

WATER – THE ELIXIR OF LIFE

How can we optimize our water consumption?

Did you know that the World Water Day is held every year, on March 22nd? It is a reminder of how important water is for all of us: The human body consists of at least 70 % of water, the most part of the earth is covered with water, in Austria, 100 % of our drinking water comes from groundwater (wells and springs) ...

But only about 3 % of all water on earth is fresh water and we only have access to a very small part of that. What's more, our water reserves are threatened by climate change. Dry, hot summers and low rainfall are causing groundwater levels to fall. At the same time, the demand for drinking water is increasing. In many countries, people have no access to clean drinking water.

Water is a valuable resource - we should therefore treat it carefully and responsibly.

Overview “WATER – the elixir of life”

How many liters of water do we use every day? How can we save water?

Context
Everyday life
Finances

Cognitive processes
Analysing situations
Processing situations
Critical thinking

Target group (incl. necessary prior skills and competences)

Adult learners with basic arithmetic and digital skills

X2-Y1

Content
Quantity and number
Pattern, relationship and change
Using digital skills

Dispositions
Affection
Beliefs

Outcomes and results

Learners can estimate and calculate their water consumption. They reflect on their own behaviour and find solutions to save water.



Main information

Content	Natural numbers, decimals, percentages Addition, subtraction, multiplication Comparison of numbers Reading and interpreting diagrams Calculating volumes
Target group	Adults with basic arithmetic skills Adults who are interested in making their everyday lives more sustainable
Learning intention	What is the intention of adults to face this problem? – Numeracy for personal and private purposes in everyday life
Duration	2 - 2.5 lessons (can also be divided into shorter learning sequences of 20 - 30 minutes)
Material and resources	PowerPoint presentation, laptop, tablet, smartphone, worksheets
Group size	Range from 5 to 12 learners
Problem statement	Water is a commodity we take for granted, but often we are not even aware of how much water we really consume, where we "waste" it and how damaging this can be for the environment and our wallets.
Working questions	How often do you use water per day? How much water do you use per day/year? Why is saving water important? Which household appliances use water and how efficient are they? What water-saving tips do you know? What water-saving products are available in the household? Which foods and clothing require a lot of water in their production?
Learning outcomes and results	The learners can read statistics and conduct independent research on the Internet. They build on their own experiences and knowledge about saving water. They interpret and reflect on their own water consumption, find tips for saving water and can transfer their findings to their private lives.



Working plan

Time (minutes)	Description of content/activities	Material	Methodical and didactic information ¹
15 minutes + discussion	<p>Activation Presentation of statistics and background information on water consumption</p> <p>The teacher stimulates a discussion by asking specific questions: - What does this information mean for us? - Have you already thought about water use? - What experiences have you had on this topic?</p>	PowerPoint presentation (or similar) (Appendix 1)	<p>HITS</p> <p>Cognitive activation</p> <p>Questioning</p> <p>Critical thinking</p>
20 minutes	<p>Activity The learners interpret statistics on drinking water consumption (in the group).</p> <p>They research the cost of drinking water on the Internet. Working individually, they calculate the water costs for a family.</p>	<p>Worksheet (Appendix 2)</p> <p>Tablet, smartphone for internet research</p>	<p>HITS</p> <p>Collaborative learning</p> <p>Critical thinking</p>
1 day at home + 30 minutes in class	<p>Self-experiment The learners should estimate and document their own water consumption for one day at home.</p> <p>The results are presented and discussed in the next lesson.</p> <p>They then calculate the approximate costs of their own daily water consumption.</p>	<p>Worksheet (Appendix 2d)</p> <p>1 sheet of paper (to document the water consumption at home)</p>	<p>HITS</p> <p>Mixed exposures</p> <p>Feedback</p>

¹ for description and explanation of kinds of tasks, HITs and other background information please consult the teacher's/user's guide



30 minutes	<p>Internet research The learners use the Internet to find out about options and various products that can be used to save water.</p> <p>The use of digital media (smartphone, laptop, tablet) is a prerequisite.</p> <p>The results are then presented and discussed in plenary.</p>	<p>Worksheet (Appendix 3) For teachers: possible solutions (Appendix 4) Smartphone, laptop, tablet Presentation cards or flipchart</p>	<p>HITS</p> <p>Critical thinking Feedback</p>
5 minutes	<p>Video The learners watch a short video which illustrates the possibilities of saving water.</p>	<p>Video (from Appendix 4)</p>	<p>HITS Cognitive Activation Critical thinking</p>
20 minutes per activity	<p>Activity The learners carry out various calculations: - Water saving when showering instead of bathing - Waste of water with a dripping tap - How much water does it take to fill a pool?</p> <p>Optionally, values for some tasks can be entered in a diagram, which can be created manually or digitally.</p> <p>The results are compared and discussed in a feedback round.</p>	<p>Worksheets (Appendix 5) (Appendix 6)</p> <p>Laptop, tablet</p>	<p>HITS Hands on learning</p> <p>Differentiated teaching</p> <p>Worked examples</p> <p>Feedback</p>
15 minutes	<p>Input – reflection Which types of food require the most of water in their production? The learners can reflect on the knowledge they have acquired and already have and discuss its impact.</p>	<p>Information sheet (Appendix 7) optionally PowerPoint presentation</p>	<p>HITS</p> <p>Critical thinking Feedback</p>
	<p>Transfer The learners have developed a better understanding of water as a precious resource and can take measures in their own everyday lives to use water more responsibly.</p>		<p>HITS</p> <p>Critical thinking</p>



Suggestions for the teacher/user

The example presented here should be considered as exemplary and inspirational material presenting a guideline with a high range of possibilities of adapting those suggestions to a specific group of learners or an individual learner with his or her very personal requirements.

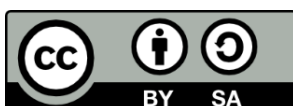
In concrete terms, the example “WATER – the elixir of life” could be adapted these ways:

- Duration and individualization: The duration can vary greatly depending on the learners' prior knowledge. The learners might need support with various activities (research on the Internet, use of the calculator, etc.).
- Level of difficulty: The example offers many different exercises with different levels of difficulty. The aim is not to work through all the exercises, but to make a selection appropriate to the level of knowledge of the learners.
- Learning setting: Working in small groups and discussing results is a very stimulating process for learners, which often leads to better learning outcomes.

Our educational activities aim at numeracy skills being not only memorized, but first of all being practiced and functionally used by the learners in daily life or/and vocational situations. It is therefore recommended to implement the idea of HITS² (higher impacts of teaching skills) as far and often as possible: ...

- ... work with concrete and authentic material that learners will recognize from everyday life situations.
- ... ask the learners questions and let them raise questions themselves. It can be crucial to discuss numeracy themes, contexts and numbers.
- ... think of possible ways of transfer: After working with this example, learners should be more aware of how they use water as a resource in their everyday lives. By dealing with the possibilities for saving water, they will be able to make informed decisions and possibly change their behavior.

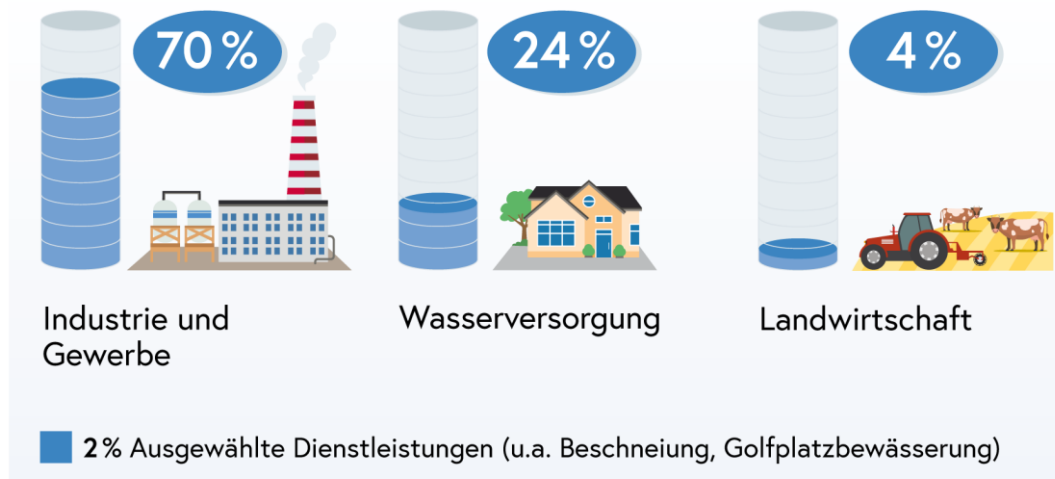
² For general information and explanation on HITS please see the teacher's/user's guide



Appendix 1

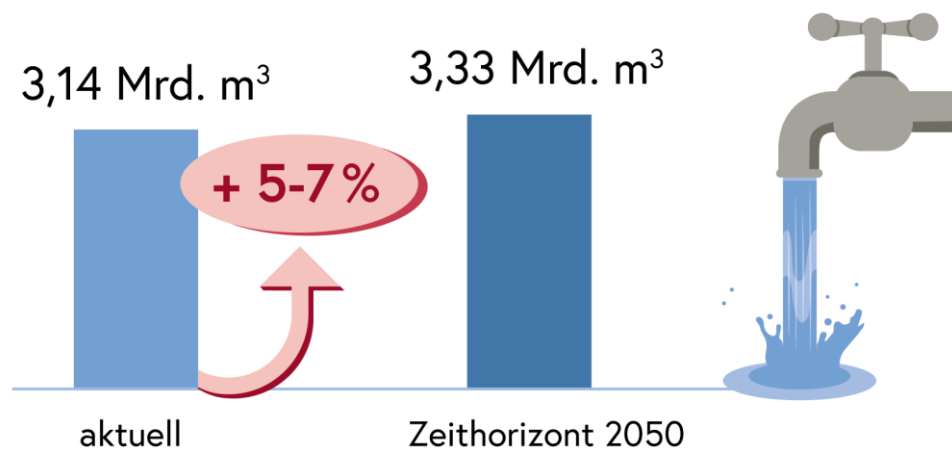
 Bundesministerium
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Aktueller Wasserbedarf in Österreich (insgesamt 3,14 Mrd. m³)



 Bundesministerium
Landwirtschaft, Regionen
und Tourismus

Der jährliche Wasserbedarf in Österreich wird sich bis 2050 um 5 bis 7% erhöhen



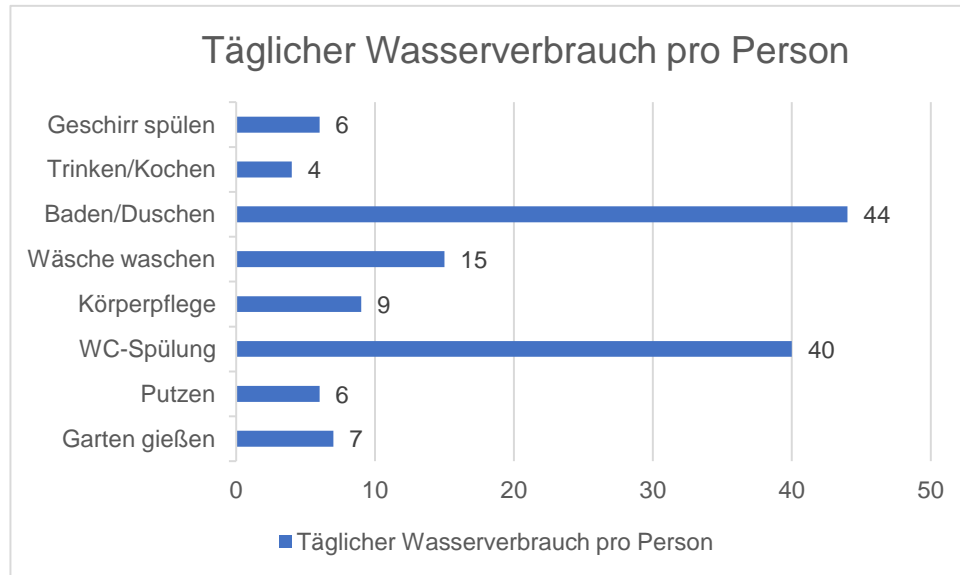
Quelle: Wasserschätz Österreichs: Studie beantwortet "Wie viel Wasser haben wir, wie viel brauchen wir?" (bml.gv.at); 15.11.2023



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Appendix 2

Drinking water consumption in the household per person and day



Quelle: www.wasserwerk.at; 25.11.2023

- Calculate how much drinking water a person uses per day.
- Do some research on the Internet: How much does a liter of drinking water cost in your country?
- Calculate the daily water costs for a family of 4. What are the costs for 1 month and for 1 year?
- Observe, estimate and write down your daily water consumption at home. How could we arrive at an approximate total?

The list is drawn up by the learners themselves. What information do we need? How can we represent the information?



Appendix 4

Possible answers for appendix 3

Possible answers (for teachers)

Toilet flush:	Flush-stop button: water savings of 30 % How many liters can be saved per person and per day?
Bath versus shower:	Bath: 160 liters Shower 6 minutes: 80 liters
Water-saving shower head:	?
Water-saving faucet:	?
Washing clothes:	?
Washing dishes:	?
Brushing teeth:	?
Watering the garden:	?

Example for a video with tips for saving water:

VIDEO (3:08 min. in german) Mr. Wasser – Spartipps zum Wassersparen
Quelle : www.youtube.com/watch?v=qelaEZ-enx4; 15.11.2023



Appendix 5

Taking a shower instead of a bath

The 4 members of the Schneider family are taking a bath twice a week. The two children use the same bath water. Now the family is considering taking a shower instead of a bath. Each family member wants to continue showering twice a week.

Water consumption for a bath: 160 l

Water consumption for a shower: 80 l

Question: How many liters of water can the Schneider family save in a week if they take a shower instead of a bath?

Solution: Water consumption for bathing for one week:

$$160 \times 3 = 480 \text{ l} \quad 480 \text{ l} \times 2 = 960 \text{ l}$$

Water consumption for showering for one week:

$$80 \times 8 = 640 \text{ l}$$

$$960 \text{ l} - 640 \text{ l} = 320 \text{ l}$$

Answer: The family is saving 320 liters of water.

Additional task
(optional):

Show the Schneider family's water consumption when showering and bathing in a suitable diagram.
Label the diagram accordingly.



Appendix 6

The dripping tap

The tap in the bathroom has been dripping for some time. Mr. Meier has noticed that 5 drops of water fall into the basin in one minute. One drop contains about 3 ml of water.

Question: How many liters of water are wasted in a week?

Solution:	1 min.	5 drops	15 ml
	1 h	300 drops	900 ml
	24 h	7200 drops	21600 ml (21 l 600 ml)
	1 week	151 l 200 ml	

Answer: 151 l 200 ml of water are wasted in one week.

Pool

The Baier family has installed a pool in their garden.
The pool is 16 m long, 8 m wide und 1.8 m deep. ($1 \text{ m}^3 = 1000 \text{ l}$)

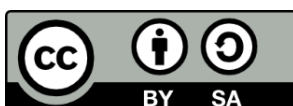
Question:

- Determine the amount of water needed to fill the pool.
- How much does it cost to fill the pool with water?
- What do you think: A family of four could do for a year with the amount of water the pool holds? Work out the result.

Solution:

- $16 \text{ m} \times 8 \text{ m} \times 1,8 \text{ m} = 230,4 \text{ m}^3 \times 1000 \text{ l/m}^3 = 230\ 400 \text{ liters}$
- $230\ 400 \times 0,2 \text{ ct} = 460,8 \text{ €}$
- $135 \text{ l} \times 4 \times 365 \text{ days} = 197\ 100 \text{ l.}$

Answer: Yes, a family of four could do for a year with the amount of water.
They use 197 100 liters of water.



Appendix 7

Which foods need the most of water?

The food with the highest water consumption is **cocoa**!
One kilogram of cocoa beans requires a total of 27,000 liters of water.

According to Hoekstra, 18,857 liters of water are needed for one kilogram of roasted **coffee**, and 132 liters for a cup with seven grams of roasted coffee.

On a global average, 1 kg of **beef** contains 15,415 liters of water, 1 kg of pork 5,988 liters and 1 kg of poultry 4,325 liters.

One kilogram of **avocados** requires an average of 1,000 to 1,500 liters of water - around eight times as much as one kilogram of potatoes.

Water consumption in clothing production

Jeans:



Quelle: www.quizlet.com/ch/411578263/wasser-was-weisst-du-set-3-flash-cards/; 17.11.2023

The production of cotton jeans requires around 11,000 liters of "virtual" water per kilo of fabric. A large proportion of this (85%) is used for cotton production. Half of this alone is needed to irrigate the fields in the growing regions.



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