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Monitoring the generation of waste water from ablution process in mosques in  
Abul Fazl, New Delhi

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## ABSTRACT

There is a lack of water resources and extreme use of potable water in India. Presently about 330 million people in India are facing regular water shortage. In 2016, 300 districts spread across 13 states in India, suffered from an acute shortage of drinking water. As quoted in Hadith, Prophet Muhammad reminded Muslims to avoid wastage, even when performing the cleansing ritual or ablution prior to prayer. The ablution ritual consumes a large amount of water, where ablution water from mosques in India is commonly discharged untreated into drainage channels. In India, most ablution systems consist simply of a row of water taps with a drainage trough to carry the greywater to main drains. As the tap is usually left running, decent amount of water is wasted in the process. Considering the unnecessary wastage, this study makes attempt to identify the amount of runoff water of the Abul Fazl, New Delhi, India and find out the possible strategies and a simple recycling system to collect, treat and re-use of ablution water within a closed-loop system for non-potable water applications, onsite and off-site both. This approach not just only introduces practical solutions in promoting sustainable living, but also in line with the Islamic principles of using natural resources in a prudent manner.

## 1. Introduction

Right from when nomads and hunters has began their lives, water has been an essential element for human survival. It has no religion, yet no religion is complete without water and this formed the basis of civilizations such as Mayan Civilization and Egyptian Civilization. This in turn became the reason of formation of basis of religion. The time and place of existence and expansion of all the religions of worlds have something do to with water. India is an amalgam of many religions and water is a part of day today rituals which takes place in millions of temples across the length and breadth of India. Not only in Temples, but Mosques too are dependent on water for purity and other rituals. Ablution is a process of cleansing and purifying oneself before the prayer, as per the Islamic practice. This process has certain steps of washing oneself. However, the current practice of ablution has led to significant wastage of clean water into grey water, which a lot of mosque directly dispose in the drains without any treatment, which can bring this waste water into several use. Overall, the current trends of water use have resulted in significant amount of water being wasted and disposed-off directly into drains without any recycling and reuse of the grey water. This further results in the depletion of our current sources of fresh water, which needs to be conserved and preserved for the generations to come. There is a certain need to monitor the consumption and wastage of water and implement solutions to channelize and collect the grey water for recycling and reusing for various purposes. There also needs to be implementation of systems for collecting the rainwater and recharging ground water which would result in the increase in the quantity of the natural water resource.

## 2. Aim & Objectives

### A. Aim:

The study aims to quantify the amount of water being wasted and disposed, without any treatment for reuse, in the ablution process in the mosques of the study area and further explore the possibilities of reusing the treated waste water from ablution.

### B. Objectives:

- To map the mosques in the study area
- To survey the footfall and the water storage capacity of each mosque
- To survey the source of water of each mosque
- To find the consumption and wastage of water for ablution per person in each mosque
- To explore the methods and applications of reusing treated grey water

## 3. Literature study

### C. Ablution rituals in Islamic scriptures

It is evident in Islamic scripture that the Almighty Allah has declared that he dislikes the people who waste resources provided to the mankind. As stated in the Holy Quran, Al-A'raf, 7:31 "O children of Adam, take your adornment (by wearing your clean clothes), while praying and going round (the Tawaf of) the

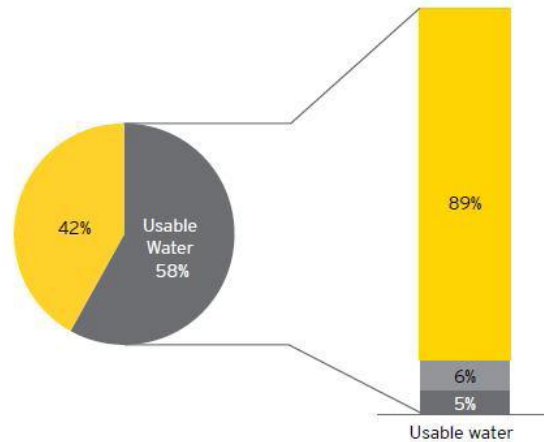
Ka'bah, and eat and drink, but waste not by extravagance, certainly He (Allah) likes not those who waste by extravagance"[1]. It is a reminder to all the Muslims to be grateful to Allah for providing the resources and use it judiciously and conserve it. As reported in Hadith 425, Book 2 of Ibn Majah, when the Prophet saw a man performing ablution on the bank of a river and wasting the water in the process, he answered to the man's question of israaf (wastefulness or wastage) in wudhu "Yes indeed, (do not waste) even if you perform them on the bank of a rushing river"[2]. These precedents have made it prudent to review and improve the current method of performing ablution, particularly for consumption, wastage, and conservation of water.

The process of ablution under a running water facility takes several minutes, which leads to a considerable amount of wastage of water while only a handful is used in each step of the ablution ritual[3]. This ritual, when performed particularly during the Friday prayers in the mosque, significantly leads to wastage of treated water [4].

The wastewater generated from ablution is relatively clean as it contains only traces of microorganisms and does not contain soap or solid impurities. Thus, this grey water can be recycled and reused for various non potable applications, by collecting this water, which is marginally contaminated, and channel it through basic treatment. Similar efforts to reuse the wastewater from ablution were reported by[5],[6]&[7].The techniques to collect and recycle other grey water are potentially applicable to the ablution water, as it is a lightly contaminated grey water compared to other grey waters[8],[9]&[10].

#### *D. Water Scenario in India:*

India, which has the 16% of the world's population, has 2.5% of the world's land area with 4% of its water resources. India is dependent on rain and it receives around 4000 TL amount as fresh water in form of rain. Due to poor water harvesting system and poor percolation of land water most of this freshwater is wasted to the sea and ocean mainly through rivers. India has a limited water reserve of 1869TL, and due to topographic constraint citizens can only utilize 1122 TL. In addition, with the rampant urbanization and industrialization fresh water is becoming an essential commodity. Irrigation constitutes the major demand of 89% in terms of fresh water followed by domestic use and industrial usage which are 5 and 6% respectively. In totality India's water consumption is about 581 TL.



Breakup of Water consumption in India (Source: ‘Global Water Initiative, JUNE 2005, GEF)

#### 4. Need of the study:

Muslims perform abluion or abluion every day before prayers by washing some parts of their bodies. In the process of abluion, usually the tap is let running, which results is good amount of clean water being wasted without any use[12].It could be said that almost half of the water from the tap flows into the drains directly without any contamination [7].

The holy Prophet Muhammad (PBUH) used only one full palm of water for performing abluion. The Islamic historical records states that the amount of water used by Prophet Muhammad (PBUH) for abluion was one “Mudd” [Hadith from Bukhari and Muslim] which is equivalent to about 0.544 L of water [7].There are other proofs of slightly higher evaluation, but the quantity of anyways remains less than 1 L. Presently, Muslims use more amount of water in performing abluion and previous studies have stated different evaluations of the average amount of water used for abluion. Abu Rozaiza has measured the amount of water used for abluion in almost 40 masjids and the two holy mosques and found that 3-7 L of water per person at a time is being used for abluion. In another study, he stated the average amount of water used for abluion in some mosques, schools and government buildings is 2.5-4.5 L/person. He also found that this amount in the two holy Harams increases to 5 L/person and in A’rafah and Muzdalifah to 6-7.5 L/person during Hajj days[5]. With the increase in the numbers of person performing prayers increases results in the more usage of water for performing Ablution. Therefore, more quantity of run-off water is required every time by an individual who performs Ablution. This runoff water if stored before going into the sewerage line can be used in number of ways. The higher the number of persons praying per time, higher than number of tap water used for performing Ablution, higher the qaintly of run-off water each time.

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be used in number of ways. A large number of persons praying at time would give rise to a large number of taps being used for performing Ablution, this in turn would give rise to a larger quantity of run-off water each time.

## **5. APPRAISAL OF STUDY AREAS**

### *E. Description of the Case study*

There are many Muslim dominated areas in our country which have dozens of Mosques, one such area is Abul Fazl Enclave located at bank of Yamuna River in the Jamia Nagar, which is situated in the South East district of New Delhi. The reason of choosing the area is due the high density of Muslim Population in the area. This area has been developed as an unauthorized settlement with 95% of population follows Islam; the area has 23 Mosques spread from Abul Fazl Thokar No. 1 till Thokar No. 9 which includes the area of Shaheen bagh. The Mosques are unevenly spread some being too close as we see near Thokar No 04 while some are apart from each other by a distance of max. 200meters. As the study area is newly habituated (only 20 years old) around 5-6 Mosques are still under construction. The number of persons praying per Mosque varies from about 30-150 for a specific time of prayer. The Friday prayers gathering vary from 150-3000 persons.

### *F. Survey of Abul Fazl*

To know the exact count of Mosques in the study area a survey has been conducted by the author between March-April 2018. This survey has following objectives which are given below:

Mapping of total number of Mosque in the Study Area

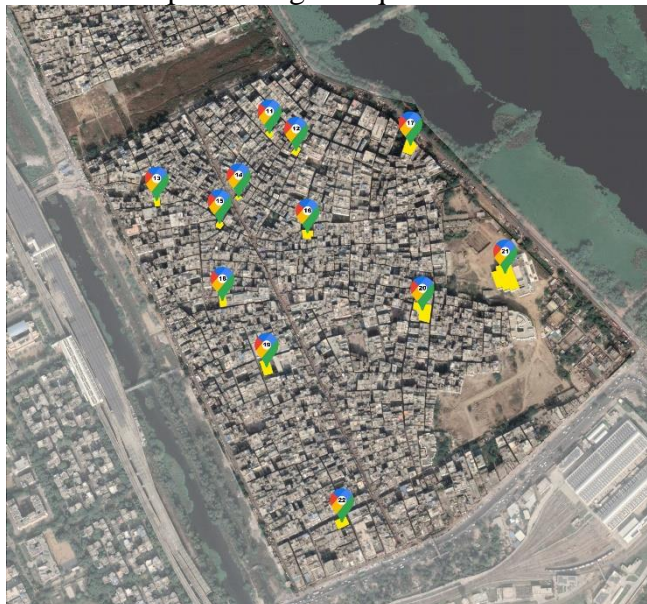
To ascertain the Water Storage Capacity of Each Mosque

To know the source & consumption of water

To calculate the water used exclusively for Ablution based upon the Data



Part 1 of Map Showing Mosques in Abul Fazl Area, New Delhi



Part 02 of Map showing Mosques in Abul Fazl Area, New Delhi  
Survey information of Mosques of Study Area

<b>S. No.</b>	<b>Name of Mosque</b>	<b>Address</b>	<b>Source of water</b>
1.	Ramzani Mosque	Thokar No.-01	Ground Water
2.	Bilaal Mosque	Thokar No.-03	Ground Water
3.	Ahle Hadees Mosque	Hari Kothi	Ground Water
4.	Ishat-E-Islam Mosque	Jamat-e-Islami Campus	Ground Water
5.	Umar Mosque	H-59	Ground Water
6.	Chand Mosque	J-64	Ground Water
7.	Noor Mosque	J-18	Ground Water
8.	Garib Nawaz Mosque	Thokar No - 04	Ground Water
9.	Fatima-Tul-Zahra Mosque	N-9/C	Ground Water
10.	Qadri Mosque	N-Block	Ground Water
11.	Ashraf Mosque	Thokar No.-06	Ground Water
12.	Ek-Minar-Mosque	Thokar No.-07	Ground Water
13.	Mosque –E-Mohammaddi	Thokar No.-06	Ground Water
14.	Medina Mosque	K-40	Ground Water
15.	Shan-E- Ilahi Mosque	M-42	Ground Water
16.	Firdaus Mosque	Thokar No.-06	Ground Water
17.	Juma Mosque	Thokar No.-07	Ground Water
18.	Abu Bakr Mosque	Thokar No.-09	Ground Water
19.	Shaheen Mosque	Thokar No.-08	Ground Water
20.	Tayyab Mosque	Thokar No.-06	Ground Water
21.	Umar bin Khattab	Jamia Islamia	Ground Water

	Mosque	Sanabil	
22.	Al-Habib Mosque	40 Foota road	Ground Water

## 6. METHODOLOGY

The methodology used for collection of data includes physical survey of the study area by the author. The survey performed has helped not only in collection of data pertaining to the number of Mosques in the area, but it also helped the author to understand the various do's and don'ts related to the Ablution water. Although there were mixed reactions and suggestions shared by the Imams of Mosques but all agreed the fact that wrong practice of doing Ablution led to the wastage of precious water which is not only a bad habit but to waste water is also forbidden in Islam. The collection and categorization of data collected concerning the following parameters mentioned below:

**Namazi:** The person who offers Salat is called a Namazi. Total number of Namazi is counted by counting the Saaf in each row.

**Storage of Water:** Each Mosque has water storage tanks which are filled at least twice a day. The Minimum quantity of water storage tank found in the study area is of 1000 Liters.

The counting of Namazi is further refined by dividing them into three categories for each time a Salat is offered during a day.

Namazi Survey of Mosques of Study Area

S.No.	Time of Salat(Prayer)	Monday - Thursday	Friday	Saturday-Sunday
01.	Fazr (Just before sunrise)			
02.	Zuhar (Noon)			
03.	Asar (Just before Evening)			
04.	Magrib (After Sunset)			
05.	Isha (2 Hours After Sunset)			

**Source:** The source of water for each Mosque is also taken into consideration and it has been found that each Mosque in the study area uses ground water for all purposes.

The various function of Mosque related to water has also been inquired during the survey which has been taken into consideration while calculating the final usage of water.

For the specific calculation of water used for Ablution, first the time was recorded based on the average of around 5 people while performing Ablution from the running water under tap. Then running water is collected in a bucket for the specific period noted before and then water is weighed.



## 7. Data Collection & Analysis

### Survey Information Of namazi Countand Water Consumption

Ramzani Mosque, Thokar No.01, Okhla Head, New Delhi						
Mosque - 01	Prayer attendance count			Water Consumption		
	Monday - Thursday	Friday	Saturday - Sunday	Source of water	Ground water	
Fazr	20	20	20	Storage capacity	3 OHT,1000 L each	
Zuhur	35	400	35	Water Usage (Wudhu)		
Asar	45	45	45	Mon - Thursday	235*5	1175
Maghrib	55	75	50	Friday	630*5	3150
Isha	80	90	70	Sat - Sunday	220*5	1100
Bilal Mosque, Thokar No.-03, Abul Fazl, New Delhi						
Mosque - 02	Prayer attendance count			Water Consumption		
	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	20	20	20	Storage capacity	3 OHT,1000 L each	
Zuhur	45	540	65	Water Usage (Wudhu)		
Asar	75	95	55	Mon - Thursday	317*5	1585
Maghrib	72	108	100	Friday	883*5	4415
Isha	105	120	55	Sat - Sunday	295*5	1475
Ahle Hadees Mosque, Hari Kothi, Abul Fazl, New Delhi						
Mosque - 03	Prayer attendance count			Water Consumption		
	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	40	49	31	Storage capacity	3 OHT,1000 L each	
Zuhur	60	550	70	Water Usage (Wudhu)		
Asar	70	75	65	Mon - Thursday	335*5	1675
Maghrib	90	135	75	Friday	934*5	4670
Isha	75	125	100	Sat - Sunday	341*5	1705
Ishrat-E-Islam Mosque, Jamat e Islami campus, Abul Fazl, New Delhi						
Mosque - 04	Prayer attendance count			Water Consumption		
	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	60	80	50	Storage capacity	3 OHT,1000 L each	
Zuhur	100	1000	100	Water Usage (Wudhu)		
Asar	110	125	65	Mon - Thursday	540*5	2700
Maghrib	120	139	100	Friday	1504*5	7520
Isha	150	160	140	Sat - Sunday	455*2	2275
Hazrat Umar Mosque, H/59, Abul Fazl, New Delhi						
Mosque - 05	Prayer attendance count			Water Consumption		
	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	175	175	175	Storage capacity	3 OHT,1000 L each	
Zuhur	210	1000	210	Water Usage (Wudhu)		
Asar	210	210	250	Mon - Thursday	1295*5	6,475
Maghrib	350	350	380	Friday	2085*5	10,425
Isha	350	350	400	Sat - Sunday	1415*5	7075
Chand Mosque, J/64, Abul Fazl, New Delhi						
Mosque - 06	Prayer attendance count			Water Consumption		
	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	80	80	80	Storage capacity	3 OHT,1000 L each	
Zuhur	150	550	160	Water Usage (Wudhu)		
Asar	125	125	125	Mon - Thursday	695*5	3475
Maghrib	160	160	160	Friday	1095*5	5475
Isha	180	180	180	Sat - Sunday	1410*5	7050
Noor Mosque, J/18, Abul Fazl, New Delhi						
Mosque - 07	Prayer attendance count			Water Consumption		
	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	40	40	40	Storage capacity	2 OHT,1000 L each	
Zuhur	100	350	100	Water Usage (Wudhu)		
Asar	100	100	120	Mon - Thursday	510*5	2550
Maghrib	190	190	190	Friday	760*5	3800
Isha	80	80	80	Sat - Sunday	530*2	1060

Mosque - 08	Garib Nawaz Mosque, Thokar No.-04, Abul Fazl, New Delhi					
	Prayer attendance count			Water Consumption		
Prayer Time	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	15	15	15	Storage capacity	1 OHT,1000 L each	
Zuhur	20	150	20	<i>Water Usage (Wudhu)</i>		
Asar	35	35	35	Mon - Thursday	155*5	775
Maghrib	35	35	35	Friday	285*5	1,425
Isha	50	50	50	Sat - Sunday	155*5	775
Mosque - 09	Fatima-Tul-Zohra Mosque, N/9C, Abul Fazl, New Delhi					
	Prayer attendance count			Water Consumption		
Prayer Time	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	50	50	50	Storage capacity	3 OHT,1000 L each	
Zuhur	60	150	60	<i>Water Usage (Wudhu)</i>		
Asar	80	80	90	Mon - Thursday	410*5	2050
Maghrib	120	120	120	Friday	500*5	2500
Isha	100	100	100	Sat - Sunday	420*5	2100
Mosque - 10	Qadri Mosque, N Block, Abul Fazl, New Delhi					
	Prayer attendance count			Water Consumption		
Prayer Time	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	120	120	120	Storage capacity	4 OHT,1000 L each	
Zuhur	150	1100	150	<i>Water Usage (Wudhu)</i>		
Asar	210	210	210	Mon - Thursday	1320*5	6600
Maghrib	390	390	390	Friday	2270*5	4070
Isha	450	450	450	Sat - Sunday	1320*5	6600
Mosque - 11	Ashraf Mosque, Tokar No.-06, Abul Fazl, New Delhi					
	Prayer attendance count			Water Consumption		
Prayer Time	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	25	25	25	Storage capacity	3 OHT,1000 L each	
Zuhur	55	410	55	<i>Water Usage (Wudhu)</i>		
Asar	35	35	35	Mon - Thursday	235*5	1175
Maghrib	60	60	60	Friday	590*5	2950
Isha	60	60	60	Sat - Sunday	235*5	1175
Mosque - 12	Ek Minar Mosque, Tokar No.-07, Shaheen Bagh, New Delhi					
	Prayer attendance count			Water Consumption		
Prayer Time	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	30	30	30	Storage capacity	3 OHT,1000 L each	
Zuhur	70	560	70	<i>Water Usage (Wudhu)</i>		
Asar	70	70	70	Mon - Thursday	450*5	2250
Maghrib	140	140	140	Friday	940*5	4700
Isha	140	140	140	Sat - Sunday	450*5	1010
Mosque - 13	Mosque Mohammadi, Tokar No.-06, Abul Fazl, New Delhi					
	Prayer attendance count			Water Consumption		
Prayer Time	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	40	40	40	Storage capacity	3 OHT,1000 L each	
Zuhur	100	1200	100	<i>Water Usage (Wudhu)</i>		
Asar	120	120	150	Mon - Thursday	1060*5	5300
Maghrib	400	400	400	Friday	2160*5	10,800
Isha	400	400	400	Sat - Sunday	1090*5	5450

Mosque - 14	Madina Mosque, K/40, Abul Fazl, New Delhi					
	Prayer attendance count			Water Consumption		
Prayer Time	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	40	40	40	Storage capacity	3 OHT, 1000 L each	
Zuhur	80	576	120	<i>Water Usage (Wudhu)</i>		
Asar	96	96	130	Mon - Thursday	504*5	2520
Maghrib	128	128	140	Friday	1000*5	5000
Isha	160	160	180	Sat - Sunday	610*5	3050
Mosque - 15	Shan-E-Ilahi Mosque, M/42, Abul Fazl, New Delhi					
	Prayer attendance count			Water Consumption		
Prayer Time	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	72	72	73	Storage capacity	3 OHT, 1000 L each	
Zuhur	180	1170	200	<i>Water Usage (Wudhu)</i>		
Asar	180	180	204	Mon - Thursday	936*5	4680
Maghrib	252	252	276	Friday	1926*5	2934
Isha	252	252	279	Sat - Sunday	1034*5	5160
Mosque - 16	Firdaus Mosque, Tokar No.-05, Abul Fazl, New Delhi					
	Prayer attendance count			Water Consumption		
Prayer Time	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	25	25	25	Storage capacity	2 OHT, 1000 L each	
Zuhur	50	400	50	<i>Water Usage (Wudhu)</i>		
Asar	50	50	60	Mon - Thursday	295*5	1475
Maghrib	65	65	75	Friday	645*5	3225
Isha	105	105	125	Sat - Sunday	335*5	1675
Mosque - 17	Juma Mosque, Thokar No.-07, Abul Fazl, New Delhi					
	Prayer attendance count			Water Consumption		
Prayer Time	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	50	50	50	Storage capacity	4 OHT, 1000 L each	
Zuhur	100	3000	100	<i>Water Usage (Wudhu)</i>		
Asar	120	120	120	Mon - Thursday	630*5	3150
Maghrib	180	180	180	Friday	3530*5	17,650
Isha	180	180	180	Sat - Sunday	630*5	3150
Mosque - 18	Abu bakar Mosque, Thokar No.-08, Abul Fazl, New Delhi					
	Prayer attendance count			Water Consumption		
Prayer Time	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	30	30	30	Storage capacity	2 OHT, 1000 L each	
Zuhur	50	150	50	<i>Water Usage (Wudhu)</i>		
Asar	30	30	30	Mon - Thursday	270*5	1350
Maghrib	80	80	80	Friday	370*5	1850
Isha	80	80	80	Sat - Sunday	270*5	1350

Mosque - 19	Shaheen Mosque, Thokar No.-08, Abul Fazl, New Delhi					
	Prayer attendance count			Water Consumption		
Prayer Time	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	30	30	30	Storage capacity	3 OHT,1000 L each	
Zuhur	50	550	50	<i>Water Usage (Wudhu)</i>		
Asar	75	85	60	Mon - Thursday	375*5	1875
Maghrib	110	130	100	Friday	905*5	4525
Isha	110	100	100	Sat - Sunday	340*5	1700
Mosque - 20	Tayyab Mosque, Thokar No.-06, Abul Fazl, New Delhi					
	Prayer attendance count			Water Consumption		
Prayer Time	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	40	40	40	Storage capacity	3 OHT,1000 L each	
Zuhur	100	1200	120	<i>Water Usage (Wudhu)</i>		
Asar	130	110	150	Mon - Thursday	1096*5	5480
Maghrib	405	370	415	Friday	2115*5	10,575
Isha	421	395	388	Sat - Sunday	1113*2	5565
Mosque - 21	Mosque Umar, Jamia Islamia sanabil, Thokar No.-09, New Delhi					
	Prayer attendance count			Water Consumption		
Prayer Time	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	650	650	650	Storage capacity	4 OHT,1000 L each	
Zuhur	720	1500	720	<i>Water Usage (Wudhu)</i>		
Asar	675	630	710	Mon - Thursday	3295*5	16,475
Maghrib	630	670	650	Friday	4100*5	20,500
Isha	620	650	680	Sat - Sunday	3410*5	17,050
Mosque - 22	Al-Habib Mosque, Shaheen bagh, New Delhi					
	Prayer attendance count			Water Consumption		
Prayer Time	Monday Thursday	Friday	Saturday -Sunday	Source of water	Ground water	
Fazr	50	50	50	Storage capacity	3 OHT,1000 L each	
Zuhur	80	450	80	<i>Water Usage (Wudhu)</i>		
Asar	120	130	110	Mon - Thursday	500*5	2500
Maghrib	100	160	120	Friday	930*5	4650
Isha	150	140	160	Sat - Sunday	520*2	1040

Based on the information in Tables, the ablution water consumption for a month can be estimated by using the following equation:

Number of mosques user per week  $\times$  4 weeks  $\times$  ablution water volume used per person

$$= 2,045 \text{ persons /week} \times 4 \text{ weeks} \times *4.5 \text{ liters}$$

$$= 36,810 \text{ liters/month}$$

$$= 36.810 \text{ m}^3/\text{month}$$

*\*4.5 liters was the average volume of water required for a single ablution ritual, obtained by monitoring a number of users of the mosque at various prayer times in a day.*

The ablution ritual requires an average amount of 3.10 m<sup>3</sup> of water per person in a mosque for a day. As compared to the domestic indoor usage per day, which is 0.26 m<sup>3</sup>[14], the water demand for the ablution is clearly 12 times more. As stated, Prophet Muhammad used 1 “mudd” (equal to 2/3 L) for performing ablution and 1 sa’ up to 5 “muds” (equal to 2-3.5 L) for bathing [2]. As the water used for ablution is not highly contaminated, it is clear waste of the water by channelling the grey water into drain rather than recycling it. This is contrasting to the efforts aimed at collecting and reusing the grey water from

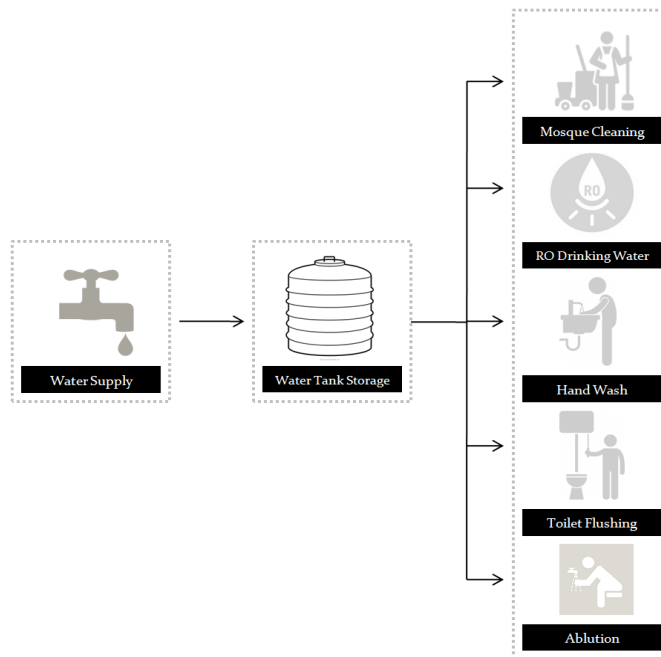
the mosques [2], which if practiced collectively, can bring long term benefits of conservation of the already depleting clean water resources. It would also implement a practice which would align a Muslim's daily life a motto of "to conserve and to not waste".

#### Survey Information Of Namazi's Attendance Count And Water Consumption At Mosques

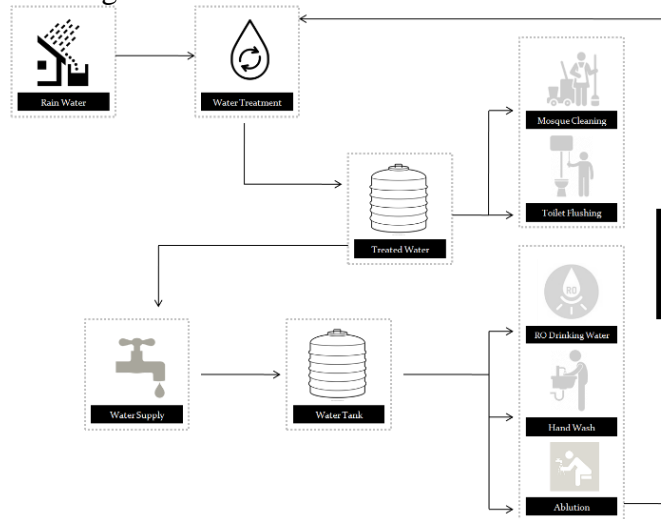
S. No.	Name of Mosque	Namazi Per Week	Water Usage/ Week	Water Usage/ Month	
			Liters/Week	Liters/Month	M <sup>3</sup> / Month
01.	Ramzani Mosque	2045	9202.5	36,810	36.81
02.	Bilaal Mosque	2825	12,712.5	50,850	50.85
03.	Ahle Hadees Mosque	3250	14,625	58,500	58.50
04.	Ishat-E-Islam Mosque	4610	20,745	82,980	82.98
05.	Umar Mosque	10095	45,427.5	1,81,710	181.71
06.	Chand Mosque	2495	11,227.5	44,910	44.91
07.	Noor Mosque	3860	17,370	69,480	69.48
08.	Garib Nawaz Mosque	1215	5,467.5	21,870	21.87
09.	Fatima-Tul-Zahra Mosque	2920	13,140	52,560	52.56
10.	Qadri Mosque	10190	45,855	1,83,420	183.42
11.	Ashraf Mosque	2000	9,000	36,000	36
12.	Ek-Minar-Mosque	3640	16,380	65,520	65.52
13.	Mosque –E-Mohammaddi	8580	38,610	1,54,440	154.44
14.	Medina Mosque	4236	19,062	76,248	76.248
15.	Shan-E- Ilahi Mosque	7804	35,118	1,40,472	140.472
16.	Firdaus Mosque	2495	11,227.5	44,910	44.910
17.	Juma Mosque	7310	32,895	1,31,580	131.58
18.	Abu Bakr Mosque	1990	8,955	35,820	35.82
19.	Shaheen Mosque	3140	14,130	56,520	56.52
20.	Tayyab Mosque	8580	38,610	1,54,440	154.44
21.	Umar Mosque	24195	1,08,877.5	4,35,510	435.51
22.	Al-Habib Mosque	4010	18045	72,180	72.18
				<b>21,86,730</b>	<b>2186.73</b>

## 8. INFERENCES

Although ablution water is relatively clean as it contains no chemical or solid impurities, but the greywater still requires treatment before it can be safely reused, even for non-potable purposes. In attempt to produce 100 % recycled water, there will not be a disruption in regular water supply for the users. Temporary termination of the water supply, dry spells with no rain and other emergencies were also considered for the feasibility of proposed system. Provision of twin-storage tank design, one for the captured greywater and the other for fresh water from the mains, synchronized with a multi-valve control mechanism will help us to achieve our proposal target. Above provision will not only support grey-water reuse; also, the depleted source water will be compensated by intake of fresh, clean water supply from mains.



Existing water circulation network of the Abul Fazal Area Mosques



Proposed Water Circulation Network Of The Abul Fazal Area Mosques

**9. WAY FORWARD**

Feasibility analysis for rain water harvesting plant and primary water treatment plant for each mosque in the study area.

Market survey for low flow faucets to reduce the wastage of water during ablu-tion.

Water use and time analysis in ablu-tion from different types of taps and faucets.

Low cost and effective measures to reduce, reuse and recycle the waste water generated from ablu-tion process.

## 10. CONCLUSION

The aim of the paper is to quantify the amount of water used for ablution in each mosque that is encompassed under the area of study. Based on analysis possible methods of reuse and recharge of groundwater could be suggested. Proposal to demonstrate feasibility and practicality can be implemented in conjunction with Islamic principles. The grey-water recycling system which is easy to install or retrofit, economical, with simple fixtures required to reduce water wastage and help conserve clean water supply can be implemented. As far as the method of purification is concerned, various on-site eco-friendly purification plants can be set up within the Mosque premises. The study area also has many Mosques in its vicinity, so the idea of setting up a common purification plant could also work out efficiently.

## References

- The Noble Qur'an. "English translation of the meanings and commentary, by Muhammad Taqi-ud-Din Al-Hilali and Muhammad Muhsin Khan". Madinah Munawwarah, King Fahd Complex for the Printing of the Holy Quran, 1983, (Al-A'raf, 7:31).
- Al-Bukhari. "The English Translation of Sahih Al-Bukhari." Translated by Muhammad Muhsin Khan, Al-Saadawi Publications, 1996, Volume 1, Book 4, Hadith 200.
- Tuan Ab Rahman, T.S. (2008). A case study of the local Islamic ablution system. Case Study Report, Faculty of Civil and Environmental Engineering, Universiti Tun Hussein Onn Malaysia, Malaysia
- Prathapar, S. A., Ahmed, M., Al Adawi, S., & Al Sidiari, S. (2004). Variation in quality and quantity of greywater produced at two mosques in Oman. Proceedings of the International Wastewater Conference, Salalah, Oman.
- Abu-Rizaiza, O. S. (2002). Ablution Water: Prospects for Reuse in Flushing of Toilets at Mosques, Schools, and Offices in Saudi Arabia. King Abdul Aziz Univ. J., 14(2), 3-28.
- Al-Wabel, M. I. (2011). Simple system for handling and reuse of gray water resulted from ablution in Mosques of Riyadh City, Saudi Arabia. Proceedings of International Conference on Environment Science and Engineering, IPCBEE vol.8 (2011), IACSIT Press, Singapore.
- Al Mamun A, Muyibi SA, Razak A, Asilah N (2014) Treatment of used ablution water from IIUM masjid for reuse. Adv Environ Biol 8(3):558–564 (special 2014)
- Erikkson, E., Auffarth, K., Eileresen, A. M., Henze, M., & Ledin, A. (2003). Household chemicals and personal care products as sources for xenobiotic organic compounds in grey wastewater. Water S.A., 29, 135-146.
- Pinto, U., & Maheshwari, B. L. (2010). Reuse of greater for irrigation around homes in Australia: Understanding community views, issues and

- practices. *Urban Water Journal*, 7(2), 141-153.  
<http://dx.doi.org/10.1080/15730620903447639>
- Yousefi, B., Moazed, H., Pouladgar, M., & Rahi, S. (2013). Review of gray water treatment and reuses for irrigation. *Nature and Science*, 11(2), 113-116.
- Rana, K., Shah, M., & Upadhy, A. (2014). Integrated approach towards grey water management. *International Journal of Engineering Sciences & Research Technology*, 239-242
- Suratkon A, Chee MC, Ab Rahman TST (2014) SmartWUDHU: recycling ablution water for sustainable living in Malaysia. *J Sustain Dev* 7(6):150–157. doi:10.5539/jsd.v7n6p150
- Center for the Study of the Build Environment, CSBE. (2003). *A Report on Greywater Reuse in Jordan*
- Water Research Foundation. (1999). *Residential end uses of Water*. Denver, Colorado, USA.