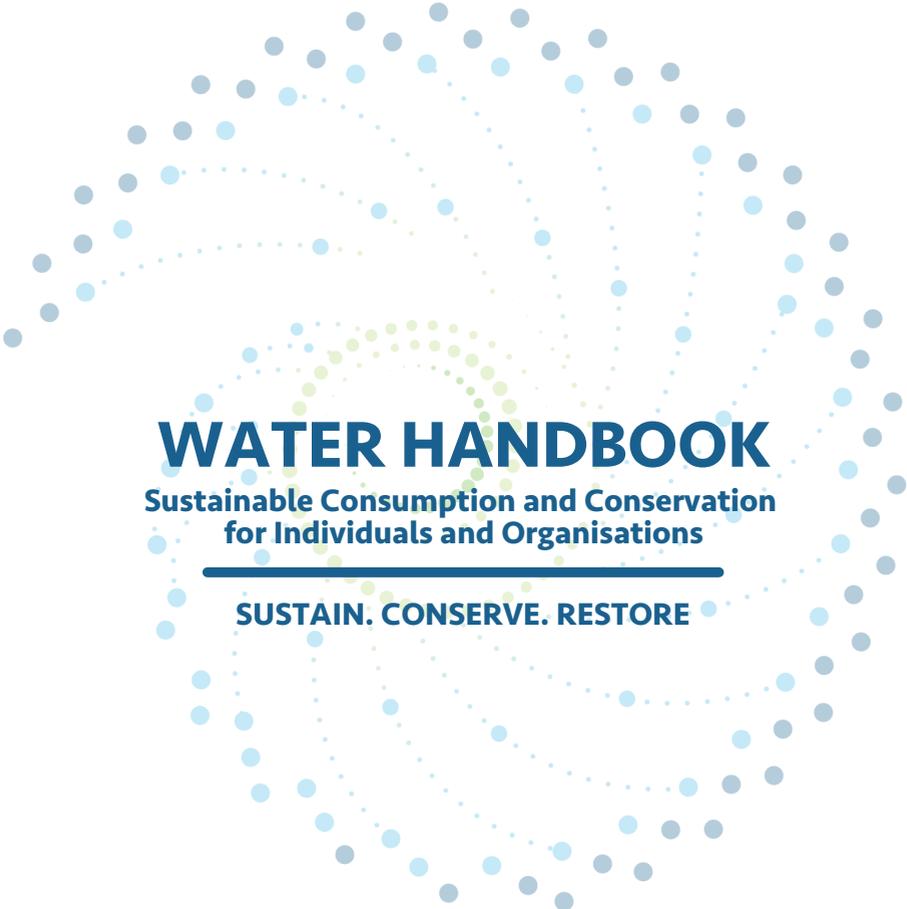




# WATER HANDBOOK

Sustainable Consumption and Conservation for Individuals and Organisations



# **WATER HANDBOOK**

**Sustainable Consumption and Conservation  
for Individuals and Organisations**

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**SUSTAIN. CONSERVE. RESTORE**

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# Foreword

Scientifically speaking, 60% of our body is made up of water and needless to say that we are a walking water container. Similarly, water covers 70% of Earth, and this has led us to think that it will forever be plentiful and bottomless. However, we need to recalibrate our perception into thinking that the water we consume, is rare. Did you know that only about 3% of the world's water is freshwater but only 0.5% is available for drinking?

With growing population rates, rapid urbanisation and the ever-expanding of businesses and industries, it only makes sense that we must preserve and conserve this very precious resource. We need to start making smart and sustainable decisions in managing our water and its sources. As the largest water services provider in Malaysia, we feel responsible to impart knowledge on water conservation not only to our consumers in Selangor, Kuala Lumpur and Putrajaya but also to Malaysians in general for the benefit of the generations to come.

In line with this, we have collaborated with UMCares – The Community and Sustainability Centre of Universiti Malaya to develop comprehensive, informative and most importantly fun guidelines for the public to turn water conservation into practice and hopefully, a habit. It is germane for everyone to take serious action on this matter as it is a responsibility, we all should be sharing. Let us start, one step at a time as every single action helps.

We made sure that this Water Handbook is easily understood by everyone and most importantly, outlined the practices and initiatives we can do daily at home. Imagine a world where every one of us plays our part to conserve water and protect the water source – a continuous clean and safe water supply right to our tap. And what better way to make that utopia a reality? Act now, it is our water, our future! So we would like to encourage everyone who has downloaded the handbook, to participate and do not forget to share it with their families, friends and communities.

Last but not least, we would like to thank everyone, from Air Selangor's Editorial team to our stakeholders and knowledge partners for making this Water Handbook a reality. Thank you for the collaboration, partnership, knowledge transfer and of course, for making this project a reality. And not to forget everyone, for playing your part to protect and conserve our water. Together, we can create a better water future for the generations to come.

# Part 1

# SUSTAIN

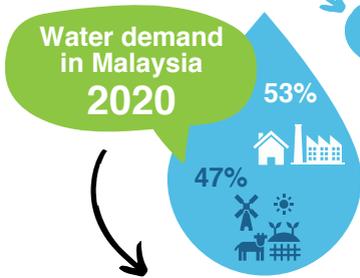
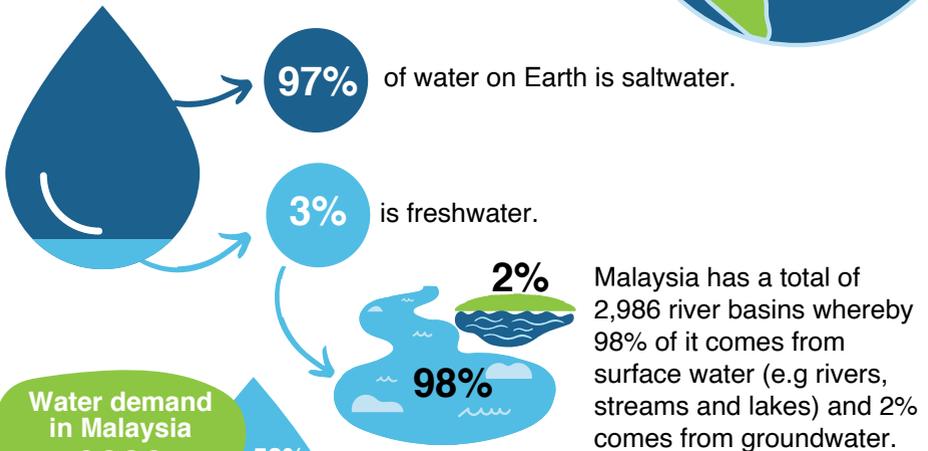
This part will introduce the concepts of freshwater, water cycle, river basin, human impacts on our local water bodies and how we can move towards water sustainability. Opportunities for water conservation exist and we have an important role to play in the journey towards water sustainability.

The first part of this Handbook aims to help users understand the significance of water as a resource and the importance of conservation efforts in the spirit of #KitaJagaAir.

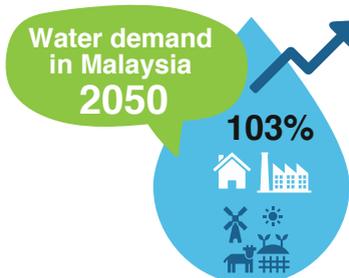


# Freshwater as a resource

70% of the Earth's surface is covered by water but only 3% is freshwater. Freshwater is water that is not salty which comes from ponds, lakes, streams, rivers and groundwater. It is needed for nearly all human activities: drinking, sanitation, agriculture, transport, electricity generation, and recreation. It also creates habitats for a diverse range of animals and plants. In short, we cannot live without freshwater.



Currently, water demand in Malaysia is approximately 53% for domestic and industrial usage while the remaining 47% is used for agriculture.



By 2050, it is predicted that water demand in Malaysia will increase by 103% for domestic usage, industrial usage and agriculture sector. (Source: National Water Resource Study 2000 - 2050, 2000)

## What happens next?

With higher demand for domestic usage, industrial usage and agriculture sector, we need to extract more water and build more facilities.

# Everyone in the world lives in a river basin

A river basin is the land area that drains into one stream, lake or river and can affect the water quality in the water body that it surrounds. Because we all live on land, we all live in a river basin — thus the condition of the river basin should be important to you, your family and your community.



Land plays an important role in absorbing rainfall and will release this water slowly over time, even during periods of dry weather. Water-resistant surfaces that are not designed to absorb water, such as roads, parking lots and rooftops in urban areas have altered the natural flow of water in river basins.



A river basin is like a sink/basin, collecting all the water in a specific place and draining into the nearest body of water.

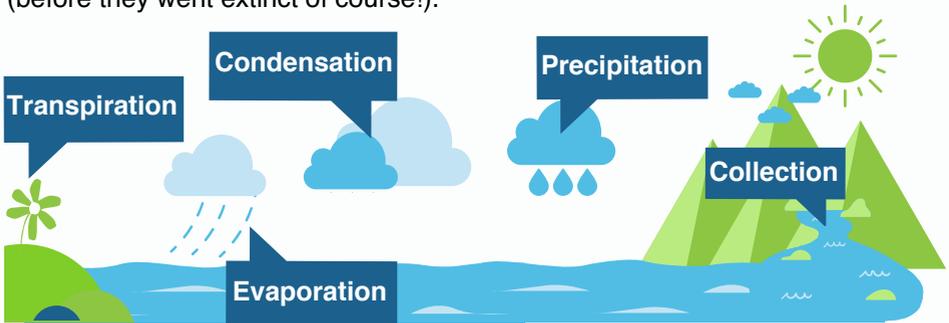


As a result, natural water cycles will be altered due to these changes in the amount, volume and time flow of water, resulting in flash floods during periods of heavy rainfall. In conclusion, poor and rapid urban development without proper planning will not only affect our river basin but also the source of our freshwater.

A visual map of River Basins in Selangor is available in the Appendix of this Handbook.

# How water travels?

The water cycle is the journey water takes around the Earth (from the land to the sky and back again) through various processes that can change it into a liquid, gas, or solid. It's like a big circle! The water on our Earth today is the same water that has been around since 5 billion years ago. We are probably drinking the same water that thirsty dinosaurs were drinking (before they went extinct of course!).



# Water equity

Water equity is simply about everyone having equal access to safe, clean, and affordable drinking water and wastewater services. It is also important to note that communities with water equity are more resilient in the face of floods, drought and other climate risks.

In 2019, it was estimated that **4.2 billion people (55% of the world's population)** are without safely managed sanitation.

(Source: United Nations, 2020)



# Challenges of the water industry

## 1 Quality of raw water

Most water treatment plants in the country process raw water from the rivers, but many of these water bodies are polluted because of human activities.

Whenever raw water sources are polluted, treatment plants may need to be shut down when the pollution exceeds the safe threshold allowed in a treatment process or in other words, exceeds the treatment process capability.



## 2 Impact of climate change

Climate change has altered the availability, quantity and quality of global water supply and water cycle. Some of its effects include longer periods of drought and heavier than usual rainfall.

Heavier than usual rainfall indirectly contributes to an increase in raw water supply and heavy rainfall affects the soil's ability to retain water. Rainwater run-off such as rubbish, twigs/leaves, grease and soil from the surface will flow into the river, resulting in murkier water that lowers its quality.

Turbidity water is a more complex process. A water treatment plant may need to be shut down or reduce the rate of inflow into the plant when it cannot process water that has a high turbidity level.



## 3 Cost of treating water

Many are not aware of the high costs and risks that water operators in Malaysia face in providing continuous and sustainable clean water supply.

According to SPAN, the cost to treat 1,000 litres (one cubic metre [m<sup>3</sup>]) of water stands at RM2.31 while the average tariff imposed on domestic users in Malaysia is only RM0.52 per cubic metre for the first 20 cubic metres of water used.

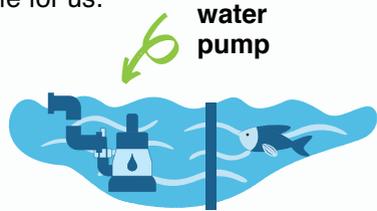


# How we get our clean water supply

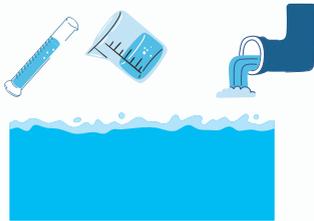
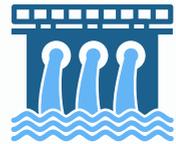
A long time ago, people used to live by the rivers and streams or dig wells so that they can get a steady supply of water. Now, all we have to do is simply turn on the water tap and we can get water whenever we want. Learn how water is processed to make it safe for us:

## STEP Intake

**01** First, raw water is extracted from a natural source such as rivers or lakes. Logs, fish, or plants will be screened out.



The main river basins in Selangor, Kuala Lumpur and Putrajaya are Selangor River, Langat River, and Bernam River. To keep up with increasing consumer water demand, Klang River has been identified as a new source of raw water for the Rasau River water treatment plant project. Dams only serve as water storage where water is released into rivers during dry season.



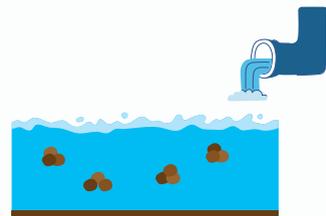
## Pre-treatment STEP

Water is firstly aerated to remove unpleasant smell and taste.

## 02

## STEP Coagulation and sedimentation

**03** Water is then treated using chemicals such as alum, a coagulating agent for dirt and solid removal. The added chemicals “cling” the dirt and solids making them sink to the bottom.





Air Selangor operates and maintains the entire water services value chain, from raw water abstraction and treatment, to distribution of treated water to consumers in Selangor, Kuala Lumpur and Putrajaya.

**34**  
Water  
treatment  
plants



Average daily  
production:

**4,946**  
MILLION  
Litres of  
water

\*as at December 2020

**8.4**  
MILLION  
Consumers



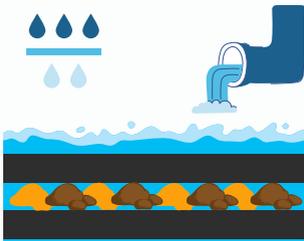
**Distribution** **STEP**  
**06**

Finally, treated water is ready to be distributed. From water treatment plants, the treated water is stored at service reservoirs. From here, treated water is supplied to our homes through reticulation system. Everyone has equal right to safe and clean water.

**STEP**  
**05**

**Disinfection and fluoridation**

Chlorine is then added into the water to kill any remaining parasites, bacteria, and viruses, and to protect the water from germs before it is distributed to homes and businesses. Fluoride is also added to the water to keep teeth strong and reduces cavities (also called tooth decay).



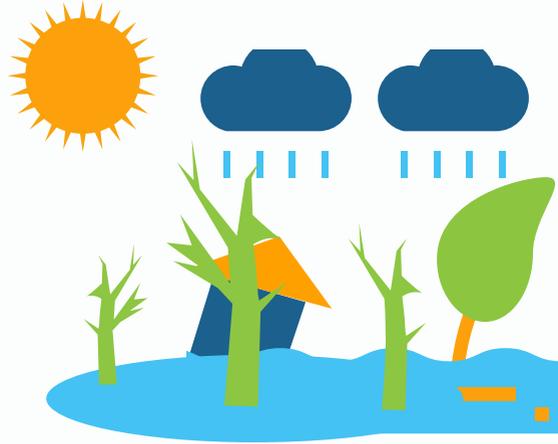
**Filtration** **STEP**  
**04**

Water is then filtered through layers of sand and gravel which remove microorganisms and other impurities.

**Filter**

# Moving towards water sustainability

The effects of climate change such as rising temperatures with more extreme and unpredictable weather can affect the availability and distribution of rainfall, river flows and groundwater leading to further drop of water quality. More floods and severe droughts are projected to occur, resulting in changes of water availability and affecting global health and food security.



Are you aware that climate change is impacting our water resources?



## What can we do to reach water sustainability?



1

Keep development to a level that is within the carrying capacity of the river basins while protecting and restoring the environment.



2

Water resources should be used, shared and managed over the long term to meet the needs of the people while maintaining a sustainable balance between demand and supply.

# Challenges in achieving water sustainability

In order to achieve water sustainability, we will need to consider the following:

## 1 To adopt the integrated management of water resources

Malaysia needs to adopt Integrated Water Resources Management (IWRM) in managing the water sector and the catchment areas. This will increase effectiveness in coordinating policies, programmes and practices addressing water-related issues considering socio-economic development and the conservation of the environment.



Water-related issues



## Adaptive urban planning

Our urban planning practices should be even more adaptive, flexible, resilient and risk-based to account for unexpected circumstances.



2

In Malaysia, between 1990 to 2016, disasters such as flash floods, storms, and transportation accidents in urban area have affected more than 3 million people & have taken thousands of lives.



Example: As a UNESCO World Heritage Site, Melaka has taken significant efforts to maintain its heritage status and improve its resilience by implementing strategic planning efforts to mitigate and overcome:

Caused nearly US\$2 billion (RM8 billion) in damages.

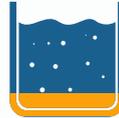


(Source: Disaster Management Reference Handbook Malaysia, 2019)



## Changes in water quality

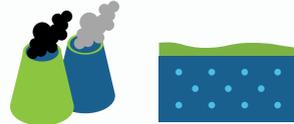
In addition to erosion caused by increased runoff, stormwater can carry sediments and soil particles from the land surface, which contain nutrients such as nitrogen and phosphorus, as well as contaminants.



4

**Studies have shown that a large portion (as much as 70%) of all water pollution comes from non-point source pollution that results from human activity.**

Be mindful that this pollution can enter the water at any stage of the water cycle and affect water quality usually from the point of water sources, through many routes:



**Non-point source pollution**      **Surface runoff**

3

## Changes in hydrology

As land use within a river basin changes, trees, shrubs and other plants are replaced with impervious surfaces (i.e. surfaces that do not allow rainfall to soak into the ground – roads, rooftops, parking lots, and other hard surfaces).

**We need plants for:**



Practical solutions can be found in Part 3 of this Handbook.

## 5

## Changes in water quantity

Land use change can also impact the quantity of groundwater reserves. Water in the groundwater system may eventually discharge into streams, lakes, and oceans. Hence, this water must be recharged.



Wetland



Forest

**Wetland areas provide the most opportunity to recharge groundwater reserves. The same goes with forested areas where water can be held in pockets on the forest floor.**



## Conclusion

We hope this first part of the handbook has helped you understand the issues around water supply before we take a deeper dive into the spirit of #KitaJagaAir. The following two parts, namely Conserve and Restore will highlight the important role of individuals and communities: how each one of us could do our part to conserve and be a good water consumer and water steward. Remember, change starts with you, first by 'knowing your river basin' and then by learning more about practical solutions that can be applied in daily life. We need clean and safe water; let us make every drop count!



## Part 2

# CONSERVE

As population increases and only a small percentage of the Earth's freshwater is available for use, we must preserve and conserve this precious resource.

Water conservation is important because clean freshwater is a limited resource and is vulnerable to pollution. We must take the responsibility to learn more about water conservation and help to preserve these sources for the next generation. It is the responsibility of every person to conserve water.



# What is water conservation?

Water conservation is the practice of using water efficiently to reduce unnecessary water usage.

## Why do we need to conserve water?

We need to conserve water to ensure sufficient and continuous supply to meet our needs, now and into the future. Here are some reasons why we should care about water conservation:

### 1 To avoid water shortages and prepare for crisis

As the demand for water increases, clean water resources will be reduced and may cause water scarcity or rationing. We also need to prepare for crisis such as such as prolonged drought or reduced rainfall.



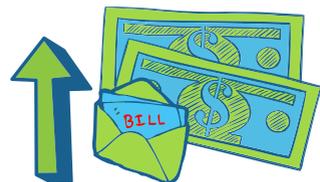
### 2 To protect the economic sector and other essential services

All economic sectors rely on water which we benefit from. Critical services such as fire brigade and hospitals utilise water to operate. By ensuring sustainable water supply, these services can continue to serve the needs of the local community.



### 3 To guard against rising cost for consumers

Water supply operators may need to construct more water treatment plants, and use more advanced technologies for treatment to meet demand, potentially increasing the cost of water for consumers.



# 01 Water auditing

A household water audit is an assessment of how much water is used and how much water can be saved.

Conducting a water audit will help you understand how you use your water and identify ways to minimise your water use by implementing certain conservation measures.



It may be possible to cut your water use by as much as 10 to 20 percent by implementing simple conservation measures without having to change your lifestyle drastically.



# Water consumption 02



For example, in the context of household usage, LCD is measured by the water we use for our daily activities such as drinking, cooking, showering, gardening, and many more.



Water consumption in a community is characterised by several types of demand. These include: domestic (household usage), public (public buildings, schools, etc.), commercial, and industrial purposes.

Water use or demand is normally expressed by average daily consumption per capita (e.g. litres per capita per day, or LCD).

# 03 Water footprint

A water footprint shows the extent of water usage in relation to consumption by people.

The water footprint of an individual, community or business is defined as the total volume of fresh water used to produce goods and services consumed by the individual or community or produced by the business.



A water footprint also measures the water that is used in the process of making our food, clothes and fuel, among others.



# Water auditing: Calculating water use

1

The easiest way to calculate your average daily water use is by using your household water bill. You can use your monthly water bill for three months and then calculate your average daily use by dividing the total usage by 90 days. This will give an estimated average of your household daily water use.



2

Another method is to use your water meter, which is faster. Water meters measure the total amount water used in your home. To obtain your water use over the course of a 24-hour day, you will need to read your meter at the same time for seven consecutive days. You can then calculate the daily average of water use. Please refer to the Appendix on how to read your water meter.



## How does your water usage rank?

The average Malaysian resident uses 201 litres per day (SPAN). To calculate the daily average water use per person, the daily water usage is divided by the number of people in your house. You can use the table below as a guide to rate your daily water usage.

<160 litres per capita per day

Excellent! You use your water wisely, less than the World Health Organization (WHO) recommended value. Please share your conservation techniques with friends and neighbours.

165-180 litres per capita per day

Good job! You use less water than the average Malaysian. Refer to the conservation tips at the end of this chapter to conserve even more water.

181-200 litres per capita per day

You are an average user. Read the conservation tips at the end of this chapter on how you can conserve water.

> 205 litres per capita per day

You use more water than the average Malaysians citizen. Try to reduce your usage and refer to the conservation tips at the end of this chapter to learn how to conserve water.

# What is the water consumption rate in Malaysia?



Malaysia's average water consumption is 201 litres per capita per day (LCD) according to a Suruhanjaya Perkhidmatan Air Negara (SPAN), which equals to 134 bottles of mineral water (1.5 litres). It is higher than the recommended value by the World Health Organization (WHO), which is 165 LCD. However, SPAN recommends 181 LCD which is the most suitable value for tropical climates such as Malaysia.

## Let us compare water use in Malaysia with other countries.



Malaysia<sup>1</sup>

201 LCD



Singapore<sup>2</sup>

151 LCD



Thailand<sup>2</sup>

193 LCD



China<sup>3</sup>

179 LCD



Hong Kong<sup>4</sup>

224 LCD



Japan<sup>5</sup>

286 LCD



India<sup>6</sup>

135 LCD

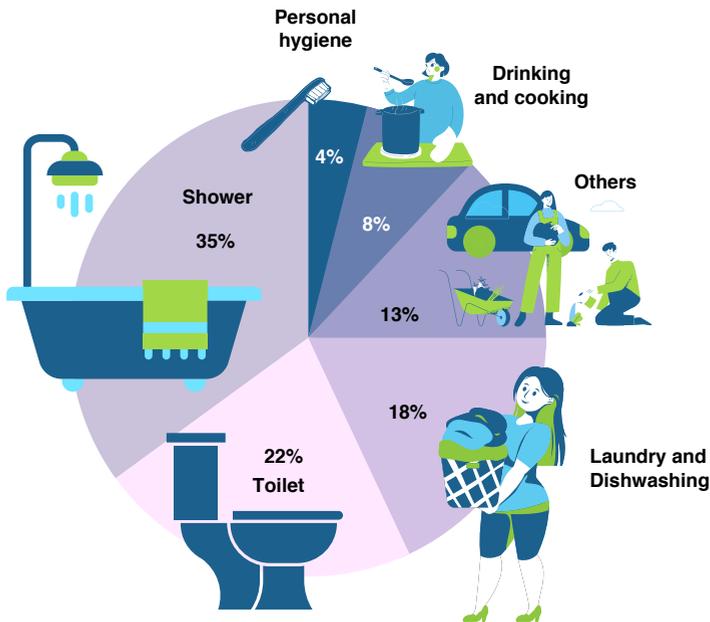
Source:

1. (Domestic consumption 2016 - 2017, National Water Service Commission (SPAN))
2. (Bernama, n.d.)
3. (Census and Economic Information Center (CEIC) Data, 2021)
4. (Gupta, A. 2017)
5. (Klein, C. 2021)
6. (Times of India, 2017)

# Water consumption breakdown

Do you know how much water you use for different activities at home? The pie chart below shows the percentage breakdown of water used by activity for a typical Malaysian. The values for each activity are calculated based on the measurements and information obtained from relevant research and resources <sup>1,2,3,4,5</sup>. The percentage for each activity is then calculated with regards to the total water consumption of 201 litres per capita per day (LCD).

It is interesting to note that cooking and drinking contribute to less than 10% of total consumption. Shower, toilet flushing, and cleaning activities (laundry and dishwashing) are the three main contributors to our water consumption, which amount to more than 70% of the total consumption.



Source:

1. (Chan et al, 2016)
2. (Domestic consumption 2016 - 2017, National Water Service Commission (SPAN))
3. (Inocencio et al., 1999)
4. (Puad and Othman, 2009)
5. (World Health Organization (WHO), 2017)

# How can we make a difference?

A few simple activities can reduce our water consumption, such as changing the showerhead to a more efficient one, installing an efficient single flush/dual flush toilet system, turning off the tap while brushing our teeth, using a watering can or a bucket instead of a running hose for gardening, car washing and general washing.

## How much water can be saved?

1

Using an efficient showerhead results in a reduction of 140 litres per week, which equals to 7,280 litres per year.



Installing an efficient single flush/dual flush toilet system reduces consumption by another 70 litres per week, resulting in a 3,640 litres per year.

2

3

Changing from using a running hose to a bucket of water for car washing, garden watering and general washing reduces water usage to 116 litres per week or 6,032 litres per year.



### Did you know?

By doing the above, we can save a total of

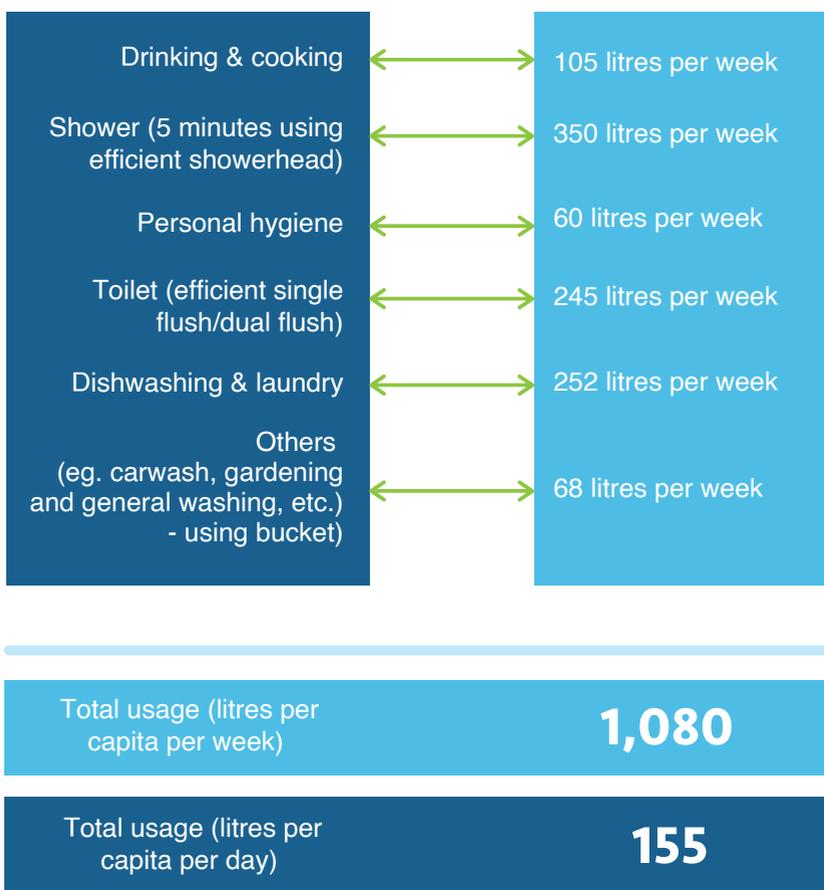
**16,950 litres of water per year !**





## What can we change?

The above approaches may contribute to a projected reduction of water consumption to 155 LCD as shown in the example below. A reduction of more than 20% from the typical Malaysian average.



# Quiz time!

1

Which one of your daily activities do you think use the most water? State the volume of water you think the activity uses.



2

Suggest two ways to help save water when doing the activity mentioned above.



3

Suggest one system or technology that can help conserve water. Explain how it helps to conserve water.



# What is your water footprint?

This includes the tap water we use, and the 'virtual water' consumed to produce our food, electricity, fuel and home goods. The water footprint measures the amount of water used to produce all of these things. Everyone has a personal water footprint which is related to what we eat, buy and use.

## Water footprint components



A water footprint can generally be divided into three components as follows:

1

### Green water footprint

Rainwater evaporated, transpired or stored in the soil due to precipitation and is available to plants.



2

### Blue water footprint

Surface or groundwater resources, such as water in rivers, lakes, wetlands, and aquifers.



3

### Grey water footprint

Volume of polluted water, including the used water discharged directly into sewage system or indirectly discharged via runoff or leaching through soil.



# Do you know what is your water footprint?



The average water footprint for Malaysia is 2,103 cubic metres per person per year compared to the global average of 1,385 cubic metres per person per year.

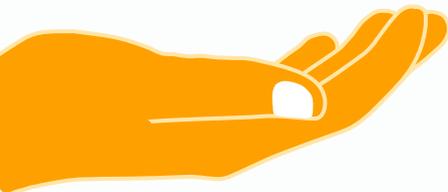
(Source: Water Footprint Network, 2018)

## How can we reduce our water footprint?

There are two types of water footprints – direct and indirect water footprint. **The direct water footprint** is basically your water consumption, while **the indirect water footprint** relates to ‘virtual water’. The indirect water footprint is generally much larger than the direct one.

We have seen some examples on how to reduce the water consumption in the previous part. Our choices and habits do affect our water usage and water footprint: our daily activities, the food we eat, the products we buy and even the energy we use. Let us see what we can do to reduce our water footprint.

Below are examples of the water footprint for some food products. For more products, you can check the water footprint product gallery at <https://waterfootprint.org/en/water-footprint/product-water-footprint>



# Water Footprint of Products



Rice

1 kg = 2,497 litres



Pasta

1 kg = 1,849 litres



Wheat Bread

1 kg = 1,608 litres



Beef

1 kg = 15,415 litres



Chicken

1 kg = 4,325 litres



Chicken egg

0.06 kg (one egg)  
= 198 litres



Olive

1 kg = 3,015 litres



Cucumber

1 kg = 353 litres



Broccoli

1 kg = 285 litres



Cabbage

1 kg = 237 litres



Tomato

1 kg = 214 litres



Carrot

1 kg = 195 litres

# Water Footprint of Products



Banana

1 pc = 160 litres



Apple

1 pc = 125 litres



Orange

1 pc = 80 litres



Milk

250 ml glass =  
255 litres



Coffee

125 ml cup =  
132 litres



Tea

250 ml cup =  
27 litres



Butter

1 kg = 5,553 litres



Cheese

1 kg = 3,178 litres



Chocolate

1 bar (0.045 kg) =  
773.82 litres

The infographic above shows that some food products have higher water footprint than others.

To reduce your water footprint, you can try to substitute a product that has a large water footprint by a different type of product that has a smaller water footprint. For example, you can eat less meat, substitute beef with chicken or vegetables, drink tea instead of coffee, or even better drink plain water.

# Example of a food diary

Meal 1: Nasi Lemak

- 1 Rice 1 kg = 2,497 litres  
0.08 kg = 200 litres
- 2 Cucumber 1 kg = 353 litres  
0.02 kg = 7.40 litres
- 3 Chicken egg 1 kg = 3,300 litres  
0.06 kg (one egg) = 198 litres



≈ 405.40 litres

Meal 2: A plate of rice with chicken & vegetables



≈ 2,450.85 litres

- 1 Chicken 1 kg = 4,325 litres  
0.5 kg = 2,162.50 litres
- 2 Broccoli 1 kg = 285 litres  
0.20 kg = 57 litres
- 3 Cabbage 1 kg = 237 litres  
0.05 kg = 11.85 litres
- 4 Rice 1 kg = 2,497 litres  
0.08 kg = 200 litres
- 5 Carrot 1 kg = 195 litres  
0.1 kg = 19.50 litres

- 1 Carrot 1 kg = 195 litres  
0.10 kg = 19.50 litres
- 2 Lemon 1 kg = 642 litres  
0.02 kg = 12.84 litres
- 3 Olive 1 kg = 3,015 litres  
0.02 kg = 60.30 litres
- 4 Tomato 1 kg = 214 litres  
0.30 kg = 64.20 litres
- 5 Cabbage 1 kg = 237 litres  
0.05 kg = 11.85 litres
- 6 Broccoli 1 kg = 285 litres  
0.10 kg = 28.50 litres

Meal 3: A plate of vegetables & fruit



≈ 134.74 litres

The above pictures show the water footprint calculations for some common Malaysian foods.

(Source: Hoekstra et al, 2017)

# Water Footprint Calculator

Check out the personal water footprint calculator developed by the researchers at UNESCO-IHE to assess your own unique water footprint. Do try it at home with your family:



<https://waterfootprint.org/en/resources/interactive-tools/personal-water-footprint-calculator/personal-calculator-extended/>

## How to use the calculator

The calculator measures water requirements per unit of product as per specific country. It consists of three components: Food Consumption, Domestic Water Use (indoor and outdoor), and Industrial goods consumption.

Start by choosing Malaysia as the country of residence.

1

The 'Food Consumption' category includes the different types of food intake and drinks. You will need to fill in the amount of your daily food intake. An example is shown below.

Food Consumption	Amount
Cereal products (wheat, rice, maize, etc.)	1 kg per week
Meat products	1.5 kg per week
Dairy products	0.2 kg per week
Eggs	5 numbers per week
How do you prefer to take your food?	with average fat
How is your sugar and sweets consumption?	Low
Vegetables	3 kg per week
Fruits	3 kg per week
Starchy roots (potatoes, tapioca)	0.2 kg per week
How many cups of coffee do you take per day?	1 cup per day
How many cups of tea do you take per day?	1 cup per day

# Water Footprint Calculator

2

The 'Domestic Water Use' consists of indoor and outdoor usage which is related to your personal usage and habits. You can complete the form as shown below.

## Domestic water use (Indoor)

Domestic water use – Indoors	Number
How many showers do you take each day?	2 times per day
What is your average length of each shower?	5 minutes per shower
Do your showers have standard or low-flow showerhead?	<input type="radio"/> Standard showerhead <input type="radio"/> Low-flow showerhead
How many baths do you take each week?	0 number per day
How many times per day do you brush your teeth, shave, or wash your hands?	2 times per day
Do you leave the tap running when brushing your teeth and shaving?	<input type="radio"/> Yes <input type="radio"/> No
How many loads of laundry do you do in an average week?	5 times per week
Do you have a dual flush toilet?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> No flushing. Use eco-toilet
If you wash your dishes by hand how many times are dishes washed each day?	3 times per day
How long does the water run during each wash?	5 minutes per wash
If you have a dish washer, how many times is it used each week?	0 time per week

# Water Footprint Calculator

## Domestic water use (Outdoor)

### Domestic water use – Outdoors

How many times per week do you wash a car? 1 time per week

How many times do you water your garden each week? 7 times per week

How long do you water your garden each time? 2 minutes per watering

How long per week do you spend rinsing equipment, driveways, or sidewalk each week? 10 minutes per week

If you have a swimming pool what is the capacity? 0 cubic metre

How many times per year do you empty your swimming pool? 0 time per year

3

Finally, you need to estimate your total spending as a portion of your gross yearly income for the consumption of industrial goods. This refers to your lifestyle which may include the purchase of industrial products such as clothes, cleaning, hygiene and cosmetic products, household bills and appliances, fuel consumptions, etc. It will then generate your total water footprint in  $\text{m}^3/\text{year}$ .

### Industrial goods consumption

### Amount

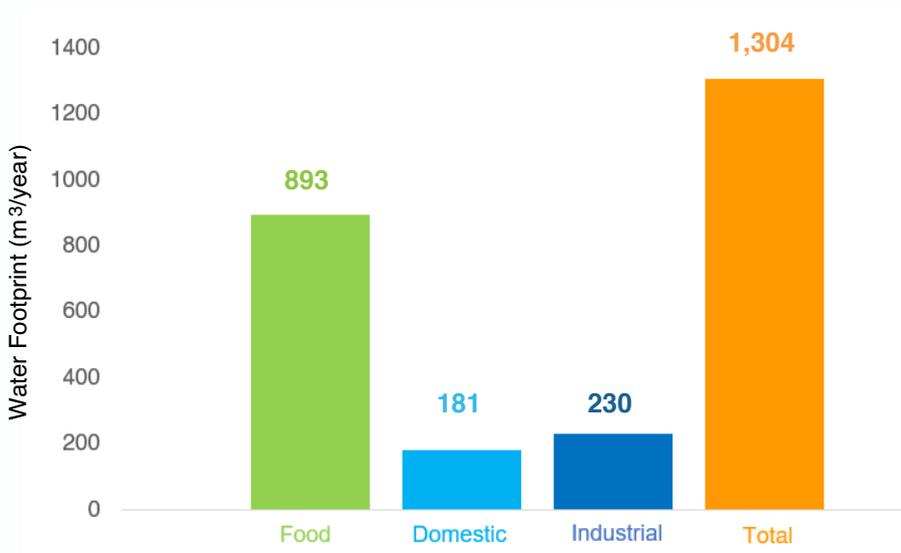
What is your gross yearly income? (Only that part of income which is consumed by you.) 6,000 US\$ per year

# Water Footprint Calculator

Your water footprint results generated

Your total water footprint is 1,304 m<sup>3</sup> per year

## Component of your water footprint



Water Footprint Components

The components of your total water footprint will also be calculated as shown above. It gives you an indication on which components you spend more on. You can then try to figure out how you can reduce your water footprint.

# Game Time!

There are two almost identical images that shows people eating their meal. Spot the differences between these two images, circle them and list them in the box below. You can now compare the differences in terms of water footprint in the diet.



Image A



Image B

## Differences

A large blue rounded rectangular box intended for writing the differences between the two images. A blue pen is shown in the bottom right corner of the box, pointing upwards.

# Answers



Image A

Image B

## Differences

- The people in image A are drinking tea which has a smaller water footprint than milk which is shown in image B.
- The people in image A consume a diet that consists of chicken and salad which has a lower water footprint compared to the diet in image B which consists of steak, sweet potato and rice.



# Water Conservation Tips

These are among the many ways that you and your family can help to use less water: in the bathroom, your kitchen and the garden.

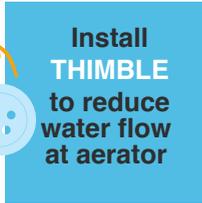
**Limit SHOWER TIME**  
to 3 - 5 minutes



**Install FAUCET AERATORS**



**Install THIMBLE**  
to reduce water flow at aerator



**Check and repair LEAKAGES**  
around the house



**Collect BATH WATER**  
and use it for washing the toilet or flushing



**Purchase WATER EFFICIENT PRODUCTS**



**Use DUAL-FLUSH TOILET**



**Purchase FRONT LOAD washing machine**



**Lighten the STOP COCK VALVE**  
to slow down water pressure



**Only run FULL LOAD**  
of laundry



**Use the SHORTEST**  
cycle possible

**Find products with higher STAR RATING**



**Stop using your toilet as a DUSTBIN**



**TURN OFF the water while...**



When you **conserve** you **save** valuable resources...



and you will save money too!





Wash your **DISHES** quickly and efficiently



**REUSE** that cup



**COLLECT** the water from washing your rice, and use it to water your **GARDEN**

Use appropriate **POT SIZES**. Large pots requires more water for cooking



**STEAM** whenever possible then use the extra water to **RINSE** plates



Do not **OVERWATER**. Use a **BUCKET** or **WATERING CAN**



Choose **DROUGHT-RESISTANT** plants



Water plants in the **MORNING** or **EVENING** to help them **RETAIN** water



Water the **SOIL** not the leaves



Try **MULCHING** to retain **MOISTURE**



Use a **BROOM** to clean driveways and sidewalks



Consider going to your local **CAR WASH** to save water or just use a **BUCKET**



Collect **RAINWATER** from a **ROOF/GUTTER**



Use a **RAIN BARREL** or use things you already have around your home



For Muslim, use a **CUP** to perform **WUDHU**



You can also collect the **WUDHU WATER** and use it to **WATER THE PLANTS**

# Water Conservation Tips

These are among the many ways that you and your workplace can help make a difference by conserving water.



Display signages on water-saving awareness



Create a water-saving initiative and incentive system at your workplace / educational sector



Send office landscapers to water-wise gardening courses



Support projects that use reclaimed wastewater



Organise an annual competition among workers / students for water-saving ideas



Design landscaped areas using only drought-resistant plants or other water-saving methods

## Conclusion

This is the end of our second part, 'Conserve'. It is indeed our responsibility to safeguard one of the most precious resources on Earth: water. In our third and final part, 'Restore', you will discover some exciting and engaging activities to equip yourself on this journey as you transform into a good steward and responsible water consumer!



## Part 3

# RESTORE

It is important to understand that all of us live in a river basin and everything that we do has a direct impact on the water bodies around us. This means we are responsible for the water we use at home and at our workplace, as well as the wastewater that flows into our drains and sewage systems which will eventually end up in streams, rivers, lakes and seas.

This final part will inspire you with the spirit of #KitaJagaKita #KitaJagaAir by providing you with the practical know-how, skills, and checklist on how to play your part. This includes projects that you can try out with your family and friends.



# Which river basin do you belong to?

Everyone lives in a river basin. There are seven river basins in Selangor, Kuala Lumpur & Putrajaya. Each river basin has its own characteristics. The largest river basin in Selangor is the Langat River Basin, followed by the Sungai Bernam River Basin and the Selangor River Basin.



Becoming aware of your river basin 'address' is a good starting point to understand your essential connection to:



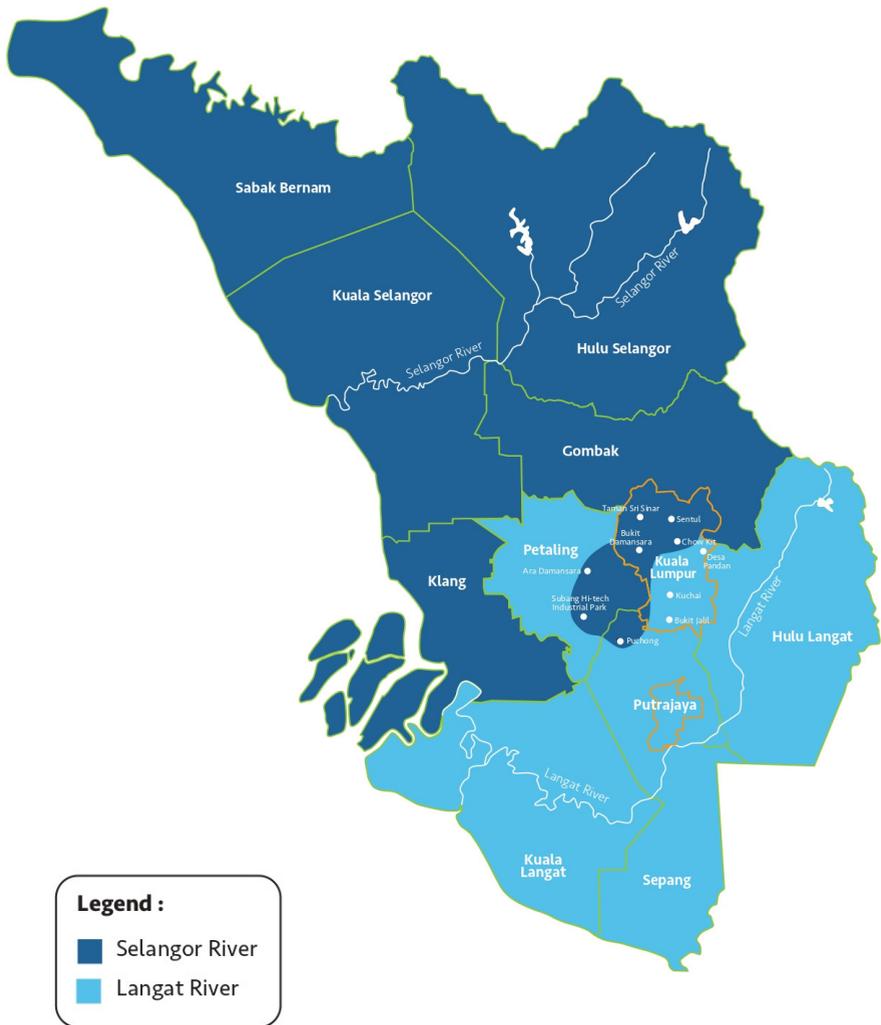
1 The streams or rivers nearest where you live.

2 Your water source - where the water you use for drinking or bathing comes from. Find out your water source from the map in the next page.

3 The drains you have at home which collect rainwater or greywater from your kitchen or bathroom.

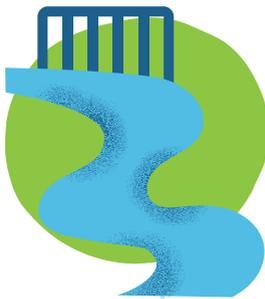
4 Where your wastewater flows to.

# Where does your water source come from?



Disclaimer: Selangor River and Langat River are the two primary water sources in Selangor, Kuala Lumpur and Putrajaya.

# Water where?

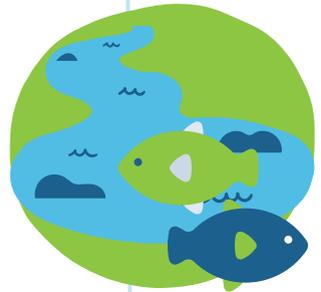


## 1 My nearest river:

Walk or drive around your neighbourhood and try to find a river near you. Some rivers might look natural, some might look like a big drain (channelised river). (Hint: Spot the blue railing.) Another simple way is to check on Google Maps! Look for a blue line and zoom in closer to see the name of your nearest river.

## 2 My water source comes from:

It can be tricky to find out where your water source comes from. Some people assume that it comes from the nearest river in their neighbourhood. Try to find where your water source comes from. For example, if you live in Petaling Jaya, the water you drink comes all the way from Sungai Selangor (that is an hour's drive away!).



## 3 My wastewater goes to:

Once you finish your 'business', do you know where 'it' goes? If you receive a bill from the national sewerage company, Indah Water Konsortium (IWK), check in the bill where 'it' is processed. But if you have never received a bill from IWK, you may be using a septic tank system instead. If this is the case, make sure your septic tank is emptied regularly so that it does not pollute the river.

# Quiz: Misconceptions about water bodies

There are a lot of common misconceptions about waterways. Be a know-it-all and raise a 'Hey, did you know?' quiz session with your family and friends.



1) Where does the water in our drains flow to?

2) Are drains supposed to be wet?

3) Are there any rivers in the city?

4) Where does your drinking water come from?

5) Who owns the rivers?

6) Are there any living things in our urban rivers?

7) Are pristine rivers only found far away from cities?

8) Why are some rivers straight and others curved?

9) Are lakes just for landscaping?

**ANSWERS:** **1)** Water in our drains flows into streams, rivers, and finally the ocean. **2)** Our drains are only supposed to carry rainwater. They are not meant for household or industrial wastewater (which should be channelled into sewerage lines). **3)** Yes! The 'big drain' that you see is actually an urban river lined with concrete. **4)** From the river to your tap. **5)** Legally, the State where the river is located in. However, ownership and responsibility should not fall solely on the authorities but everyone who depend on the river for resources, including drinking water. **6)** Yes! Look closer and you will find that our rivers are home to many plants and animals. **7)** No. You can find natural streams in cities - just go to urban forests. **8)** Rivers are naturally curvy, but in some places they have been straightened to reduce flooding and prevent erosion, especially in urban areas. **9)** Not necessarily. During heavy rains, lakes can help to temporarily store water and in some places can even be an alternative water source if rivers become polluted.

# Water and our shared values

Water is an inseparable element of human life. The way water is used and valued constitutes an integral part of our culture. In a multicultural society like Malaysia, there is a rich cultural connection with water - but this connection has been gradually forgotten. As a developing country, the 'far water' phenomenon (human disconnection from the original source of water) is inevitable yet worrying.

This begs the question of the long-term sustainability of our current development trends. If future generations have limited exposure to the real value of our water resources, how can we expect them to preserve and restore them - be it now or in the future? Hence it is important for us to remind ourselves on why water is valuable to our lives, what are the values that we share and why we need to take care of our water bodies collectively!



Add a ✓ if the water bodies around you are valuable to your community under the different categories of shared values:

Value in providing water supply

Value as a natural ecosystem

Value in supporting economic activities

Value as a space for social and cultural interactions

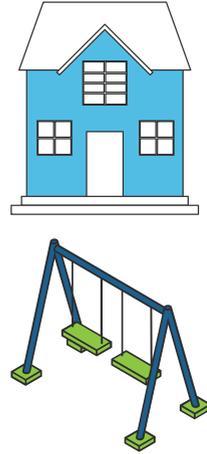
Value as beautiful landscapes

Value in providing spiritual and religious meaning

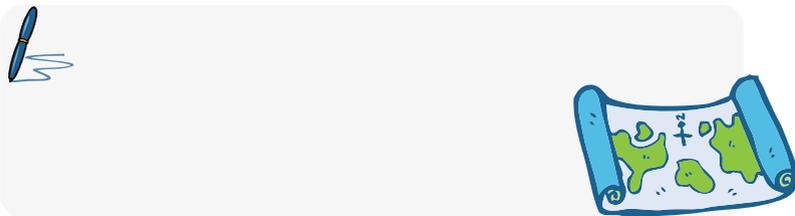
Once we know our watershed address, the specific water bodies that we are directly impacting and the value of these areas to our lives and culture, we have a better appreciation of our responsibilities in taking care of water resources, be it individually or collectively! This section provides some guidance to begin your journey.

## Being mindful: Around us

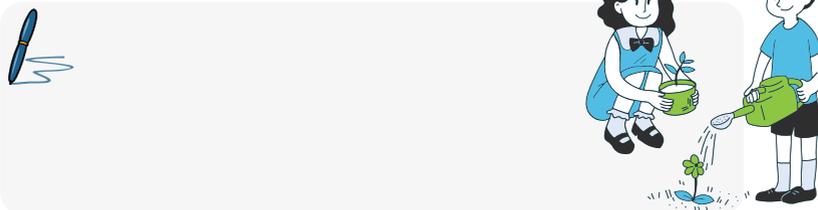
Besides water bodies (such as lakes, rivers or streams) look at the places around you where you live, play, study or work. These include places such as homes, schools, places of work, parking lots, offices, places of worship, grocery stores, playgrounds, and others. Your actions at these places may be polluting the water bodies without your realisation (see next page on how you can help). Some of these places are private properties, which means only you, your family, your friends or your co-worker can do something about it.



- 1 Name a few common places and water bodies near you that are worth restoring:



- 2 Reflect on why they are worth restoring:





# Pollution prevention

You can help to prevent pollution from entering our waterways by incorporating some of these water care tips at a place close to you.

## 1 Recycle and compost

Separate your waste and start recycling. Ensure your trash bins are not overflowing because during heavy rainfall rubbish might flow into the drain. You should also compost your food and garden waste so that it does not end up at the landfill, producing harmful leachate which may pollute soil and water if it is not managed properly by the landfill operator.



## 2 Garden and lawn care

Use less or, even better, no chemical fertilisers and pesticides on your lawn, garden, or farm. Excessive use is not only harmful for you, your plants and the wildlife in your garden, but will also pollute surface water which is then washed into our waterways.

## 3 Collect used cooking oil

After cooking, save the used oil and DO NOT pour it down the sink/drain. Many recycling centres accept used cooking oil and will even purchase from you.





#### 5 DIY wetlands

Check if it is possible to redirect some of your wastewater, then create a mini DIY filtration system using a container with holes at the bottom, some stones, and wetland plants. Wetland plants may help to purify your wastewater at home before it reaches the nearest stream or river.

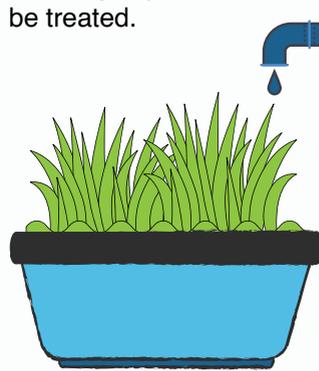


#### 7 Planting

If you have a garden, plant more. Barren land may introduce soil into the waterways during heavy rain. Plants may also help to 'catch' litter.

#### 4 Drain map

If the drain gets wet when it is not raining, this means that somewhere there is water flowing from the toilet, kitchen, etc. (if there is no leak or groundwater flowing). Trace your drain from where it starts to where it ends. If possible, connect your wastewater to the sewerage system so that it can be treated.



#### 6 Eco-friendly

Go eco-friendly with your purchases. Use soaps and detergents that are less harmful for the environment. This may include eco-friendly car wash shampoo, bathroom soaps or dishwashing liquid.



# Cleanup!

In Malaysia, we often hear about how our rivers and lakes are frequently dumped with all sorts of trash - especially with plastic wastes. The simplest thing that we can do is to clean up our act and start picking up trash for proper disposal or recycling.

## 1 Going solo

It is okay to do cleanup alone (do not be shy!). If you own a vehicle, you can bring these few simple items wherever you go so that you can pick litter up and throw it away properly whenever you are on the move:

- Rubber gloves.
- Big plastic bags/gunny sacks.
- Trash picker that helps you to pick up the litter without even touching it.



## 2 Plogging

Plogging (a combination of 'pick up' and 'jogging') is a healthy eco-friendly activity that encourages people to pick up litter while jogging. Try it out with your friends and family!



## 3 Go together

The more people, the greater the impact! Engage with the community who uses the cleanup site i.e. people who work, live or conduct recreational activities there. You can even use cleanups as a social activity to get together with others.



# More than a cleanup

## 1 Investigate

The total weight and types of trash collected can be further investigated. Do a simple assessment then share the results with others! Use apps such as Cleanswell to easily record each item of trash collected. You can also help to do a trash survey (without doing a cleanup) by standing on a bridge where you can see debris floating on a river. Install the River Survey app by The Ocean Cleanup to do this.



## 2 Managing waste

It is best not to leave the collected waste lying around in case it attracts wildlife or gets washed back into waterways during heavy rainfall. Locate the nearest waste collection site and recycling centre. Always separate your waste during a cleanup. Learn how communities globally are upcycling litter from cleanups into cool new products: [preciousplastic.com/](http://preciousplastic.com/)

## 3 Get together and innovate

Create solutions on how to stop the litter from getting into the water in the first place, or a practical way to stop waste from getting into the ocean. Example: [www.watergoat.org/](http://www.watergoat.org/)



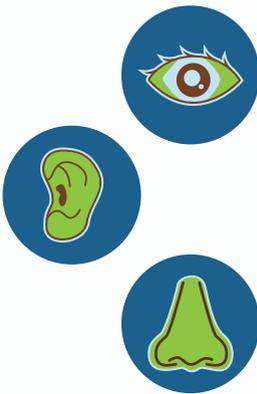
# Be a citizen scientist

Citizen scientists refer to the public (that is you!) who are involved in science/community monitoring. Law enforcers or local agencies may not be able to constantly monitor our waterways. This is when citizens like ourselves can play an important role in being the 'eyes and ears' for them.



## 1 Snap and report: Physical monitoring

You can help to monitor a waterway such as a river from anywhere as long as you have a good view of it to observe, make good judgement and snap a photo/make a video recording for evidence.



- Changes in the water colour. What does it usually look like? Has it suddenly turned black, brown, white or green?
- Look and listen for suspicious behaviour or rumours like waste dumping. Snap photos if you are at a distance and know that you will not be in danger by doing so.
- Unpleasant smell: Does it smell different than usual? You can also collect the water in a container and smell it.
- Refer to page 52 on where to report findings.



## 2 Look for life underwater: Biological monitoring

Aquatic life can be used to determine the health of waterways because some are more tolerant to pollution, while others are less so.

- Healthy and clean water are home to insects such as stonefly nymphs, mayfly larvae or dragonfly nymphs.
- Unhealthy and dirty water can become a home for large numbers of midge fly larvae, black fly larvae or leeches.



### 3 Monitoring using tools

Here are some examples on what you can measure to characterise water quality:



PH  
How acidic/basic water is.



The presence of bacteria.



Amount of oxygen.



The presence of heavy metals.

There are many tools available. You can purchase simple tools online such as a pH test strip (the kind used for aquariums) or create your own 'Secchi disk' to measure the turbidity of water. You can even buy various kinds of simple testing kits here: <https://lamotte.com/>

The results you get from simple water monitoring tools can only provide baseline data. Reach out to local agencies who can conduct a more thorough investigation if there is a need. You can also use more advanced tools as suggested in this manual:

### 4 Eco-heart citizen science



**Citizen science manual for water conservation:**



<https://bit.ly/3zpqJeu>

Eco-heart Citizen Science is an approach to citizen science that considers the 'place' where we are as the heart to the science that is applied. A place can be understood or be described in terms of its geography, i.e. upstream or downstream of a river; its locale, i.e. Kuala Lumpur or Selangor; or its meaning, i.e. home or workplace. It uses the so-called 'Eco-Heart' index to provide a more meaningful visualisation to scientific indicators. Scan the QR code above to access the Eco-heart Citizen Science website and manual prepared by Universiti Malaya and Cardiff University, with support from Akademi Sains Malaysia.

# Urban wilderness

Here are some ways to reconnect your urban rivers in harmony with the people, plants and animals that depend on them.

## 1 Plant more

Create a new habitat by planting on the banks of the river, or at the catchment areas. Consider diverse, low-maintenance plants that can also provide shelter and food for wildlife. You can also create a wetland area that helps to purify the water.



## 2 Trailblazer

River trails and small scale urban farms/gardens by the river are becoming popular. Search online for '[Program Denai Sungai Kebangsaan](#)' (National River Trail Programme). Consider how these new ideas can harmonise with the existing landscape. For instance, leave space for naturally occurring plants to grow and cut grass less often or only where needed. Natural plants that grow on the banks of a river help to reduce erosion, flooding and pollution.

## What you can also do:

3 Install interpretive signage to inform people why the river appears 'wild' or 'messy'. Tell people it is for the bees, birds, and cute animals like otters.

4 Make a wildlife checklist. You can use apps such as iNaturalist (or its website [inaturalist.org](http://inaturalist.org)) to document and learn about the biodiversity in and around the water body.



# Go exploring

In cities, channelised rivers with concrete embankments are everywhere. Look closer, and you may be surprised to find wildflowers and fig trees growing from the cracks in the wall or dragonflies flying in pairs. Water-loving creatures such as egrets or otters have also been spotted here! Such 'wilderness' in the city can be refreshing, conjuring up feelings of wonder and even nostalgia in an increasingly urbanised world. On this page are some of the amazing wildlife you can find at the urban rivers in the Klang Valley. Explore an urban river with a family member or a friend and try to spot these plants and animals. Rules are similar to traditional BINGO. The first person who can find four species in a row, wins!



Otter



Taro



Water strider



Snail



Bee/wasp



Frog/toad



Wildflower



Monitor lizard



Fig



Water bird



Wetland plants



Damselfly



Dragonfly



Fish



Grass



Butterfly/moth

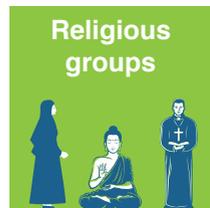
# Be a water steward

In order to solve water woes and to ensure sustainable water management for the country in the long term, we need to create real cultural change in the way we care about our water resources as fellow citizens. We need to encourage each other to be more responsible water users.

## Join the river care movement!

Do your bit by joining and supporting river care movement near your area. In Malaysia, there are various 'river care' groups organised by the government, NGOs and community groups. If you cannot find one in your area, maybe it is time to create your own movement - this can even start under any existing groups you are part of. Aim for inclusiveness and try to include individuals and groups that are often left out in discussions.

Find an existing group here:



# Support our water frontliners

There are many agencies that are responsible for taking care of our water bodies, and they have very specific roles. However, their roles cannot be executed effectively if there is no adequate support from the public to play their part. Therefore, use whatever resources and skills that you have, be it as a responsible water consumer, a citizen scientist, an educator, an influencer, a community organiser, a storyteller, etc. Taking good care of our water resources and ensuring sustainable water supply is a collective effort.

Finally, you can support our water frontliners by reporting water-related issues by contacting them directly or via social media!



Department of Environment (DOE)

- ☎ 1-800-88-2727
- ✉ [complaint\\_k@doe.gov.my](mailto:complaint_k@doe.gov.my)
- 🌐 [eaduan.doe.gov.my](http://eaduan.doe.gov.my)

Lembaga Urus Air Selangor (LUAS)

- ☎ 03-5511 1800
- ✉ [aduan@luas.gov.my](mailto:aduan@luas.gov.my)
- 🌐 [www.luas.gov.my/v3/my/hubungi-kami/maklumbalas-aduan](http://www.luas.gov.my/v3/my/hubungi-kami/maklumbalas-aduan)

Suruhanjaya Perkhidmatan Air Negara (SPAN)

- ☎ 03-8317 9336
- ✉ [aduan@span.gov.my](mailto:aduan@span.gov.my)
- 🌐 [eaduan.span.gov.my](http://eaduan.span.gov.my)

Department of Irrigation and Drainage (DID)

- ☎ 03-2615 1765
- ✉ [pro@water.gov.my](mailto:pro@water.gov.my)
- 🌐 [water.spab.gov.my](http://water.spab.gov.my)

Indah Water Konsortium (IWK)

- ☎ 03-2780 1100
- ✉ [care@iwk.com.my](mailto:care@iwk.com.my)
- 🌐 [www.iwk.com.my/my/contact-us](http://www.iwk.com.my/my/contact-us)

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# Appendix A



## Selangor River Map

**Legend :**

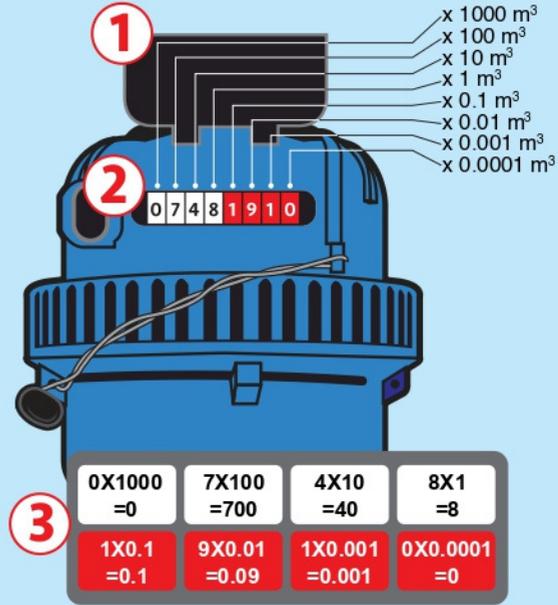
-  Reservoir / Dam
-  River

# Appendix B

## Know your meter

Learn how to read your water meter. The meter counter at your premise displays your total water consumption measured in cubic metres (m<sup>3</sup>).

- 1 Lift the meter counter cover to see the reading.
- 2 The meter displays an 8-digit number with 4 decimal points. The first 4 digits in black with white background before the 4 decimal points in white with red background on the meter reading signifies the water consumption amount in cubic metres. The meter reading captured (referring to the digit in black) must be deducted with previous month's reading. The difference will indicate the total consumption for the month.
- 3 As such, if the reading difference is 40 m<sup>3</sup>, this amount will be billed as your consumption for the month.



The calculation for customers' water bills will be recorded based on a full 30-day period. However, the water tariff rate is determined by the Water Services Industry Act 2006 (Act 655), as advised by Suruhanjaya Perkhidmatan Air Negara (SPAN).

Billing Period : 30 days/30 days (1 month) = 1.00 month  
 Consumption : 40 m<sup>3</sup>

Water charges for the first 20 m <sup>3</sup> x 30 days / 30 days	= 20 m <sup>3</sup> x RM0.57	RM11.40
Water charges for the following 15 m <sup>3</sup> x 30 days / 30 days	= 15 m <sup>3</sup> x RM1.03	RM15.45
Water charges for the remaining usage m <sup>3</sup>	= 5 m <sup>3</sup> x RM2.00	RM10.00
Total bill		RM36.85

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