

## STUDY OF REDUCING WASTAGE OF WATER IN HOUSEHOLD USING FOOT TAP

Munendra Kumar<sup>1\*</sup>, Dharmender Tiwari<sup>2</sup>

1. Associate professor, Department of Civil Engineering, Delhi technological University,  
1. Delhi-110042, India
- 2M.tech student, Department of Civil Engineering, Delhi technological University,  
2. Delhi,-110042, India

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### ABSTRACT

To develop regulating strategies for reduction in consumption of domestic water, more proactive approach is to determine behavior of domestic consumers of water. During analysis, we found that water usage in domestic households consists of water closet, kitchen, bathing, wash-basins and many other minor or major occasional usages. From experimental study we found that water is wasted during cleaning of utensils in sink, washing of hands, trimming of beard, brushing in wash-basin because of continuous running of tap water during all these actions. This wastage happens due to the fact that we perform all these actions by our hands and also operate the tap with our hands. So, if we operate these taps without using our hands we can create breaks in continuous flow of water and water can be used efficiently. By keeping all these requirements in mind, we made an apparatus to operate tap by feet instead of hand and the amount of water save is computed. Results shows that for urban households of Delhi, water can be saved up to 34.78% and sometimes even more than this.

*Keywords: Foot Tap, Household, New Technology, Water Conservation;*

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### INTRODUCTION

Rapid population growth, urbanization, water pollution and climate change increases water scarcity not only in India but also in whole world. From statistical data, it is observed that one fifth of world population lives in areas with water scarcity which means that water is not sufficient to meet the basic demands and one third of world population doesn't have clean drinking water. So, it is our key requirement to make policies, different strategies and activities to sustain-ably use natural resources of water, to fulfil the current and future demands. In this paper, we conducted an activity by using an experimental setup (Tap operated by using feet). Firstly, we determined the activities where water is wasted within the domestic households. The result obtained showed that water is wasted during cleaning of utensils in sink, washing of hands, trimming of beard, brushing in wash-basin because of continuous running of tap water during all these actions. So, Alternative approach is thought and analyzed by conducting experiments. This is done by making set up which controls all taps by using foot instead of hand. This allows doing the work with hand while operating the tap by foot. So, if we operate these taps without using our hands we can create breaks in continuous flow of water and water can be used efficiently.

## LITERATURE REVIEW

Arjun Wagh in his paper titled “Modern Methods of Water Conservation in India”, suggested methods for conserving water in India. He has given many processes for water conservation including: protection of water from pollution, redistribution of water (using canal), rational use of groundwater (proper management of crops within the regions), population control, renovation of traditional water sources, use of modern irrigation techniques, increasing density of cover, crop rotation techniques, management of flood (out of total 32.8 crore hectare 4 crore hectare land is flood effected), limited use of water within the industries, reuse of urban waste water.

C.R.Ramakrishnaiah in his paper titled “Urban water management”, showed that better policies, reallocation, automatic and semiautomatic valves, reuse of rinsing water, and low grade water, can save water efficiently. For this purpose he did case study of countries including Indonesia, Melbourne (Australia), and Israel.

Gary A. Gagnon (1984) in his article “The role of water audits in water conservation”, shows that water can be conserved by controlling leakage from water distribution system by executing proper water audits. Water audits can be accomplished in three phases including meter testing, leakage detection, and quantification, and system inventory. This results in saving of water to a factor of approximately 12% to 70%.

Yixing Shan et al.(2015), in their article “Household water consumption: insight from a survey in Greece and Poland”, surveyed major elements to know the behavior of domestic water consumers. These elements include: end user behaviors, socio-demographic and property characteristics, psychosocial conditions i.e., attitudes and beliefs.

Bill Randolph and Patrick Troy (2008) in their paper “Attitude to conservation and water consumption”, conducted a survey to know the attitude of households in various types of housing using telephonic interview and making focus groups from the same areas. In this paper, shaping in demand of water was analyzed in relation to socio-demographic composition in different households in different dwelling conditions, cultural, behavioral and institutional aspects.

By reading all listed papers, we concluded that along with these traditional water conservation techniques we should develop something that can be really helpful same as automatic and semiautomatic valves as mentioned by “C.R. Ramakrishnaiah” in his paper. So, we made a temporary apparatus for experimental purpose to know how much water can be saved by using foot tap in place of traditional tap in households.

## METHODOLOGY AND APPARATUS USED

Four inches broad wooden plank, gate valve, Nails of different varieties according to requirement, Modded iron strip (modded similar to gear of bike and used in place of valve operating handle), ½ inches elbow 90<sup>0</sup>, 2 inches and 6 inches nipples, male adaptor brass threaded, 2 feet PVC pipe, brass elbow, tap, spring, two clamps, three feet plastic pipe, one adhesive tube.

### • EXPERIMENTAL SET UP

- 1) Cut 4 inches broad plank in 12 inches, 7 inches and 8 inches long pieces.
- 2) Attach 12 inches and 7 inches planks perpendicularly with 8 inches plank with the help of 4 small nails: two on each plank (Figure 1). This serves as foundation for our apparatus.
- 3) With the help of iron strip make assembly analogous to gear of bike which serves the purpose of handle of gate valve operated with the help of feet(Figure 2).



**Figure 1.**



**Figure 2.**

- 4) Remaining assembly is divided in two parts, bottom part (below gate valve) and top part (above gate valve).
- 5) Top part: - This part is formed by assembling “male adaptor brass threaded” followed by 2 feet PVC pipe which is further followed by brass elbow and then tap is installed.
- 6) Bottom part: - This part consists of two inches nipple attached to elbow followed by six inches nipple and then plastic pipe is attached to it(Figure 3).
- 7) Both the parts are assembled at top and bottom of gate valve. Then, whole product is attached with wooden planks with the help of clamps and nails. Spring is attached by using nail and hole in the modded iron strip handle (Figure 4).
- 8) Now this assembly is used in kitchen sink, washbasins to know the water used by this apparatus.



Figure 3.



Figure 4.

## RESULTS

### • PROCEDURE AND OBSERVATIONS

The wash-basins, kitchen sink are mainly found in urban part of Delhi. So, we used data only for urban part of Delhi for experimental purpose.

Estimated number of households in Delhi = 36.26 Lakh  
 Urban household = 34.6 Lakh  
 Average household sizes in Urban = 4.51

Table.1 Data for conventional tap system

Activities	Average time taken( sec)	Number of Times per day	Water used (L) per day
Rinsing mouth and cleaningtongue( while Brushing)	60	2	4.4
Washing Hands	30	2	2.4
Shaving	80	2/7	0.915
Washing Utensils in sink	80	2	6.4

### • Water used for conventional tap system

- 1) Rinsing mouth and cleaning tongue( while Brushing)-  $34.6 \times 10^5 \times 4.51 \times 4.4 = 68.66 \text{ ML}$
- 2) Washing Hands -  $34.6 \times 10^5 \times 4.51 \times 2.4 = 37.4 \text{ ML}$
- 3) Shaving ( considering one member per family ) -  $34.6 \times 10^5 \times (6.4/7) = 3.16 \text{ ML}$
- 4) Washing Utensils in sink -  $34.6 \times 10^5 \times 6.4 = 22.12 \text{ ML}$

Total usage of water in Delhi households per day = 131.34 ML

Table.2 Data for Foot tap system

Activities	Average time taken( sec)	Number of Times per day	Water used (L) per day
Rinsing mouth and cleaningtongue( while Brushing)	40	2	3
Washing Hands	18	2	1.5
Shaving	40	2/7	0.428
Washing Utensils in sink	50	2	4

• Water used for Foot tap system

- 1) Rinsing mouth and cleaning tongue( while Brushing)-  $34.6 \times 10^5 \times 4.51 \times 3 = 46.81 \text{ ML}$
  - 2) Washing Hands -  $34.6 \times 10^5 \times 4.51 \times 1.5 = 23.37 \text{ ML}$
  - 3) Shaving ( considering one member per family) -  $34.6 \times 10^5 \times (3/7) = 1.48 \text{ ML}$
  - 4) Washing Utensils in sink -  $34.6 \times 10^5 \times 4 = 13.825 \text{ ML}$
- Total usage of water in Delhi household per day = 85.485 ML

Total amount of water save using foot tap instead of conventional tap =  $(131.34 - 85.485) \text{ ML}$   
 = 45.855 ML

Percentage of water saved = 34.78%

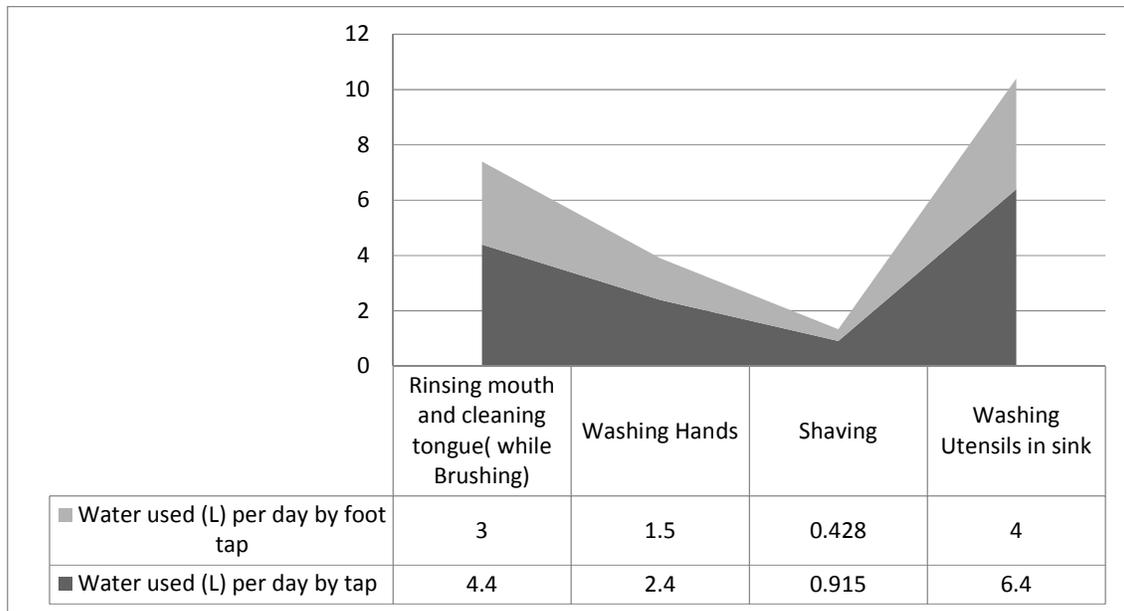


Figure 5.

Total amount of water saved using foot tap instead of conventional tap =  $(131.3 - 85.485) \text{ ML}$   
 = 45.855 ML

Percentage of water saved = 34.78%

## CONCLUSION

Scarcity of water is spread all over the world as we cannot create water we can only save it by using it efficiently. So, it is our sole responsibility to invent something that will cut down the usage of water by meeting all the demands. To fulfill these requirements we developed an experimental setup for operating tap by using foot instead of hands. Based on the results of this experiment we recommend that this apparatus should be used in every household, so that the water usage can be reduced to 34.78 percentage or even more.

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