**CHAPTER 1: GATHERING DATA AND QUESTIONS**

* 1. **CATEGORIES:**

The consumption of water in domestic sector can be narrowed down to majorly 9 categories. These are:

* Bathing
* Toilet
* Washing clothes
* Cleaning home
* Kitchen
* Drinking
* Car or Bike cleaning
* Garden
* Pets

Apart from these 9 categories, a miscellaneous category was also thought of to take into account some other areas which come under domestic usage of water.

* + 1. Bathing

One of the major sectors where water is consumed in households is in Bathing. For bathing the following questions were thought of:

1. How do you take your bath?
2. What is the duration of your shower?
3. What is the size of your bucket?
4. How many buckets do you use in a single bath?
5. How many times do you take bath in a day?
   * 1. Toilet:

Other major sectors where water is consumed in households is in Toilet. For toilet, the following questions were thought of:

1. How long do you leave your bathroom faucet running while Brushing?
2. How long do you leave your bathroom faucet running while shaving?
3. What type of toilet do you have?
4. Do you have dual/low flush system in your toilet?
5. How many buckets of water do you use per use?
6. What is the size of the bucket?
   * 1. Washing clothes:

Other major sectors where water is consumed in households is in laundry. For this, the following questions were thought of:

1. How do you wash your clothes?
2. How many buckets of water do you use for washing clothes once?
3. What is the size of the bucket that you use?
4. What is the type of your washing machine?
5. How many times do you wash clothes per week?
6. How many times do you wash clothes per week?
   * 1. Home Cleaning:

Other major sectors where water is consumed in households is in cleaning home. For this, the following questions were thought of:

1. How do you clean your home?
2. How may buckets do you use per clean?
3. What is the size of the bucket that you use?
   * 1. Kitchen:

Other major sectors where water is consumed in households is in kitchen. For this, the following questions were thought of:

1. How much water do you use for cooking?
2. How do you wash your dishes?
3. How many loads per day do you wash?
4. How long do you leave the kitchen faucet running for washing dishes?
5. How long do you leave the kitchen faucet running each day other than for washing utensils?
   * 1. Drinking:

Fresh water is also consumed for drinking purpose. The questions thought for this category were:

* 1. How much water do you drink per day?
  2. How do you purify your drinking water?
  3. Do you use the backwashed water from RO system?
     1. Car or Bike Wash:

In urban as well as rural areas, water consumption for cleaning transport vehicles is also an important and big use of water. The questions for this category were:

1. Do you have a car?
2. How do you wash your car?
3. How many times per month do you wash your car?
4. Do you have a motorbike/cycle?
5. How do you wash your bike/cycle?
6. How many times per month do you wash your bike?
   * 1. Garden:

Huge amount of water is spent for watering plants as well. The questions for this category were:

1. Do you have a lawn or a balcony garden?
2. What is the area of the garden?
3. How much water do you use to water your garden?
   * 1. Pets:

Intake of water of domestic pets is also an aspect of the owner. The questions for this category were:

1. Do you have pets at home?
2. How many pets do you have?
   * 1. Miscellaneous:

Water is consumed in some other ways as well. The questions for this category were:

1. Do you have an aquarium at home?
2. What is the size of the aquarium?
3. How many times do you change its water per year?
4. Do you have an air cooler at home?
5. Do you have air conditioner at home?
6. Do you recycle the AC drained water?
7. Do you have rain water harvesting system?
8. Do you recycle water in any other way?
9. How much water do you recycle?
   1. **FORMULATING OPTIONS AND FINDING RELEVANT WATER USAGE** 
      1. BATHING:
         1. How do you take your bath?

**Options:**

BUCKET

SHOWER

* + - 1. What is the duration of your shower?

**Options:**

Range of 0 minutes to 100 minutes

* + - 1. What is the size of your bucket?

**Options:**

Range of 0 litres to 30 litres with step size of 5

* + - 1. How many buckets do you use in a single bath?

**Options:**

Range of 0 buckets to 10 buckets

* + - 1. How many times do you take bath in a day?

**Options:**

Range of 0 times to 10 times

* + 1. TOILET:

1. How long do you leave your bathroom faucet running while Brushing?

**Options:**

Range of 0 minutes to 100 minutes

1. How long do you leave your bathroom faucet running while Shaving?

**Options:**

Range of 0 minutes to 100 minutes

1. What type of toilet do you have??

**Options:**

FLUSH

NON-FLUSH

1. Do you have dual/low flush system in your toilet?

**Options:**

YES

NO

1. How many buckets do you use per use?

**Options:**

Range of 0 buckets to 10 buckets

1. How many times do you take bath in a day?

**Options:**

Range of 0 times to 10 times

* + 1. WASHING CLOTHES:

1. How do you wash your clothes?

**Options:**

WASHING MACHINE

MANUALLY

1. How many buckets of water do you use for washing clothes once?

**Options:**

Range of 0 minutes to 10 buckets

1. What is the size of the bucket that you use?

**Options:**

Range of 0 minutes to 30 liters

1. What is the type of your washing machine?

**Options:**

FULLY AUTOMATIC TOP LOAD

FULLY AUTOMATIC FRONT LOAD

SEMI AUTOMATIC

1. How many times do you wash clothes per week?

**Options:**

Range of 0 minutes to 10 times

* + 1. HOME CLEANING:

1. How do you clean your home?

**Options:**

VACCUUM CLEANER

MOP AND WATER

1. How many buckets of water do you use for washing clothes once?

**Options:**

Range of 0 minutes to 10 buckets

1. What is the size of the bucket that you use?

**Options:**

Range of 0 litres to 30 litres with step size of 5

* + 1. Kitchen:
       1. How much water do you use for cooking?

**Options:**

Range of 0 litres to 30 litres

* + - 1. How do you wash your dishes?

**Options:**

MANUALLY  
DISH WASHER

* + - 1. How many loads per day do you wash?

**Options:**

Range of 0 minutes to 10 times

* + - 1. How long do you leave the kitchen faucet running for washing dishes?

**Options:**

Range of 0 minutes to 10 times

* + - 1. How long do you leave the kitchen faucet running each day other than for washing utensils?

**Options:**

Range of 0 minutes to 10 times

* + 1. Drinking:

1. How much water do you drink per day?

**Options:**

Range of 0 litres to 30 litres

1. How do you purify your drinking water?

**Options:**

UV & VF

RO PURIFIER

DO NOT PURIFY

1. Do you use the backwashed water from RO system?

**Options:**

YES

NO

* + 1. Car or Bike Wash:

1. Do you have a car?

**Options:**

YES

NO

1. How do you wash your car?

**Options:**

GARDEN HOSE

BUCKET AND WET CLOTH

1. How many times per week do you wash your car?

**Options:**

Range of 0 to 10 times

1. Do you have a motorbike/cycle?

**Options:**

YES

NO

1. How do you wash your bike/cycle?

**Options:**

GARDEN HOSE

BUCKET AND WET CLOTH

1. How many times per week do you wash your bike?

**Options:**

Range of 0 to 10 times

* + 1. Garden:

1. Do you have a lawn or a balcony garden?

**Options:**

LAWN

BALCONY GARDEN

NONE

1. What is the area of the garden?

**Options:**

Range of 0-100 sq meters

1. How much water do you use to water your garden?

**Options:**

Range of 0-30 litres

* + 1. Pets:

1. Do you have pets at home?

**Options:**

YES

NO

1. How many pets do you have?

**Options:**

Range of 0-10 pets

* + 1. Miscellaneous:

1. Do you have an aquarium at home?

**Options:**

YES

NO

1. What is the size of the aquarium?

**Options:**

SMALL

MEDIUM

LARGE

1. How many times do you change its water per year?

**Options:**

Range of 0-10 times

1. Do you have an air cooler at home?

**Options:**

YES

NO

1. Do you have air conditioner at home?

**Options:**

YES

NO

1. Do you recycle the AC drained water?

**Options:**

YES

NO

1. Do you have rain water harvesting system?

**Options:**

YES

NO

1. Do you recycle water in any other way?

**Options:**

YES

NO

1. How much water do you recycle?

**Options:**

Range of 0-100 liters

* 1. **CALCULATIONS AND ASSUMPTION**

**CATEGORY: TOILET:**

Calculation 1(Single flush toilet): Water usage = 3\*9 = 27 litres

Calculation 2(Dual/low flush toilet): Water usage = 2\*3 + 1\*6 = 12 litres

Calculation 3(non-flush toilet): Water usage = number of buckets\*3\*size of bucket]

**CATEGORY: WASHING:**

[Assumptions:

Usage per person per day = 3 times

Average water usage for single flush toilet: 9 litres

Average water usage for dual/low flush toilet: 3/6 litres]

(ref: <https://www.cseindia.org/content/downloadreports/7655>)

[Calculation 1(brushing): Water usage = flow rate (2.83 lit/ min)\*time]

[Calculation 2(shaving): Water usage = flow rate (2.83 lit/ min)\*time]

(ref: <https://www.cseindia.org/content/downloadreports/7655>)

[Assumption: Water consumption per wash for fully automatic front load = 60L

Water consumption per wash for fully automatic top load = 140L

Water consumption per wash for semi-automatic = 120L]

(ref: <https://www.samsung.com/in/support/home-appliances/what-is-water-consumption-per-wash/)>

(Calculation: water consumption per wash\*number of wash)

(Calculation: size of bucket\*number of bucket\*times)

**CATEGORY: CLEANING**

(Calculation: size of bucket\*number of bucket\*times)

**CATEGORY: KITCHEN**

[Calculation (for dishwasher: Water usage = number of loads per day\*7]

(Assumption: A standard dishwasher uses around 7 litres of water per wash)

(Ref: <https://www.bosch-home.in/experience-bosch/living-with-bosch/fresh-reads/9-things-you-may-not-know-about-your-dishwasher>)

[Calculation: Water usage = flow rate (2.83 lit/ min)\*time]

(Assumption: flow rate of bathroom faucet is 2.83 lit/min)

(ref: <https://www.cseindia.org/content/downloadreports/7655>)

[Calculation: Water usage = flow rate (2.83 lit/ min)\*time]

(Assumption: flow rate of bathroom faucet is 2.83 lit/min)

(ref: <https://www.cseindia.org/content/downloadreports/7655>)

**CATEGORY: DRINKING**

[Calculation (for RO): Water usage = volume of drinking water consumed per day\*3.5]

(Assumption: to produce 1 liter of drinking water on an average 3.5 litres water is wasted)

 (Ref: [https://www.thebetterindia.com/92731/5-ways-to-use-ro-wastewater/](https://www.google.com/url?q=https://www.thebetterindia.com/92731/5-ways-to-use-ro-wastewater/&sa=D&source=hangouts&ust=1559298058523000&usg=AFQjCNGjRIs9nqgtCCvN_4PdK9YL37yMdw)

[https://www.bestrowaterpurifier.in/blog/water-purifier-buying-guide/](https://www.google.com/url?q=https://www.bestrowaterpurifier.in/blog/water-purifier-buying-guide/&sa=D&source=hangouts&ust=1559298107254000&usg=AFQjCNEFwvONr3AEifQMm2OL2xTOeavPvw) )

**CATEGORY: CAR/BIKE:**

<https://timesofindia.indiatimes.com/city/mangaluru/Now-getyour-car-cleaned-with-only-2-litres-of-water/articleshow/49504838.cms>

CAR-WASH using hose:

<https://timesofindia.indiatimes.com/city/mangaluru/Now-getyour-car-cleaned-with-only-2-litres-of-water/articleshow/49504838.cms>

**CATEGORY: GARDEN:**

www.[isreal.home.ministry](https://timesofindia.indiatimes.com/city/mangaluru/Now-getyour-car-cleaned-with-only-2-litres-of-water/articleshow/49504838.cms).com

**CATEGORY: PETS:**

[www.petmd.com](http://www.petmd.com)

Drinking water:

Average daily water = 3.5 liters per ounce

Average weight = 55.47

**SOURCES OF OTHER DATA:**

COMPARISON OF COUNTRIES:

<http://chartsbin.com/view/1455>

|  |  |
| --- | --- |
| Uganda | 35 L/day |
| China | 1136 L/day |
| Bangladesh | 614.2 L/day |
| India | 1764 L/day |
| Australia | 3147 L/day |
| USA | 4247 L/day |
|  |  |

MEAN HOUSEHOLD SIZE IN INDIA ( For rainwater harvesting)

http://www.censusindia.gov.in/2011census/hh-series/HH-1/DDW-HH01-0000-2011.XLS

**CHAPTER 2: TECHNICAL CONTENTS AND REPORTS**

**2.1 SOFTWARE USED**

2.1.1 Language used:

* Python
* Version: 3.6
* Download link: [www.python.org/downloads/release/python-370](http://www.python.org/downloads/release/python-370)

2.1.2 Python packages used:

• Django

* Version: 3.3.2
* Download link: <https://pypi.org/project/opencv-python/>

• MySQL

* Version: 5.10.1
* Download link: <https://pypi.org/project/PyQt5/>

• Pillow

* Version: 0.4.5
* Download link: <https://pypi.org/project/imutils/>