WATER

WATÆSTIC

by Big Bang

Avishek Chatterjee, RWTH Aachen University
Daniele Manzoni, POLIMI
Elham Abdollahzadeh, NTNU
Elsa Täck, Chalmers
Júlia Giménez-Solano, UPV
Karina Loekmanwidjaja, TU Berlin
Tomasz Wróblewski, WUT

Stage 1: Understanding the problem

How does water use on campus affect climate change?

The keywords taken from the problem statement are colour-coded and broken down into multiple facets of sub-keywords. They are as follows:

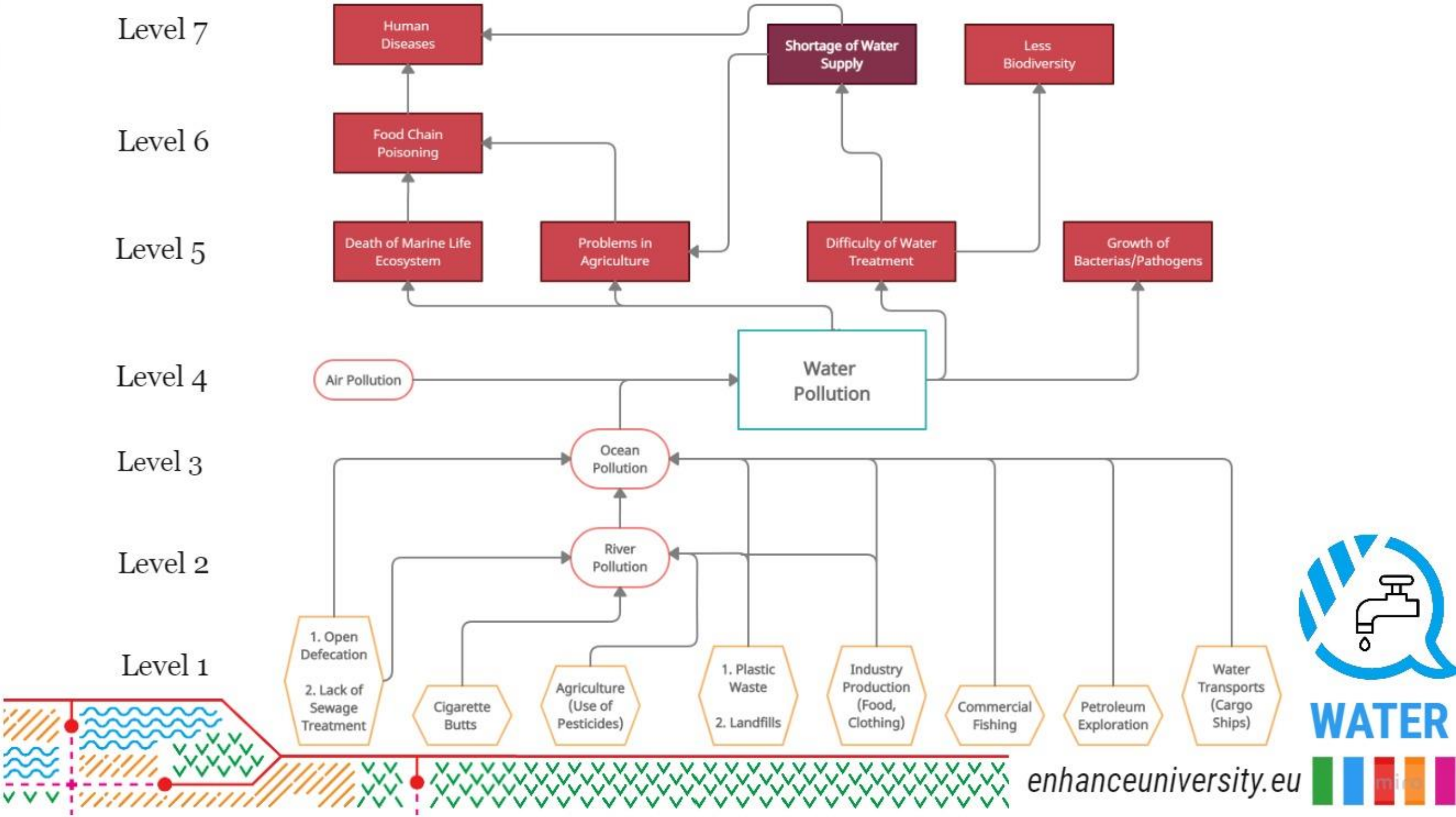
1. **Water use**: i) Drinking ii) Toilets iii) Gardening/Irrigation iv) Cooling and Heating v) Labs vi) Cleaning vii) Food viii) Aquariums - filter system

2. **Campus**: The definition of campus states that it is a collection of buildings or land that belongs to a group or an organization. Keeping this definition in context, multiple facets of this keyword are considered such as a school, university, factory or a company. However, for the feasibility purposes of making the project, the campus (university) of the Warsaw University of Technology is chosen.

3. **Affect**: i) negative ii) positive iii) neutral

4. **Climate Change**: i) Water Cycle (geothermal activity changes) ii) Water temperature changes iii) Marine Life iv) Extreme weather events and natural disasters v) Water Pollution

Finally, a concept map is built from the collection of these keywords and it's respective sub-keywords, taking into account a central theme, which for this project is **Water Pollution**.


Level 7
Level 6
Level 5
Level 4
Level 3
Level 2
Level 1
Human Diseases
Shortage of Water Supply
Less Biodiversity
Food Chain Poisoning
Death of Marine Life Ecosystem
Problems in Agriculture
Difficulty of Water Treatment
Growth of Bacterias/Pathogens
Air Pollution
Water Pollution
Ocean Pollution
River Pollution
1. Open Defecation
2. Lack of Sewage Treatment
Cigarette Butts
Agriculture (Use of Pesticides)
1. Plastic Waste
2. Landfills
Industry Production (Food, Clothing)
Commercial Fishing
Petroleum Exploration
Water Transports (Cargo Ships)
WATER
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Water Pollution *(Sky blue outline block)* is considered as the central theme of this project based on the topic of "Water".

Various aspects of this theme are considered while defining the relationship of the theme with it's origins and impacts. For the simiplisitic understanding of the concept map, multiple levels are created that correspond to either a sub-category, origin or impact of the central theme ie. Water Pollution.

Level 1 shows the **origins** of Water Pollution *(Orange outline block)*
Levels 2, 3 and 4 show the **sub-categories** of Water Pollution. *(Red outline block)*
Levels 5, 6 and 7 show the **impacts** of Water Pollution. *(Light red filled block)*

Two-thirds of the earth is covered with water of which only 1% can be utilized for humankind. And, as globalization and population explosion generate new diseases (COVID-19, SARS, Ebola, etc), preventing their spread becomes a key through washing our hands after using the toilet becomes crucial. Our daily consumer behavior is making fresh water a precious commodity and therefore an awareness on this problem needs to be made.

Taking into account the acuteness of this problem, the impact of Water Pollution known as **Shortage of Water Supply** *(Dark red filled block)* is finally considered as a central theme for the Field of Action phase, with the objective of **reducing water waste**.

Stage 1: Field of action

The prerogatives, which helped us choose and define our field of action in context of climate change:

- Water pollution is highly dangerous to the natural environment. One of the causes of water pollution is **shortage of water supply**.
- Tackling the water pollution problem requires a collective action. One of the most effective and feasible ways to do it, is to **reduce water wastage**.

As we choose our project to be embeded in context of the **WUT campus**, we must consider the **purpose** of such an Institution:

- Promoting intelectual culture and education
- Sharing knowledge
- Promoting civil virtue
- Providing research and leading innovation

WATER

Stage 1: Field of action

From abovementioned prerogatives, it can be concluded, that **the need to take an action is urgent** and that the **WUT should lead ecological action** as an institution of a social and educational nature.

We summarized, that a local water system, designed to **reduce the waste of water at the WUT campus**, could provide a good example for the academic society and also lead other institutions to take an action. This led us to formulate the **HMW question** (How might we ... ?), which determined our project's goal.

WATER

Stage 1: Formulating the HMW

How might we design a local water system for the campus in order to reduce the waste of water?

Stage 2: Idea generation

Starting from the HMW question the next steps were:

- Doing a brainstorm concerning water use in campus
- Categorize all the topics obtained with the brainstorm

After all this process we ended up with 8 categories

Stage 2: Idea generation

Categories:
Filtering (5)
Rainwater
Quality control
Reusing
Sewage
Water consumption social awareness (2)
Monitoring
Infrastructure

The category that got more votes was filtering, but we soon realized that it's not possible to have some improvements without investing a lot of money in structures like big purification systems.
After some discussion we chose to change argument and to think about **water consumption social awareness**, even if at the beginning it had only 2 votes, this is mainly because among the categories it is the most effective with small invested capitals.

Stage 2: Main Idea

Water use awareness

Stage 2: Main Idea

Water use awareness

Designing a device that can count the amount of water used while washing hands, at the same time that it's able to emit a sound as an alarm when too much water is being wasted. So we intend to do two things:

Making users aware of the waste of water by seeing the seconds and litres of water they are consuming

Letting users know how many seconds they should be washing their hands to waste as little water as possible

As long as the alarm doesn't sound, everything is fine

Stage 2: Main Idea

Water use awareness

After hand washing → Feedback about behaviour ¿Below or above average?

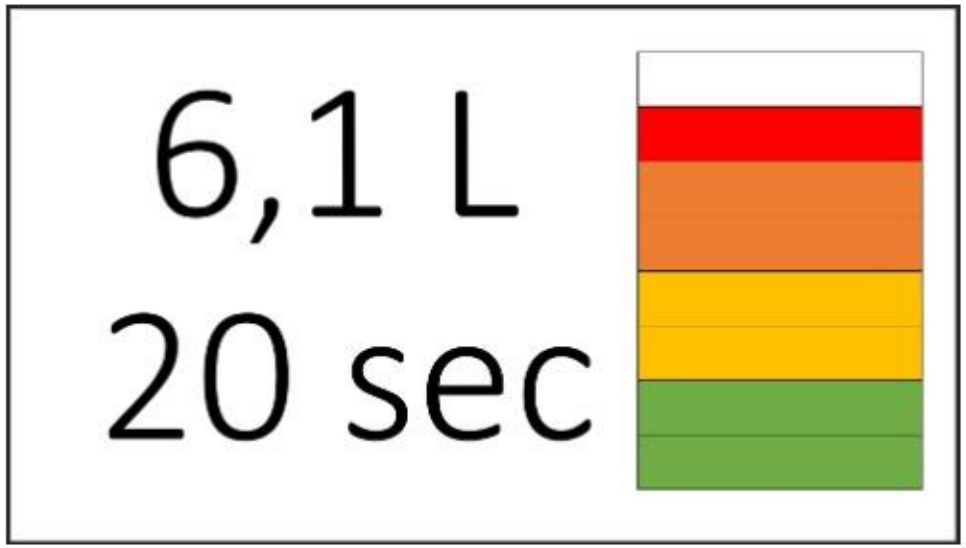
Ranking of the different departments or buildings in our green campus depending on how much water is spending.

Stage 3: Prototyping

A PowerPoint document

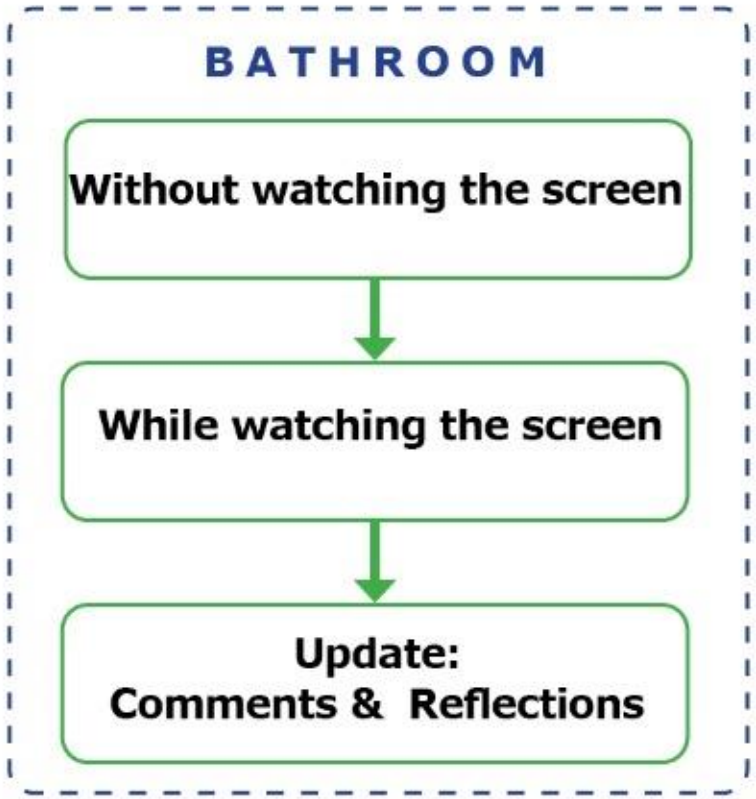
- chronometer counting seconds
- calculating amount of water
  visualizing it with **water bottles**

- Using:
  red color
  sound effect
to warn about too much water is used



First Prototype

Stage 3: Testing



Measurements

1. Time
2. User comments

Stage 3: Prototyping & Testing

The first prototype was mainly focused on showing the time spent on washing hands. Although the amount of water was the main concern of this project.
The colors were showing a shade from green to red. Using four different colors were unnecessary so the prototype was updated with red color only to show warning.

The first sound effect made for this prototype started with heart beat and then a warning alarm in red zone of water usage. The alarm was changed to a single beep sound later in the updated prototype to avoid too much disturbance while more than one person is using the device.

Stage 3: Development

New table

Observations	Solution
The sound - Some subjects thought the sound was too much, and didn't understand the point to it	Only having one signal that is a bit softer
The time - We had to do some readjusting to the time, since with corona the recommendation has been to wash ur hands for 20-30 s, we assumed that would be a good place to have the max. Although we discovered with testing that some people may shut off the tap in between soap, and some are just very effecient at it.	So we shortened the time to max 10 seconds of water running. Since this was the more theisable
Conclusion slides - We got the feedback of having a 'slide' at the end which tells the person if they are below or above average	Evaluating the performance - So we implemented a conclusion slide to evaluate the performance of washing hands, which can contribute to more awareness
Visual effects - Since not everyone might know or understand how much a litre is, we got the feedback to maybe put it in a context on the screen	Showing how many bottles are filled - So we decided to use water bottles and as the water is used they fill up.
The color system - The colors we didn't get feedback on it specifically, but we did see that it might be a lot of things going on when they tried it	Changing color when in the red zone, so we changed to only using the red colour when they hit 10 seconds

Stage 4: Product & Conclusion

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Every drop counts...

Warsaw University of Technology

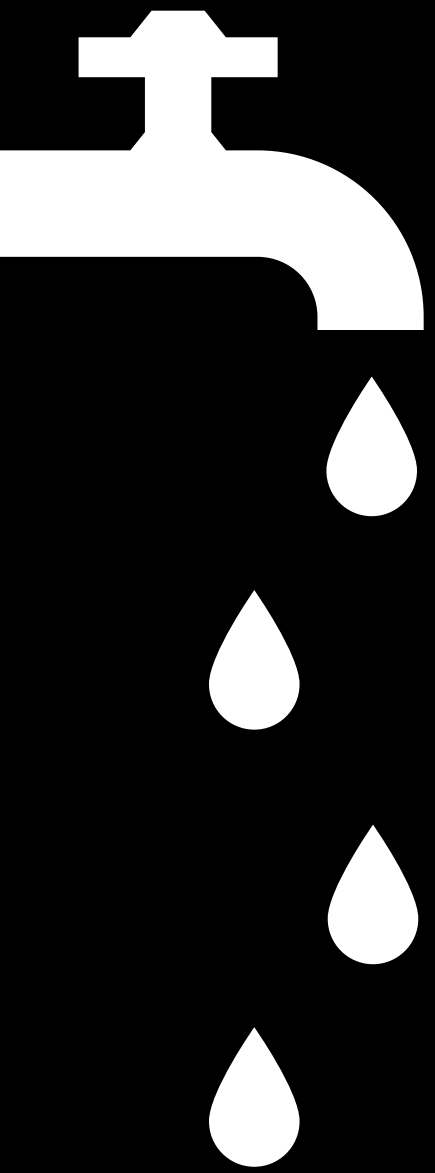
33.400 members

Less 3 seconds = 0,3 L per handwash

30.000 L water/day saved

16.000 EUR / year

WATER



How much water do you spend?

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1,00 sec

0.1

liters

WATÆSTIC

2,00 sec

0.2

liters

WATÆSTIC

3,00 sec

0.3

liters

WATÆSTIC

4,00 sec

0.4

liters

WATÆSTIC

5,00 sec

0.5

liters

WATÆSTIC

6,00 sec

0.6

liters

WATÆSTIC

7,00 sec

0.7

liters

WATÆSTIC

8,00 sec

0.8

liters

WATÆSTIC

9,00 sec

0.9

liters

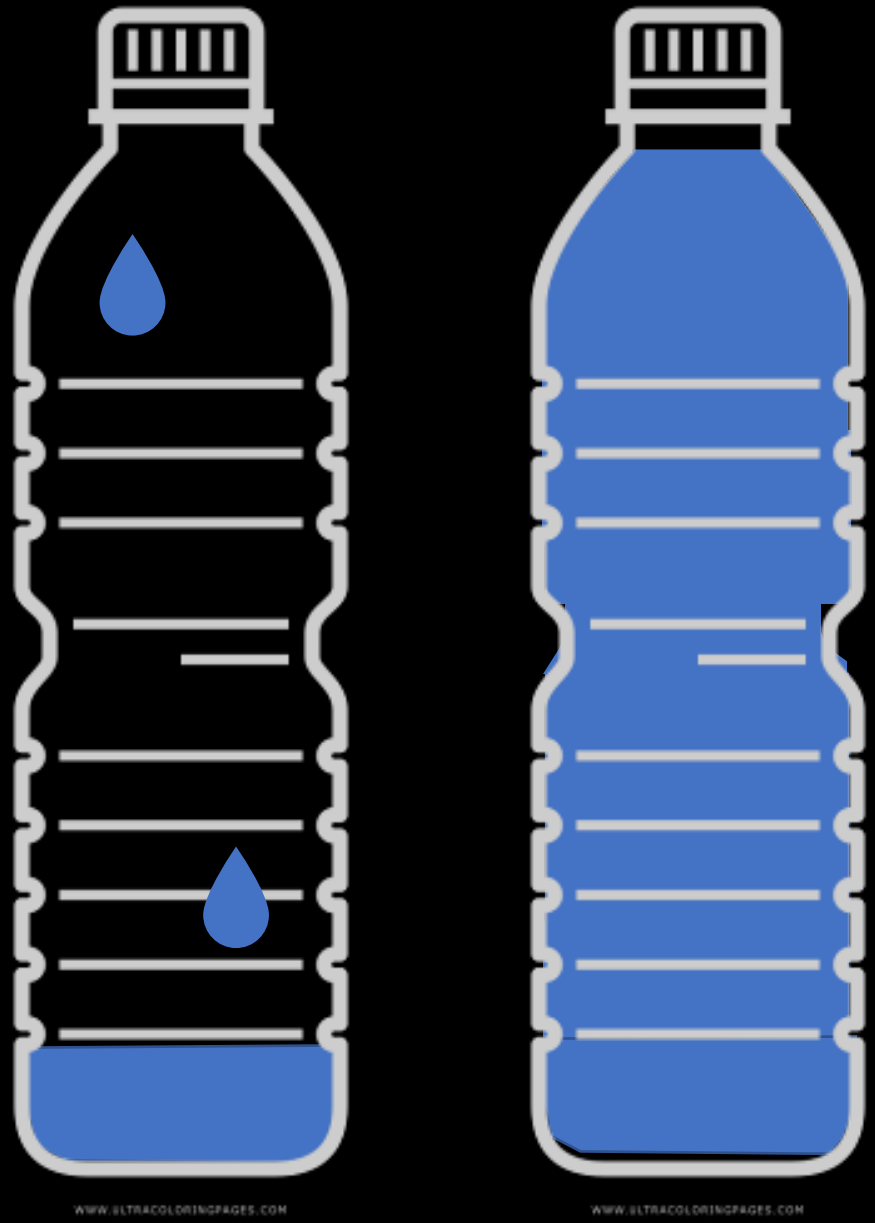
WATÆSTIC

10,00 sec

1.0

liters

WATÆSTIC

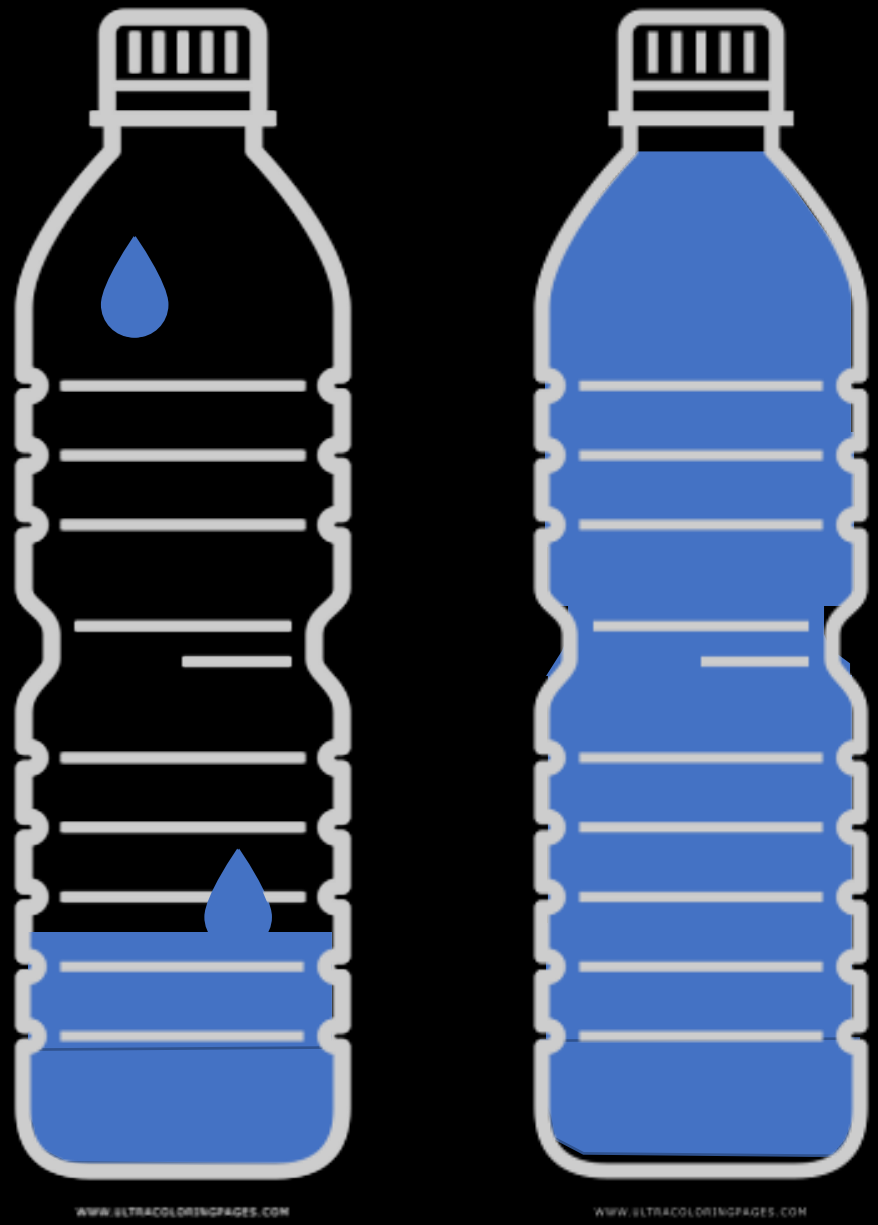


11,00 sec

1.1

liters

WATÆSTIC

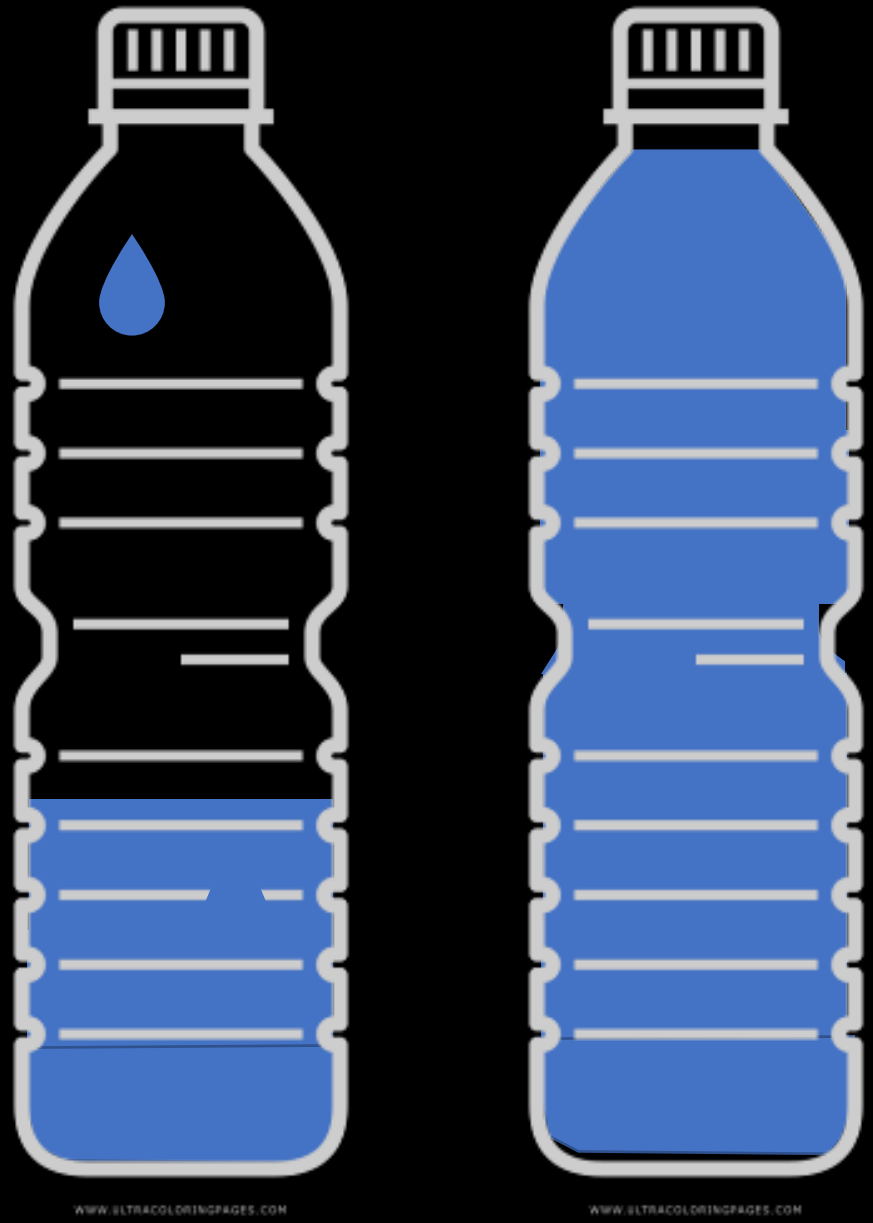


12,00 sec

1.2

liters

WATÆSTIC

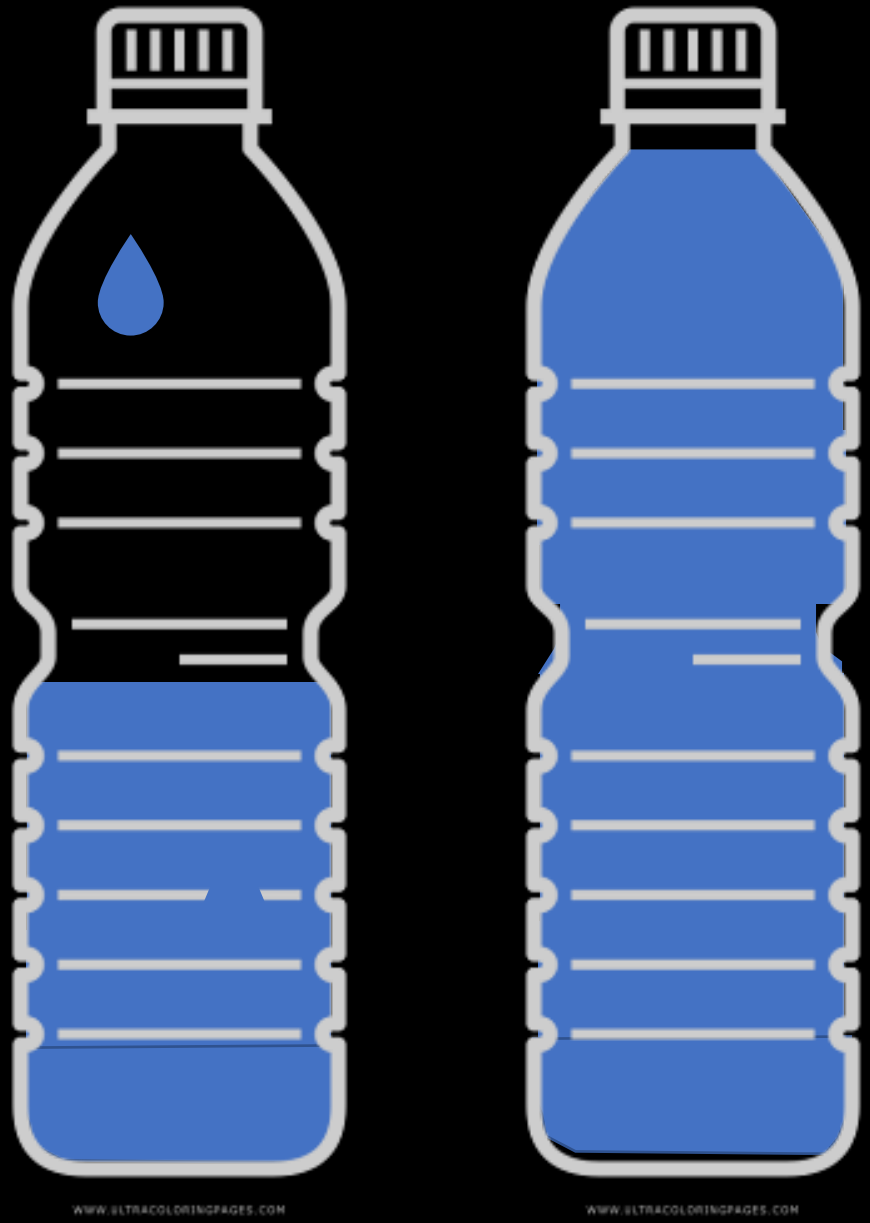


13,00 sec

1.3

liters

WATÆSTIC

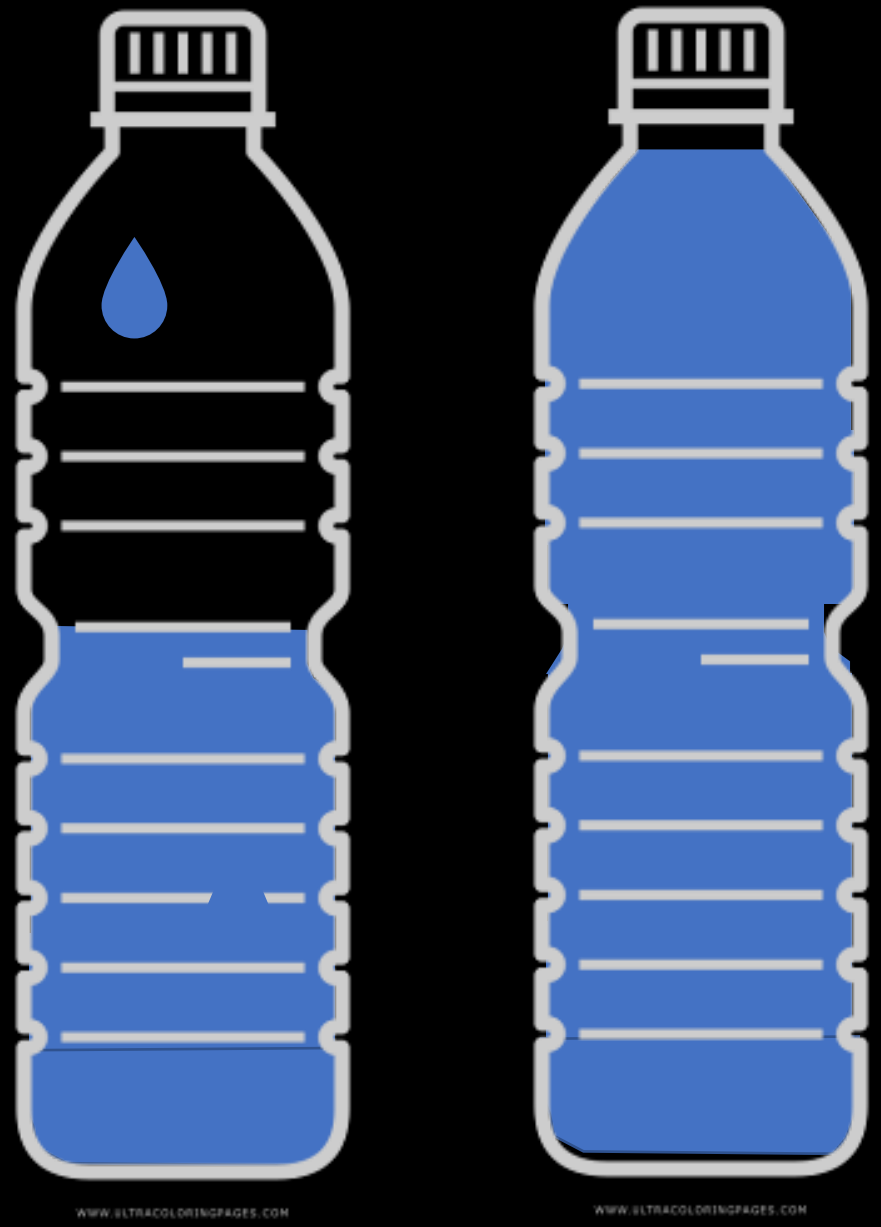


14,00 sec

1.4

liters

WATÆSTIC

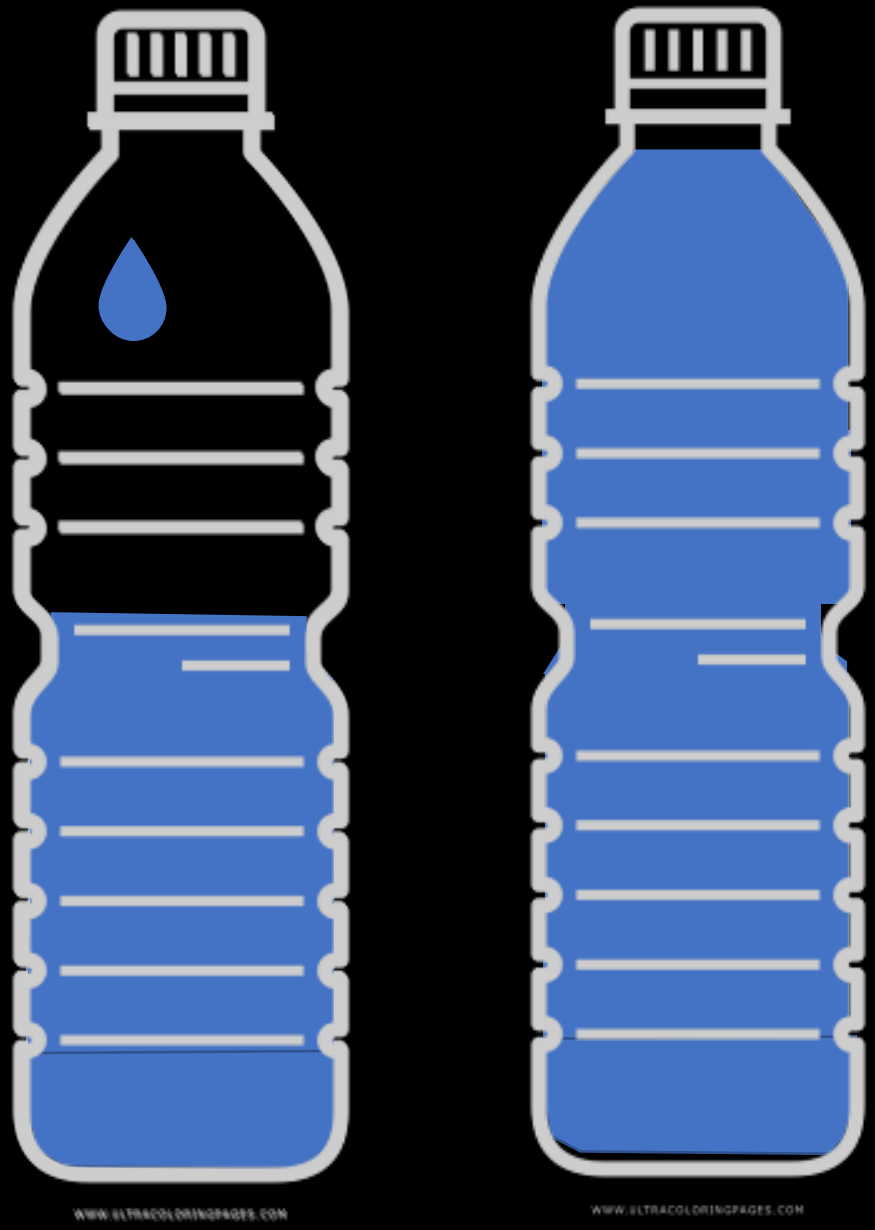


15,00 sec

1.5

liters

WATÆSTIC

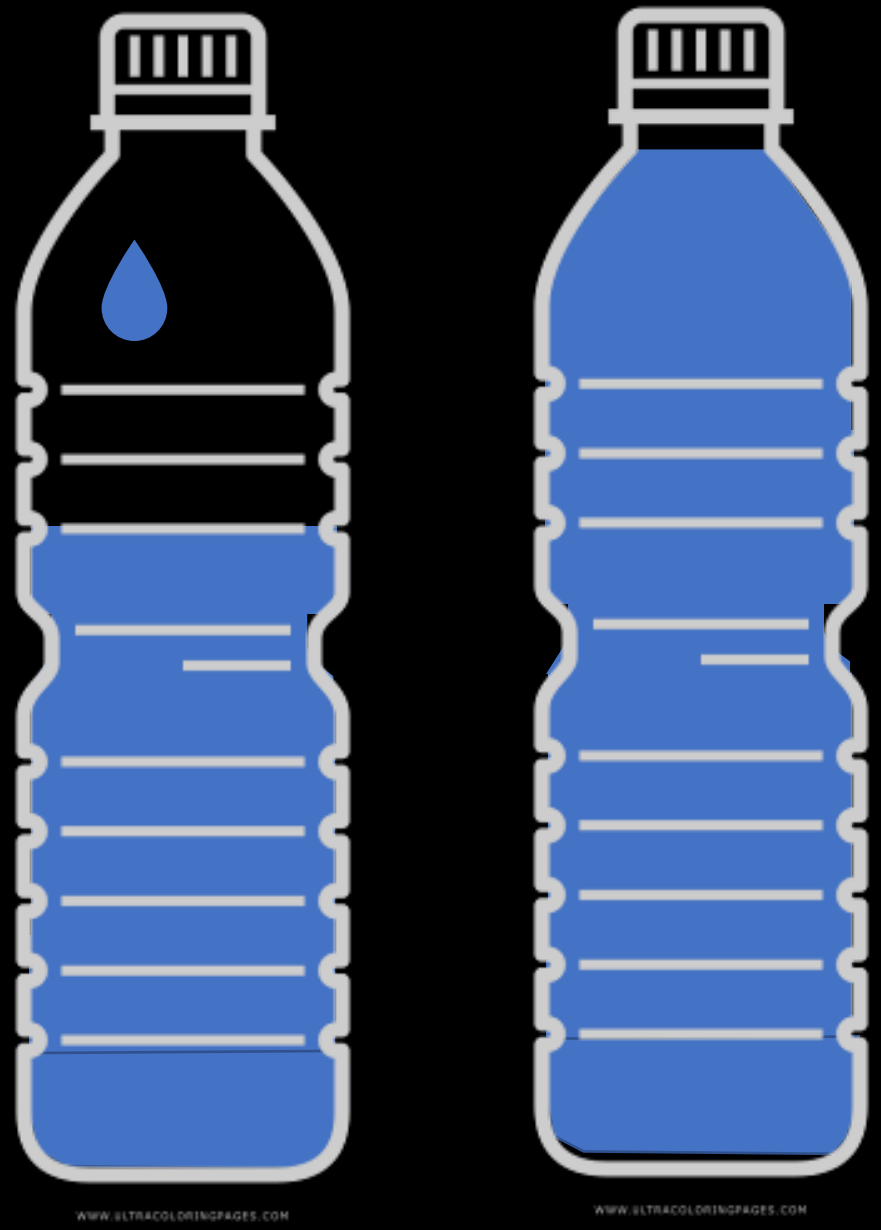


16,00 sec

1.6

liters

WATÆSTIC

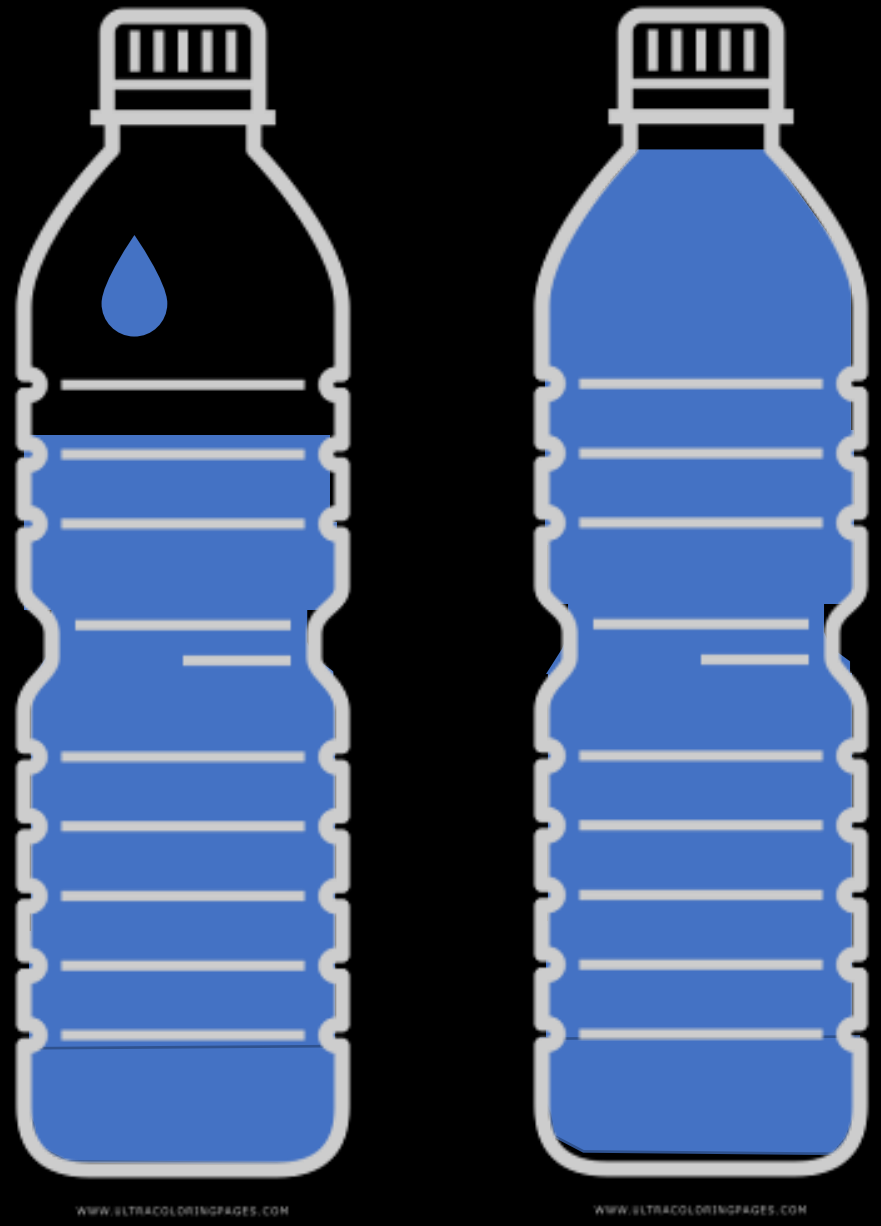


17,00 sec

1.7

liters

WATÆSTIC

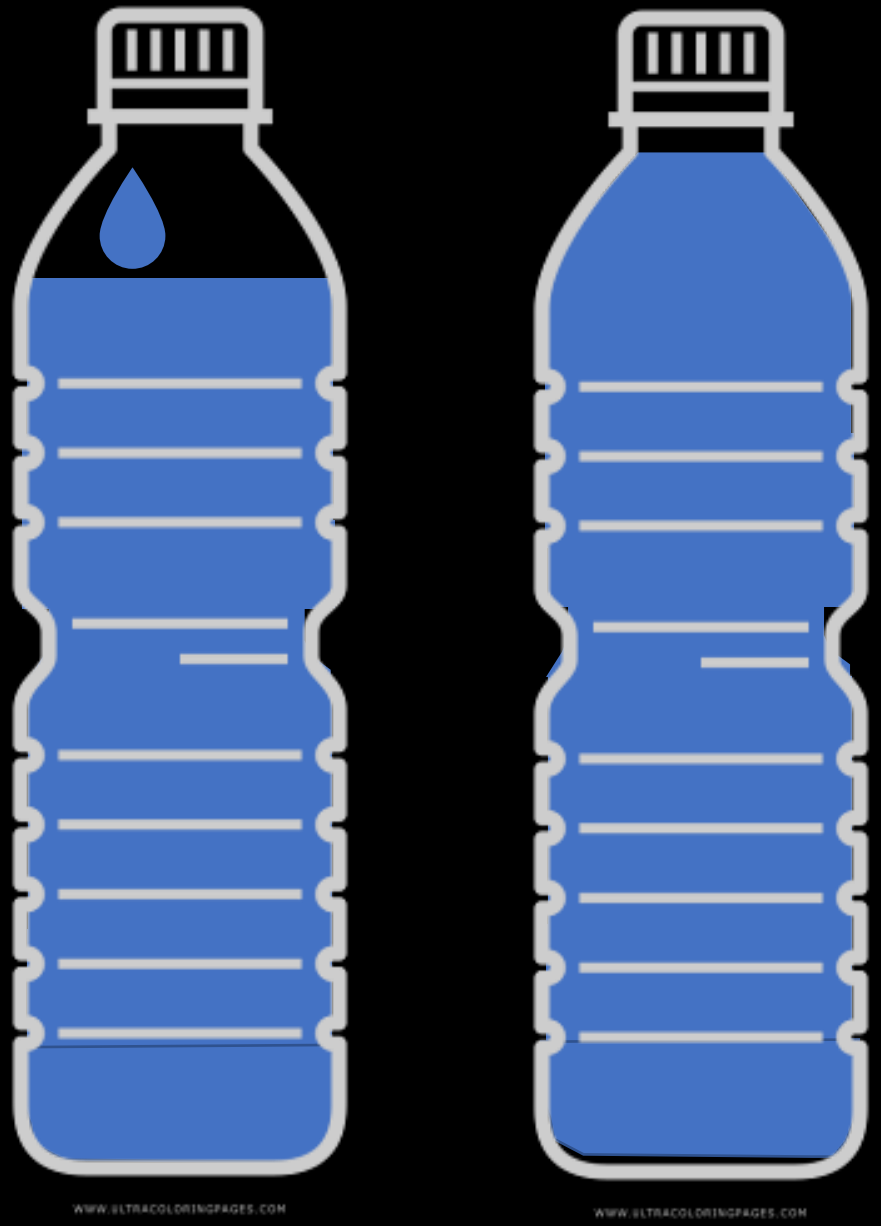


18,00 sec

1.8

liters

WATÆSTIC

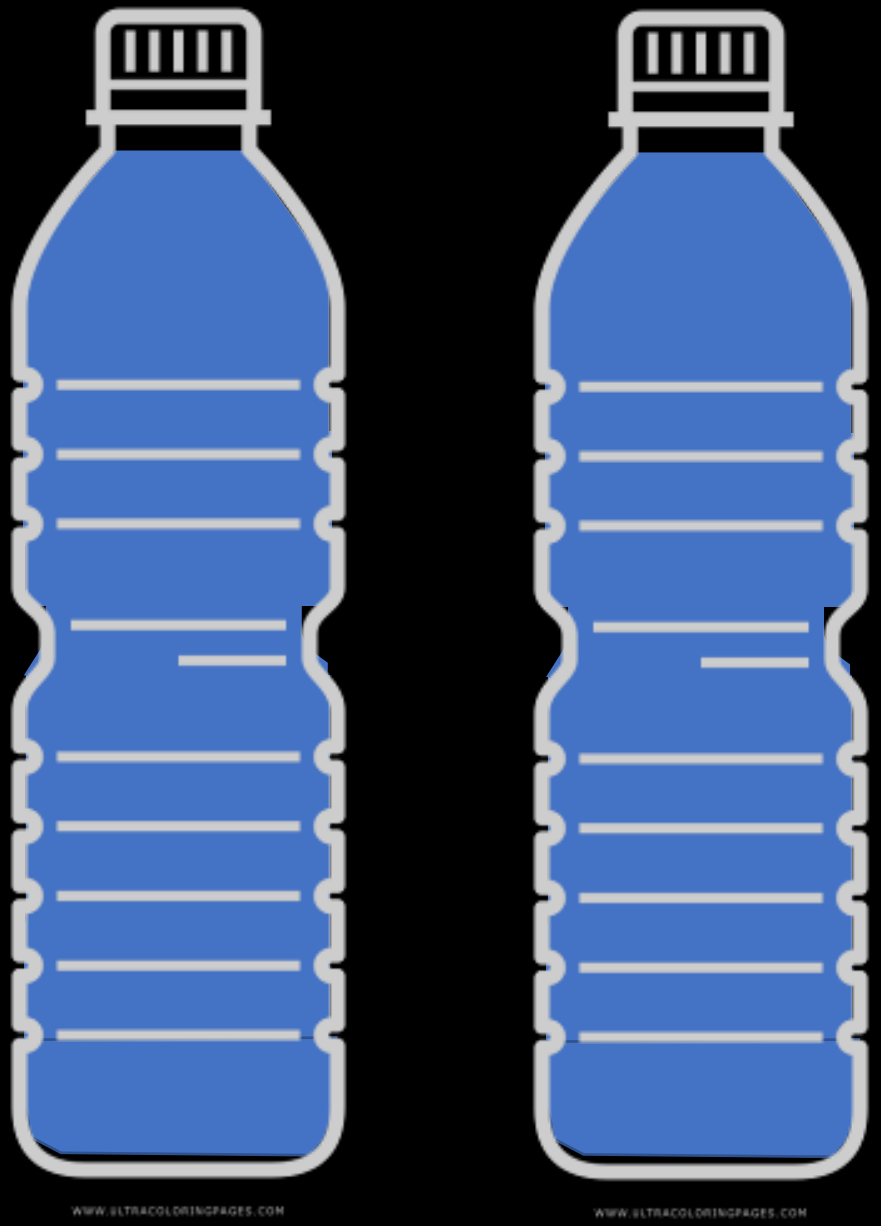


19,00 sec

1.9

liters

WATÆSTIC



20,00 sec

2.0

liters

WATÆSTIC

You spent **0,8 liter** of water in 8 seconds!

The average is:
1 liter of water per handwash

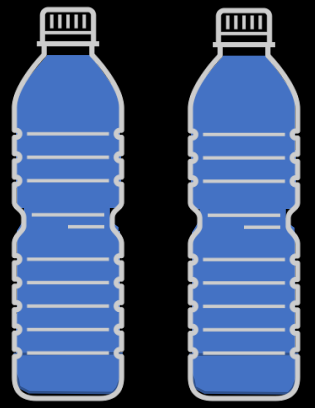
WATÆSTIC

You spent **1 liter** of water in 10 seconds!

The average is:
1 liter of water per handwash

WATÆSTIC

You spent **2 liter** of water in 20 seconds!



The average is:

1 liter of water per handwash

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Stage 4: Product & Conclusion

After scanning the QR code, the user is sent to a website, where some more info can be found:

- WHO instruction of proper handwash - steps when water is needed are circled
- a ranking of water usage of different buildings at the campus

Best performance: 0,5L per hand wash
Average: 1L per hand wash
Worst performance: 2L per hand wash

1. Architecture - 0,5 L per hand wash
2. Engineer - 0,7 L per hand wash
3. Biology – 1 L per hand wash
4. Chemistry – 1 L per hand wash
5. Technology – 1,2 L per hand wash
6. Main Building – 1,2 L per hand wash
7. Canteen – 1,3 L per hand wash
8. History – 1,5 L per hand wash
9. Material – 1,7 L per hand wash
10. Library – 1,8 L per hand wash
11. Mathematics– 1,9 L per hand wash
12. Management– 2,0 L per hand wash

WATER

Check how you can improve next time!

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Ranking
Information
Data

Big Bang

How much water each building spent?

Best performance: 0,5L per hand wash
Average: 1L per hand wash
Worst performance: 2L per hand wash

1. Architecture - 0,5 L per hand wash
2. Engineer - 0,7 L per hand wash
3. Biology – 1 L per hand wash
4. Chemistry – 1 L per hand wash
5. Technology – 1,2 L per hand wash
6. Main Building – 1,2 L per hand wash

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How much water do you need to wash your hands?

1 sec

5 to 10 sec

WATÆSTIC

Every drop counts…

Warsaw University of Technology

33.400 members

Less 3 seconds =
0,3 L per handwash

30.000 L water/day saved

WATÆSTIC

16.000 EUR / year

THANK YOU for your attention!

Take care of the climate!

Summer School 2021

'GREEN CAMPUS'

WARSAW 2021

With the support of the Erasmus+ Programme of the European Union

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Warsaw University of Technology