STUDY OF POTENTIAL UTILIZATION OF RECYCLING ABLUTION USED WATER, CASE STUDY AT ULUL ALBAAB MOSQUE, UNIVERSITAS PASUNDAN, BANDUNG, INDONESIA

Evi Afiatun*, Sri Wahyuni, Jeanyta Harto

Department of Environmental Engineering, Universitas Pasundan, Indonesia

Abstract

The role of water in daily life, including activities in the mosque is very significant. The existence of the Ulul Albaab Mosque which is always busy with various congregation activities and activities carried out by students and the campus community affects the need for clean water. So far, the ablution used water at the Ulul Albaab Mosque has been dumped into the sewers. Measuring the quantity of water to determine the volume of ablution used water at the time of obligatory prayer is the first step to assessing its potential utilization. The number of congregation who perform ablution is directly proportional to the number of congregation of the Ulul Albaab Mosque. The average congregation of the mosque is 857 people/day and the average number who perform ablution is 778 people/day. The results showed that the volume of water used for ablution was 3.9 liters/person with an average time required for ablution of around 64 seconds. The use of recycling ablution water can be used for non-consumption needs.

Keywords: *ablution water, mosque activities, non-consumption needs, recycling*

Introduction

Ulul Albaab Mosque is one of four mosques spread throughout the Universitas Pasundan Campus, Bandung. The existence of the Ulul Albaab Mosque which is always busy with various congregation activities and activities carried out by students and the campus community affects the need for clean water. The study's results (Bahagia, 2018) state that ablution is carried out at least five times in one day or can be interpreted as five prayer times. If it is assumed that in one ablution, each congregation needs about 3 liters of clean water, then in one day for one congregation ablution requires approximately 15 liters. Ulul Albaab Mosque's water needs come through groundwater pumping. So far, the ablution used water at the Ulul Albaab Mosque is still being dumped into the sewers without any use. In its use, the ablution used water has been used to clean certain body parts prescribed for ablution. The ablution activity at the Ulul Albaab Mosque is carried out by the congregations every time they will carry out the 5 daily obligatory prayers and other congregations. The quantity of congregations who perform the obligatory prayers at the Ulul Albaab Mosque fluctuates. The number of congregations will only be maximized on certain days such as Fridays and other religious days. Fluctuations in the use of ablution water, depending on the congregation present at the Ulul Albaab Mosque. The routine use of ablution water shows the large potential of ablution used water that can be utilized at the Ulul Albaab Mosque, so efforts are needed to utilize ablution used water as an alternative source of clean water for various purposes. One concept that can be applied as an effort to

*)Corresponding Author:
E-mail: evi_afiatun@unpas.ac.id

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preserve clean water resources is water recycling. The strategy of recycling ablution used water aims at efficient use of water resources and to participate in environmental management (Taylor, 2016). This research needs to be done in order to provide an initial picture of the potential for recycling ablution used water that can be done at the Ulul Albaab Mosque.

The purpose of this study was to examine the potential use of ablution used water at the Ulul Albaab Mosque. Measurement of the quantity of water to determine the amount of ablution used water at the time of obligatory prayers.

Methodology

The research method used is quantitative research with a descriptive approach. This study uses observation by means of a direct survey to the research site to determine the quantity of ablution used water. The quantity of ablution used water was analyzed at five prayer times for 24 days. Calculation of congregation who perform ablution is done manually using a hand tally counter. The research flow can be seen in Figure 1.

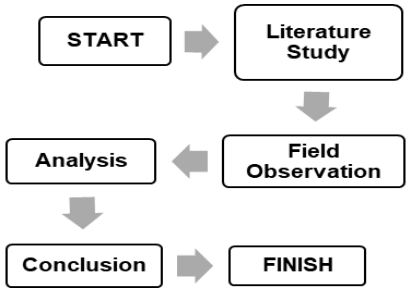

Figure 1. Research Flow

Research Location

The research location is on Campus IV, Universitas Pasundan, JL Setiabudhi No. 193 Bandung. The target of this research is the congregation of the mosque who performs ablution at the Ulul Albaab Mosque.

Sampling Technique

Sampling of ablution used water in this study used the Slovin formula (Setiawan, 2005). The number of samples must be representative so that the research results can be generalized with simple formulas and calculations, Eq. (1).

$$n = \frac{N}{(1+Ne^2)} \quad (1)$$

where:

n = number of samples

N = number of population

e = The error tolerance limit (error estimate), in this study is 5% because the number of respondents using the 5% error tolerance limit will get a representative number of samples, namely the truth reaches ± 95%.

To find out the sample group to be studied, use the Fraction Per Cluster formula, Eq. (2).

$$Fi = \frac{Ni}{N} \quad (2)$$

where :

Fi = sampling fraction cluster

Ni = the number of individuals in the cluster

N = total population

n = number of members included in the sample

ni = number of members included in the sub sample

Sampling of water for ablution is carried out when entering the time of one of the obligatory prayers, namely the Zuhr prayer. The congregation's ablution water is accommodated in a bucket, then the volume of water and the time required are measured. The total number of congregation is also recorded and counted.

This is done to determine the volume of water and the time used by congregation to perform ablution at the time of obligatory prayers. The research data analyzed are presented in graphs or tables, then described thoroughly.

Results and Discussion

Result

This study focuses on the quantity of water used for ablution starting from counting the number of congregation who perform ablution, the total amount of ablution used water and the average

volume of used water per person/one time for ablution.

Table 1 is data from a survey of the number of congregation of the Ulul Albaab Mosque at five prayer times in a month, which are presented in the following tables and graphs:

Tabel 1. The Average Congregation of the Ulul Albaab Mosque

Days	Mosque Congregation					Total
	Fajr	Zuhr	Asr	Maghrib	Isha	
Monday	11	356	260	202	47	876
Tuesday	8	315	250	148	36	757
Wednesday	10	301	237	147	44	739
Thursday	12	355	305	187	42	901
Friday	9	624	273	150	38	1094
Saturday	9	284	250	196	39	778
Average	10	373	263	172	41	858
Total						5145

Based on table 1, it is found that the average congregation of the mosque in a day is 858 people/day. Survey data shows fluctuations in the number of congregation, both from the 5 daily prayers and the number of daily congregation.

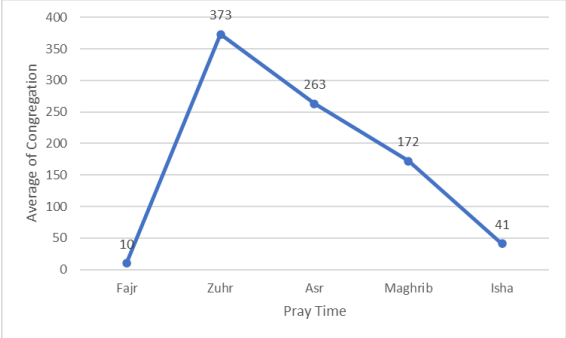

Figure 2. The average congregation who performs ablution at 5 times of obligatory prayer.

Overall, the highest number of congregation in the mosque during one week, is on Fridays. This is influenced by the existence of religious activities that take place at the Ulul Albaab Mosque, including Friday prayers in congregation, mentoring and learning recitations of the Qur'an.

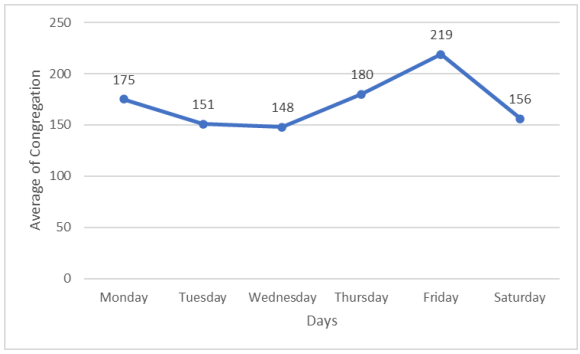

Figure 3. The average congregation who performs ablution in a week.

From the observations, it is known that the mentoring and learning activities of the Qur'an recitation occur on Mondays, Thursdays and Fridays. While on Saturdays, the hall in the mosque building is usually used for seminars and meetings. Islamic activities and congregational activities at the Ulul Albaab Mosque affect the number of mosque congregation. This can be seen in Table 2, the congregation on Monday, Thursday and Friday experienced an increase of up to 26.4% of the congregation on Tuesday, Wednesday and Saturday.

In addition, the lecture schedule has an impact on the number of congregation who pray at the Ulul Albaab Mosque, the number of congregation during exam activities has increased to 2.35% of the number of congregation on lecture days which is around 235 people, Figure 4 is a recapitulation of congregations for one month.

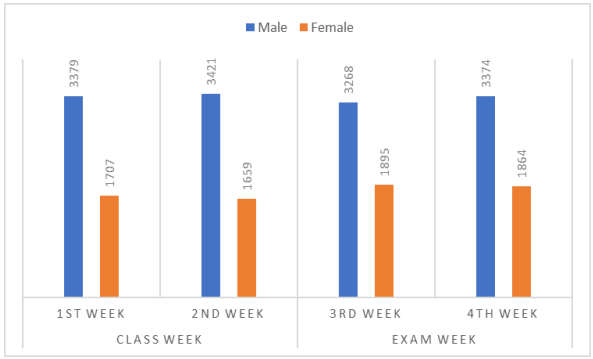

Figure 4. Recapitulation of the Ulul Albaab Mosque congregation for 1 month.

To find out the number of congregation who perform ablution at the Ulul Albaab Mosque is the same as counting the congregation of the mosque using a hand tally counter. Table 2 is data from a survey of congregation who perform ablution at the Ulul Albaab Mosque at five prayer times a month, which is presented in the following Table 2 and Fig. 5.

Table 2. The Average Congregation Who Performs Ablution at the Ulul Albaab Mosque

Days	Congregation who performs ablution					Total
	Fajr	Zuhr	Asr	Maghrib	Isha	
Monday	10	310	249	172	41	781
Tuesday	8	279	224	141	29	679
Wednesday	10	270	230	129	38	677
Thursday	12	311	274	158	34	788
Friday	9	586	261	136	36	1027
Saturday	9	268	232	173	35	717
Average	9	337	245	151	35	778
Total						4668

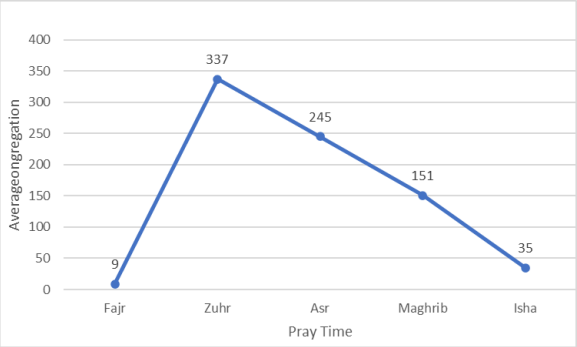

Figure 5. The average congregation who performs ablution at 5 times of obligatory prayer.

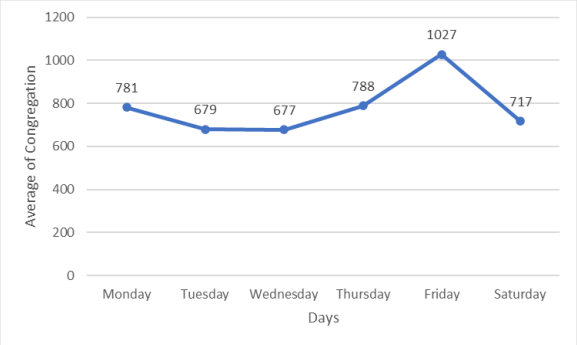

Figure 6. The average congregation who performs ablution in a week.

Based on Table 2, it is found that the total congregation who perform ablution in a day are 778 people/day. Survey data shows a fluctuation in the number of congregation, both from the 5 daily prayers and the number of daily congregation. Overall, it is the same with the highest number of congregation in the mosque, the congregation who performs the highest ablution in one week, is on Friday. While the congregation who performs ablution the most at the time of the obligatory prayers, namely at the time of the Zuhr prayer and the time of the Friday prayer.

Statistical calculations show a correlation between mosque congregations and congregations who perform ablution. Through the calculation of SSPS 20 from the output, the coefficient of determination (R Square) is 0.953, which means that the influence of mosque congregations on congregations who perform ablution is 95.3%, other factors influence the rest.

The results obtained from the average congregation of mosques are 857 people/day, sampling the volume of ablution used water is reduced using the Slovin formula, see Table 3.

Table 3. Determination of Sample Quantity

No	Mosque Congregation	Population	Sample
1.	Male	560	178
2.	Female	297	95
	Total	857	273

Data collection was taken from 5 prayer times in one week. The congregation's ablution water is accommodated in a bucket, measured and then recorded. The total volume of ablution used water from 273 samples is 1,079 liters and the total time needed for ablution is 17,444 seconds, so it can be calculated that the average volume of ablution water per person is 3.9 liters with an average ablution time of 64 seconds.

Discussion

Ulul Albaab Mosque's water needs are met by pumping groundwater. So far, the ablution used water at the Ulul Albaab Mosque is still being dumped into the sewers without any use. In this study, ablution used water is the main target that needs attention. Ablution is a self-purification ritual that Muslims must do before performing prayers (Sutrisno, 2016). The use of water when performing ablution is only to wash some parts of the body so that a lot of water is wasted during ablution (Suratkon et al., 2014), (Rachmadhi & Moersidik, 2016)

The quantity of ablution water is measured to determine the volume of ablution used water at the time of obligatory prayers. The water sample is ablution used water from all mosque congregations who perform ablution at the mosque's ablution place.

From the study results, the number of mosque congregations was 10.2% more than those who performed ablution. Based on observations in the field, not all congregations perform ablution at the Ulul Albab Mosque, especially during Friday prayers. However, it is not known exactly how many congregations perform ablution outside the Ulul Albaab Mosque ablution place. Limited water before Friday prayers is one of the factors for male congregations not to perform ablution at the Ulul Albaab Mosque. The number of congregations on Friday which is not balanced with the availability of clean water causes long queues when performing ablution.

According to (Mafra, 2018) the duration of ablution time is influenced by habits in ablution, tolerance for ablution queues, velocity of ablution faucet and the time interval for the call to prayer and iqomah. While the volume of ablution used water, is influenced by the duration of the sample in ablution, behavior in ablution, and the velocity of ablution faucet.

The results showed that the volume of ablution used water produced from one ablution was 3.9 liters/person. Based on the decision of the Ministry of PUPR regarding the need for water for ablution as much as 15 liters / person / day, in line with the need for clean water from the Health Office for ablution needs is around 15 liters / day. So, the use of ablution water at the Ulul Albaab Mosque exceeds the applicable provisions.

In one day the average congregation who performs ablution at the Ulul Albaab Mosque is 778 people, then the ablution used water used is 3,034.2 liters / day, if in one week it is 18,205.2 liters, a large amount for water that is not utilized. The number of congregation who perform ablution in the mosque will affect the amount of wastewater produced by the mosque (Jacob & Sandjaya, 2018).

The amount of ablution used water is wasted/not utilized optimally in the midst of a water shortage, is one of the reasons for the need to apply the use of ablution used water at the Ulul Albaab Mosque. According to (Rachmadani et al., 2011) ablution used water can be a good potential for recycling to meet water needs for activities that do not prioritize high quality (non-consumption).

The results of the research at the Istiqlal Mosque show the level of congregation acceptance of the use of ablution used water, which can be used as: utilization of garden watering, washing floors, washing congregation clothes, washing carpets, toilet needs.

The study's results (Al Mamun et. Al. 2013) in (Madona et al., 2014) show that ablution used water is not too polluted and can be easily recycled and reused for cleaning purposes and watering plants after passing through a sand filter. The application of ablution used water can be reused for tilapia cultivation, because it has potential both in terms of quality and quantity (Sutrisno, 2016).

In addition, other research states that ablution used water includes greywater that can be recycled, where the results can be used for reclamation water such as for landscape water, namely for watering plants, fish pond water, mopping floors or cleaning vehicles (Bahagia, 2018).

In addition to water continuity, a factor that needs to be considered in reusing water is the quality of the water. According to (Said, 2006) the main considerations in the use of recycled wastewater are the health risks caused by organic pollutant compounds and pathogenic microorganisms, as well as the acceptance of water users related to aesthetic value. The quality of the water to be used needs to be considered. However, processing water used for ablution will be easier than water from rivers. BOD (Biochemical Oxygen Demand) of used water may reach 50mg/L (Alfiah et al., 2015). The water quality of urban rivers is indicated to be polluted, especially in densely populated areas (Yustiani et al., 2019). Utilization of used water from mosques is a good alternative as a substitute for river water use. Filtration may treat used water from ablution activity to be recycled as other purposes including for ablution again (Lubis & Sutisna, 2022).

Conclusion

From the study of the use of ablution used water at the Ulul Albaab Mosque, it was found that:

- In a day the number of congregation of the Ulul Albaab Mosque varies from 10 people to 372 people. The average congregation of the mosque is 857 people/day. Meanwhile, the average number of congregation who perform ablution is 778 people/day.
- The number of congregations who perform ablution is directly proportional to the number of congregations of the Ulul Albaab Mosque. This is evidenced by the correlation between mosque congregations and congregations who perform ablution, which has an output of 95.3%.
- Other factors that affect congregation attendance and the increase in people performing ablution in mosques include religious activities (such as: congregational Friday prayers, mentoring and learning recitations of the Qur'an), congregational activities and lecture activities.
- The results showed that the volume of ablution used water produced from ablution activities was 3.9 liters/person, with the required ablution time of 64 seconds. If the congregation performs ablution 5 times at the time of obligatory prayer in one day, the number obtained is 19.5 liters. The volume of water is still far above the recommended PUPR regulation, which is 15 liters/day/person.

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