

## AWARENESS OF WATER DISTRIBUTION COSTS

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### ABSTRACT

It is widely acclaimed that water should be provided for free as far as possible. When it comes to water supply, there are always many people who are never satisfied and suggest that they are willing to pay more if they were sure of obtaining a better service.

It has been observed, however, that most people are completely unaware of the costs of producing water. The same person who says that his water bill is high has no qualms in paying his cellular phone bill which is up to 10 times as much. Unfortunately, this wrong perception about the cost and value of water is caused by an ignorance of the basic factors involved in producing and distributing water from rainfall to the tap.

Given the aim behind meeting the MDGs, it is hoped that if a few STANDARD posters with a suitable label may be established so that they carry the necessary authority both vis à vis the governments and the people.

The series of posters could include

- (1) General Water Cycle
- (2) Cost of 1 m<sup>3</sup> (or 1 Litre) of water compared to a few other goods or services.
- (3) Basic components of water costs
  - (a) Dams, filtration, storage, distribution, repairs and maintenance, electricity
  - (b) Boreholes, treatment, storage, distribution, repairs and maintenance, electricity
- (4) Water Recycling and its Uses
- (5) Desalination
- (6) Water Demand Management

It is hoped that countries will prepare similar posters as presented in this paper, but adapted to their local context.

**Key words:** production cost of water

## 1. INTRODUCTION

### 1.1 *Production cost of water in Mauritius and Rodrigues*

The cost of production of water is slightly more than Rs. 7 per cubic metre (1 Euro = Rs. 42). However, the tariff is a progressive one starting at Rs. 4.50/cubic metre for the first 10 cubic metres. It will be shown below that most people are NOT aware of this production cost of water, always complaining of the “high” price of water.

### 1.2 *Price of water in Rodrigues*

In Rodrigues, each subscriber (a family) pays an **annual fee** of Rs. 22 (half of a Euro) for its water supply. The daily consumption for a family of 5 is about 700 to 1,000 litres, depending on seasonal water availability. The story is that, sometimes (during droughts) there a few consumers who do come and complain about a lack of water at their premises with: “I pay my water bill, you know!” Nobody has ever complained of diseases due to lack of water.

Well, this is not atypical of many countries, where people either believe that water is a gift of God and should be available free or that if rain is plentiful, why should they pay for a water supply, which seems to be never (or rarely) adequate.

### *1.3 Ignorance of “educated” people*

Regularly, students at the University of Mauritius have been asked to carry out assignments on the use of water at home. It is surprising that these students are blissfully unaware of the amount of water that they use daily and they even do not even know what is the monthly water bill.

In Mauritius, because water is “available”, the consumption is about 150 to 250 L/p/d, and the average monthly bill is Rs. 150 (4 Euros).

However, these same students do use their cellular phone regularly, with high bills which the parents pay. And these same parents (with 2 to 4 children will pay the phone bills (Rs. 1,000) amounting 4 to 10 times the water bill (Rs 100 to 250). Again, surprisingly, the complaint is against the high water bill.

## 2. CONSUMER BEHAVIOUR

### *2.1 Consumer behaviour during drought periods*

During the years 1999 and 2000, Mauritius and Rodrigues were faced with a severe drought. The behaviour of people, in drought periods, is probably similar in all countries. People in Rodrigues who could not obtain water easily from their taps went to the local watercourses to fetch some water. As the water distribution follows an irregular pattern in Rodrigues, rain water harvesting was still being carried out, even more so during this drought period.

In Mauritius, the government invested heavily in developing new sources (groundwater – deeper boreholes) and in providing water tankers to places where a ground water supply was not possible. Overall, the government spent some Rs.50 million (2 million Euros at that time) in this connection. The net result was that most people, though they suffered from a hot climate, were NOT affected at all by the drought. The number of clean and washed cars was practically the same.

Nearly all the cars at the University of Mauritius (educated people) and the Central Water Authority (water engineers – water distribution company) were spotlessly clean. NOT really a good example to be set by “educated” people.

### *2.2 Consumer behaviour during “normal” periods*

Once a regular supply was established in Rodrigues, with more people obtaining their water from taps, the number of people carrying out rainwater harvesting reduced drastically.

In Mauritius, once the drought was over, no change was observed, because very few people had been really affected.

In effect, there had been NO real DROUGHT behaviour in the way of savings by the consumer. If water consumption had dropped slightly, it was only because the Central Water Authority could not supply an adequate volume of water, and not because the consumers wanted to use LESS water.

### *2.3 Lessons to be learnt*

The above observations show that probably most people, whatever be their background,

- (1) are NOT aware of the cost of providing water,
- (2) do NOT seem to appreciate the need to save or use less water.
- (3) do NOT understand that water could be more precious than gold.

Though campaigns are carried out on an ad hoc basis, they do not seem to be effective. Sometimes, the effects do not last a long time, and sometimes they do not seem to be effective because probably people are not really convinced of the messages.

### 3. ACTION PLAN

It would therefore seem necessary to think about a strategy for sending convincing messages to the population about:

- (1) ways and means of water production,
- (2) cost of water production,
- (3) different ways of using water and
- (4) demand management.

Given the aim behind meeting the MDGs, it is proposed that a few STANDARD posters be established with a suitable label so that they carry the necessary authority both vis à vis the governments and the people.

The series of posters could include

- General Water Cycle
- Cost of 1 m<sup>3</sup> (or 1 Litre) of water compared to a few other goods or services.
- Basic components of water costs
  - Dams, filtration, storage, distribution, repairs and maintenance, electricity
  - Boreholes, treatment, storage, distribution, repairs and maintenance, electricity
- Water Recycling and its Uses
- Desalination
- Water Demand Management

Possible contents are proposed below, but it is understood that the respective governments would prepare similar ones, adapted to the local context.

### 4. GENERAL WATER CYCLE

#### 4.1 *Title of the poster*

The title is THE WATER CYCLE.

#### 4.2 *Purpose of the poster*

The purpose of the poster is to show the viewer how precipitation (rainfall, snow, etc) falls on the earth, and moves around through evaporation, rivers, underground to rivers and the sea before being transformed into clouds and coming as precipitation again.

#### 4.3 *Contents of the poster*

The drawing on the poster should include the different components as generally shown on a water cycle, but could include features which are more specific to the country, such as mountains or forests, names of some rivers, etc. It is also important to give some figures, in tabular format, relating to the different components of the water cycle, such as in Table 1.

**Table 1: Elements of the Water Cycle for Mauritius**

	Mm <sup>3</sup>	%
Total precipitation	3,900	100
Evaporation	2,340	60
Run off (rivers)	1,170	30
Infiltration (groundwater)	390	10

4.4 *Caption – Message of the poster*

The message should be simple and clear, such as:

**BRINGING Water from this Water Cycle  
to YOUR House COSTS Money**

5. COST OF WATER

5.1 *Title of the poster*

The title is THE COST OF WATER

5.2 *Purpose of the poster*

The purpose of the poster is to show the reader that, in fact, water is sold at a cheap price compared to other commodities.

**Table 2: Costs of some everyday goods in Mauritius**

	UNIT		ITEM		Rs.
<b>1000</b>	litres	of	water from the tap	costs	<b>6 ONLY</b>
1	litre		oil		35
1	litre		fizzy drink		15
1	litre		bottled water		10
1	litre		beer		25
1	kilogram		bread		24
1	kilogram		margarine		72
1	kilogram		butter		120
1	kilogram		cheese		180
1	kilogram		lentils		40
1	kilogram		potatoes		24

5.3 *Contents of the poster*

The drawing on the poster should include pictorial representations of different commodities, such as bread, butter, cheese, fizzy drinks, bottled water, lentils, beer, cigarette, newspaper, vegetables and the price of each. The comparison can be for the cost of 1 cubic metre of water, or per unit of each commodity. A possibility is given in Table 2.

5.4 *Caption – Message of the poster*

The message should be simple and clear, such as:

**Do you still think water is EXPENSIVE?**

OR

**If you think water is EXPENSIVE, try doing WITHOUT it**

## 6. HARNESSING WATER FROM A RIVER

### 6.1 *Title of the poster*

The title is HOW WATER IS OBTAINED FROM A RIVER

### 6.2 *Purpose of the poster*

The purpose of the poster is to show the different components that are required to harness water from a river. These cost money and take time to construct.

### 6.3 *Contents of the poster*

The drawing on the poster should include a small or big DAM across a river (with a local name, if possible), the PIPELINES leading to the filters, the FILTRATION PLANT, other PIPELINES leading to storage RESERVOIRS and DISTRIBUTION NETWORKS, without forgetting WORKERS for repair and maintenance.

### 6.4 *Caption – Message of the poster*

The message should be simple and clear:

**A car is expensive and needs regular maintenance.  
Your water supply system as well.**

## 7. PUMPING WATER FROM A BOREHOLE

### 7.1 *Title of the poster*

The title is HOW WATER IS PUMPED FROM UNDERGROUND

### 7.2 *Purpose of the poster*

The purpose of the poster is to show the different components that are required to pump water from a borehole or well. They may be installed quickly but may be expensive to operate.

### 7.3 *Contents of the poster*

The drawing on the poster should include the borehole/well in section with a submersible PUMP sending the water through PIPELINES to a FILTRATION PLANT, other PIPELINES leading to storage RESERVOIRS and DISTRIBUTION NETWORKS, without forgetting WORKERS for repair and maintenance. In particular, here, a source of energy (ELECTRICITY, generally) would be needed.

### 7.4 *Caption – Message of the poster*

The message should be simple and clear:

**A hand well pump does not give much water.  
If you want MORE water, it has to be PAID for.**

## 8. WATER RECYCLING

### 8.1 *Title of the poster*

The title is WHY RECLAIM WATER?

8.2 Purpose of the poster

The purpose of the poster is to show that many uses of water do not really need water of potable quality. Using reclaimed water is like developing a new source of water.

8.3 Contents of the poster

The drawing on the poster should include the sources of waste water (domestic and industrial) which could be reclaimed and where they could be used, either after partial or extensive treatment (aquaculture, agriculture, industrial, or even potable, as in Namibia).

8.4 Caption – Message of the poster

The message should be simple and clear:

**Harnessing NEW sources of water may be MORE  
EXPENSIVE than RECLAIMING water**

9. DESALINATION

9.1 Title of the poster

The title is DESALINATION

9.2 Purpose of the poster

The purpose of the poster is to show what is desalination and how it is carried out and the energy consumed, which has to be paid.

9.3 Contents of the poster

The drawing on the poster should include the different processes, simplified, but with one common feature – the energy, in kWh, required to produce 1 cubic metre of water, as in Table 3. If necessary, a price may also be given to indicate the cost of energy (solar or electricity or fuel, etc).

**Table 3: Energy Cost of Different Desalination Procedures**

Process	Min Power kWh/m <sup>3</sup>	Max Power kWh/m <sup>3</sup>
Seawater reverse osmosis	3.96	7.93
Brackish water reverse osmosis	0.26	1.85
Brackish water electrodialysis reversal	N/A	3.7
Seawater electrodialysis reversal	N/A	4.2
Multiple Effect Distillation (MED)	0.75	1.75
Multi-Stage Flash distillation (MSF)	2.64	3.96
Mechanical Vapour Compression (MVC)	8.5	12

N/A= Not Available.

N.B: These figures include neither the energy required for pumping from sea level to the plant nor the running of control systems, instrumentation, etc.

9.4 *Caption – Message of the poster*

The message should be simple and clear:

**People who need to rely on desalination  
pay US \$1 for 1 cubic metre of water**

10. WATER DEMAND MANAGEMENT

10.1 *Title of the poster*

The title is MANAGING YOUR DEMAND FOR WATER

10.2 *Purpose of the poster*

The purpose of the poster is to show that there are many uses of water where the consumption may be reduced, or deferred or effected with reclaimed water.

10.3 *Contents of the poster*

The drawing on the poster should include several pictorial representations, such as shown in Table 4.

**Table 4: Examples of Managing Water Demand**

	<b>Pictorial feature</b>	<b>Caption - Message</b>
1	Big, Bigger and Biggest taps to show progressive tariff	The more you consume, the more you pay
2	Washing utensils/ brushing teeth/ shaving	Close the tap, if you don't need the water
3	W.C Tank	Save water - Use a low or Two volume flushing Tank
4	Hand watering with a sauce pan	Reuse of kitchen water for watering vegetables
5	Watering or washing with water from a can under a drain gutter	Use rain water

10.4 *Caption – Message of the poster*

The message should be simple and clear:

**MANAGE your DEMAND for WATER.  
It could HELP another PERSON**

11. TARGET AUDIENCE

In order to be able to be successful in this type of enterprise, it is necessary to carry out a never ending campaign. It may be noted that both in Rodrigues and in Namibia, many hotels (for tourists) have a well placed small notice/poster saying: “Water is a rare commodity in our country. Use it wisely”.

Posters such as those proposed should be posted in all public places and in schools in particular, where the impact is likely to be more effective over the years. The coming decades are likely to show water scarcity in many countries. If it is possible to make the future adults aware of costs associated

with water production and distribution, they could become more conscious of the precautions to be taken with this resource.

## 12. PROPOSAL PLAN FOR AWARENESS PROGRAM

In order to ensure that the posters are well received, it is hoped that EACH country could be encouraged to prepare such posters based on a general format:

Countries could request help from funding agencies for the preparation of these posters, and of course with a suitable label included.

It is expected that if this is properly co-ordinated, the country can say that it is meeting one of the UN MDGs.

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