **970 ml (Add salt to the container)**

### Materials Needed

- 1 liter of water in a container
- 6 measuring cups or graduated cylinders
- Salt



- Measure out the portions into clear cups so that the amount of water is easily visible.
- Discuss the different ways of acquiring drinkable water from the six sources (e.g. desalination plants, ground water wells, rain capture, dams etc.). Reflect on the pros and cons for each method.
- Conclusion: because freshwater is such a limited, yet fundamental, resource, it is important to not to waste water.



# Lesson Plan 2

## THE WATER CYCLE |

### AIM

To build students' understanding of the water cycle and its importance for sustaining life.

### OBJECTIVES

Students will be able to:

- Describe the importance of the water cycle
- Make a model to simulate the water cycle
- Understand the impact of global warming on the water cycle

Earth's water cycle controls the distribution of water, which is always in movement and always changing states from liquid to vapor or to ice and back again. The water cycle begins in the evaporation phase. The sun's energy warms the surface of the water in oceans, lakes, and rivers, and evaporates it. Water vapor accumulates in the atmosphere and forms clouds during the condensation phase. Clouds are formed as the water vapor condenses. When the clouds cool down, it starts raining - also known as precipitation.

After precipitation, one of three things can happen to the water. Most of it soaks into the ground and is either used by plants or becomes part of underground reservoirs called aquifers. About 1/3 runs off the surface and joins water in lakes and rivers. Some of it ends up in the ocean. The water cycle, along with other physical, chemical, and biological processes, helps to sustain ecosystems.



Global warming intensifies this cycle because as the air temperature increases, more water evaporates into the air. Warmer air can hold more water vapor, which can lead to more intense rainstorms, causing major problems like extreme flooding in coastal communities around the world.



## CLASSROOM ACTIVITIES - 60 MINUTES ✓

**Building a Mini Water Cycle Model.** Build this model together with your students to visualise the water cycle in a simple way.

### Materials Needed

- Transparent box
  - Water
  - Clay
  - Small bowl
  - Plastic wrap
  - Heating lamp
  - Bag with ice cubes
- Put water into a transparent plastic box (the depth of the water should be approx. 2 cm)
  - On one end of the box, place a piece of clay (representing land) and put small bowl on top of it.
  - Cover the box with plastic wrap (there is supposed to be space between the wrap and bowl).
  - Put a heating lamp next to the box and switch it on.
  - Wait for 10-20 min.
  - Place bag with ice on the top of box cover above the bowl.
  - Observe what is happening
- Ask the students to explain the different stages of this water cycle model. Discuss what is making the water move and provide evidence.
  - Potential observations:
    - The lamp represents the sun.
    - The water in the bottom represents the ocean.
    - The ice cubes represent the low temperature of the atmosphere which causes condensation.
    - The water collects and drops down like rain/precipitation because of gravity.
  - Watch the video below for a slightly more complex understanding of the water cycle and the impact of climate change.







**Day Zero - Reading and Reflection Exercise.** The below case story from South Africa helps connect the theme of water with climate change. It also highlights the importance of adaptation and water saving actions.

#### Read the text:

In January 2018 officials in Cape Town announced that the city of 4 million people was three months away from running out of municipal water. Labelled “Day Zero” by local officials April 12, 2018 was to be the date of the largest drought-induced municipal water failure in modern history.

Most of Cape Town relies on dams to supply the city with water. Three years of inadequate rainfall caused dam levels to fall to 25% of capacity by late January 2018, and water was expected to drop to the critical 13.5% of capacity by April 12, 2018.

At that critical point, water would only be supplied to critical services such as hospitals, and municipal taps would be shut off. Residents would be forced to line up for daily water rations of 25 l per person at one of 200 collection points. Day Zero was defined as the point at which stricter regulations would begin because defining Day Zero at 0% capacity would only prompt action from residents when it was too late.

#### Discuss: What could have lead to the water crisis? Continue reading.

In February 2018, national government throttled allocation of water in the region earmarked for agriculture, allowing more to flow to urban residents. The same month, farmers also agreed to divert additional water stored for agricultural purposes to the city.

Technical fixes and regulatory controls implemented by the municipality were important to curbing water consumption but reaching such levels of conservation would not have been possible without large-scale cooperation by a wide swath of residents, businesses, and other stakeholders.

“It doesn’t matter how much technical expertise you’ve got, but you actually have to stand back and understand the system more broadly,” notes Gina Ziervogel of the University of Cape Town, who has researched the crisis. For the city, this meant using data more effectively to prompt people to save water.



Starting in 2017, the municipality had begun ratcheting up its drought-awareness campaign, publishing weekly updates on regional dam levels and water consumption and using electronic boards on freeways to notify drivers of how many days of water supply Cape Town had left. In the end of January, in addition to announcing its Day Zero countdown, the city launched a city-wide water map to show water consumption on a household level, allowing people to compare their consumption to their neighbors and the rest of the city.

The municipality's weekly water report became a regular topic at social gatherings and on the radio. Prompted by new water-use tariffs, businesses also began increased efforts to communicate the need to save water to customers and employees. Bathroom signs explaining "If it's yellow, let it mellow..." became ubiquitous in restaurants and bars, while startup and corporate types initiated "dirty shirt" challenges to see who could go the most days without washing their work shirt.

**Discuss: How would you prevent future water crisis? Continue reading.**

By the end of March 2018, the emergency efforts had provided a small additional buffer in the city's water reserves, allowing city officials to push back Day Zero beyond the upcoming rainy season. In June 2018, the region saw average rainfall for the first time in four years. With the rain, dam levels rose, and officials were able to call off Day Zero.

The city was able to avoid Day Zero – but only through a combination of water conservation and efficiency campaigns, and increased rainfall in 2018.

Stanford Law School Professor Barton Thompson explained that the crisis in Cape Town was exacerbated by lack of alternatives for water supply that do not rely on local precipitation. Cape Town was also uniquely vulnerable because its excellent water conservation over the past few decades has allowed the city to grow without looking for more water, tightening its ability to cut back on water usage through efficiency. Cities in arid regions elsewhere, are similarly at risk for water scarcity if they depend largely on local rainfall when climate change is expected to prolong droughts.

Diversifying the municipal water portfolio with water recycling, desalination, and groundwater can reduce risk of water shortages due to drought. Cape Town has also been investing in desalination plants and in groundwater projects which may help avoid another Day Zero.

As water crises pop up all over the globe, we should be thinking about how we can create resilient water systems and encourage water conserving behaviors such that we are prepared to avoid our own Day Zero.

**Make conclusion and plan for a water crisis in your city**

Sources:

[Avoiding a water crisis: how Cape Town avoided 'Day Zero'](#) (Northeastern University)

[Looking Back on Cape Town's Drought and 'Day Zero'](#) (Bloomberg)

[How the Cape Town water crisis was averted](#) (Borgen Project)



# Lesson Plan 3

## WATER USE |

### AIM

To build students' understanding of water use and water saving.

### OBJECTIVES

Students will be able to:

- Explore the targets of SDG 6
- Compare the country-level achievements related to water
- Propose ways to save water
- Evaluate different water saving strategies

Water is fundamental to life and is key to sustainable development. SDG 6 specifically aims to 'Ensure availability and sustainable management of water and sanitation for all'.

Water usage differs from country to country. It depends on the level of economic development as well as other factors such as the agricultural development and supply networks. For instance, 70% of the world's freshwater is used for agriculture.

Without water, many companies and the products they provide would fail to exist. Water is a fundamental commodity for nearly every step of the manufacturing and production processes around the world. Whether it is deionized water for electronics and pharmaceutical sectors, or softened water for boiler feed applications, water is necessary and comes embedded in the footprint of virtually every item created on the planet.

When it comes to food,, animal products like meat and dairy are linked to higher environmental impacts than fruits and vegetables - generally speaking. This includes higher levels of greenhouse gas emissions, land-use, and water use.





## CLASSROOM ACTIVITIES - 60 MINUTES

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### SDG Index Activity

1. Open the website: <https://dashboards.sdgindex.org/profiles> and find your country.
2. Look at the achievements (or lack thereof) related to water under SDG 6.
3. You can find more detailed information by clicking on each indicator.
4. Compare your country's developments with other countries.
5. Discuss the differences in the achievement of targets and the potential reasons behind.



### Brainstorm Session on Water Saving

1. Brainstorm all the possible ways of saving water in your school and at home.
2. Ask the students to place the actions on a graph similar to the one to the right where the vertical Y axis represents the "Water Saving Potential" and the horizontal X axis is the "Difficulty/Complexity Level".
3. Ask the students to explain their reasoning behind their placements on the graph.
4. Check out the "Lazy Person's Guide to Saving Water" for more ideas:  
<https://www.un.org/sustainabledevelopment/the-lazy-persons-guide-to-saving-water/>

