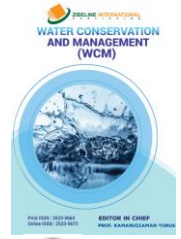


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RESEARCH ARTICLE  
**AWARENESS LEVEL OF WATER RESOURCE CONSERVATION OF UNIVERSITY STUDENTS**

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## ARTICLE DETAILS

## ABSTRACT

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Water security is becoming one of Malaysia's greatest issues of concern. This study aims to assess the level of awareness of students on the importance of water resources and their water conservation practices at 10 selected residential colleges, Universiti Kebangsaan Malaysia (UKM). 500 questionnaires were distributed in 10 residential colleges in UKM. The data collected from the questionnaires were analysed in computer by using the software Statistical Package for the Social Sciences (SPSS). The analysis conducted in the study include descriptive analysis (frequency, percentage, mean, median, crosstab) and correlation analysis by using Spearman's Rho. The findings show that UKM students have high awareness level on water resource conservation. However, the implementation of water conservation practices is still low amongst the students. A comprehensive inventory, characterization and assessment of primary types of water-related energy consumption is recommended in future study to develop a comprehensive understanding of water-energy nexus as well as to enhance water conservation practices not only among university student but among the citizen of Malaysia as well.

## KEYWORDS

water resources, awareness, Statistical Package for the Social Sciences, water-energy nexus.

## 1. INTRODUCTION

Water is fundamental for economic growth and to the environment. Water has been identified as one of the most important natural resources and somewhat different from the rest because it is viewed as a key to prosperity and wealth [1]. However, water depletion and contamination are among the main environmental problem faced worldwide in the 21<sup>st</sup> century [2]. Malaysia faces increasing pressure on its water resources with its booming economy and growing population, these pressures are also compounded by the impact of climate variability and accelerating climate change. As a result, there is growing realization of the urgent need to conserve water.

While technological advances of water-based appliances offer increased efficiency, the way in which users interact with these appliances ultimately has a major effect on the water performance of the appliance. However, user interaction with water-based appliances is inextricably linked to the habitual use of water and users' expectations of cleanliness, comfort, and relaxation [3]. As such, the consumption of water has become a routine and inconspicuous part of everyday life with most people giving little consideration to the conservation of water. To develop effective water conservation policies which aim to encourage water saving behavioural change, an understanding of users' level of awareness, conservation behaviours is needed. This study aims to provide new evidence of students' awareness of water issues and their attitudes to water conservation, and how these relate to water saving behaviours.

## 2. METHODOLOGY

This research was conducted based on a literature review and distribution of questionnaire survey to 10 residential colleges at the Universiti

Kebangsaan Malaysia (UKM), located in Bangi, Selangor Malaysia to assess the level of awareness among the students on the importance of water resources and their water conservation practices. The questionnaires were distributed to 500 respondents (25 male students and 25 female students) from 10 residential colleges in UKM. The 10 selected residential colleges are given in Table 1.

**Table 1:** 10 selected residential colleges involved in this study

No.	Residential College
1	Dato' Onn College (KDO)
2	Aminuddin Baki College (KAB)
3	Ungku Omar College (KUO)
4	Burhanuddin Helmi College (KBH)
5	Ibrahim Yaakub College (KIY)
6	Rahim Kajai College (KRK)
7	Ibu Zain College (KIZ)
8	Keris Mas College (KKM)
9	Pendeta Zaaba College (KPZ)
10	Tun Hussein Onn College (KTTHO)

The data obtained from the questionnaires was developed by using Likert scale of the interval and ordinal types. For questions with Likert scale interval type, descriptive analysis was conducted to obtain the mean, median, mode and standard deviation. Likert scale questionnaire was chosen because it suitable for surveying the level of awareness regarding

environmental issues [4]. Preliminary survey (pilot test) was administered over 50 respondents before execution. The Questionnaire was divided into 3 sections. Section A: Demographic profiles; Section B: Awareness Level and Section C: Application. Measurement in Likert scale was used for each statement of water supply crisis and each item was given a scale of 1 to 5, namely:

1=Strongly Disagree, 2=Disagree, 3=Unsure/Neutral, 4=Agree, 5=Strongly Agree

The questionnaire addressed the following questions:

- Socio demographic factors (age, gender and level of education)
- Environmental Awareness [5]
- Water conservation awareness [6,7]
- Individual water-use patterns
- Water consumption activities at home
- Water conservation practices [6]

The reliability of the instrument has been identified by conducting a pilot survey. A pilot survey is a strategy used to test the questionnaire using a smaller sample compared to the planned sample size. In this phase of conducting a survey, the questionnaire is administered to a percentage of the total sample population, or in more informal cases just to a convenience sample. 50 sets of questionnaires were distributed and 44 were successfully collected back from the respondents. 4 sets of questionnaires were considered not valid as the demographic profile were not answered and another 2 sets of questionnaires were considered not valid as the respondents were failed to answer completely every section of the questions. The Alpha Cronbach value obtained from the pilot survey was 0.8999, which proven a strong reliability of the instrument. According to a study, 0.7 is an acceptable value for reliability of the instrument [8].

### 3. RESULTS AND DISCUSSION

Out of 515 sets of questionnaires that were distributed, 500 sets were collected back from 10 residential colleges in UKM. The respondents consist of 25 males and 25 females from one respective residential college. 15 sets of questionnaires were rejected because some of the respondents were not a UKM resident in neither of the residential colleges in UKM. In this survey, the total sample size is 500, 135.14% of 370 sample size suggested by some researchers [9]. The questionnaires were distributed randomly to 25 male residents and 25 female residents of each residential college in UKM. Table 2 shows the demographic profile of respondents.

**Table 2:** Respondent's demographic profile

Respondent's Profile		Frequency	Percentage (%)
Gender	Male	250	50
	Female	250	50
Age Group	<20	94	18.8
	20-25	368	73.6
	26-30	32	6.4
	31-35	4	0.8
	36-40	1	0.2
	>40	1	0.2
Citizenship	Malaysia	493	98.6
	Indonesia	2	0.4
	Pakistan	1	0.2
	Iraq	1	0.2
	Thailand	1	0.2
	India	2	0.4
Race	Malay	381	75.2
	Chinese	72	14.4
	Indian	33	5.5
	Kadazan	4	0.8

	Melanau	3	0.6
	Kelabit	1	0.2
	Sungai	1	0.2
	Iban	1	0.2
	Thai	1	0.2
	Iranian	1	0.2
	Pakistani	1	0.2
	Indonesian	1	0.2
Marital Status	Single	498	99.6
	Married	2	0.4
Faculty	FST	170	34
	FPEND	22	4.4
	FSSK	93	18.6
	FEP	75	15.0
	FUU	22	4.4
	FPI	31	6.2
	FKAB	47	9.4
	FTSM	28	5.6
	FSK	3	0.6
	AsasiPintar	8	1.6
	LESTARI	1	0.2
Level of Education	Foundation	16	3.2
	Degree	410	82
	Master's Degree	65	13
	PhD	9	1.8

Table 3 shows the mean value and standard deviation of 8 main sections of the questionnaire. Section 3 on awareness level has the highest mean value of 4.4856 (standard deviation 0.6740). Section 3 inquires on the statements related to water resource. For example, S3\_Q20 the availability of fresh water is very less and limited at global level. The mean value of section 3 explained that the awareness level of respondents on the importance to conserve water resource is high. The knowledge of water resource conservation is very high especially amongst youth in universities.

**Table 3:** Mean value for 8 main sections of questions

No.	Section of Questions	Mean	Standard Deviation
1	S3 Awareness Level (The following section includes statements related to water resource. Please circle the response that best fits your opinion for each statement.)	4.4856	0.6740
2	S2 Awareness Level (Please indicate how much you agree or disagree with the following activities to reduce pollutions towards the environment.)	4.3964	0.724
3	S8 Water-Energy Nexus (The following section includes statements related to water-energy nexus. Please circle the response that best fits your opinion for each statement.)	4.1792	0.8072
4	S4 Awareness Level (Please indicate how much you agree or disagree with the following statement on water conservation.)	4.1232	0.8453
5	S1 Awareness Level (Please circle the response that best fits your level of environmental awareness.)	4.1004	0.7718
6	S5 Application (Please indicate how much you agree or disagree with the following activities at home will help to conserve water.)	4.0640	0.9571

7	S6 Application (How likely you agree or disagree on the water conservation activities at home -as mentioned in S5, will be applicable to conserve water in your residential college.)	4.0480	0.9574
8	S7 Application (Please circle the response that best fits your opinion on the measures taken to prevent wastage of water in your residential college.)	4.0335	0.8998

Table 4 shows the tabulation of mean, standard deviation and median of the questions in section 3. Based on the mean value of S3\_Q18, most of the respondent strongly agree that fresh water is an important natural resource necessary for the survival of all ecosystems. The value of median shows that most of the respondents answered agree and strongly agree towards the questions on the importance of water resource.

**Table 4:** Awareness level of respondents on water resource conservation

No.	Questions	Mean	Standard Deviation	Median
1	S3_Q17 Water resource is essential for livelihood and environment's health.	4.61	0.588	5.00
2	S3_Q18 Fresh water is an important natural resource necessary for the survival of all ecosystems.	4.65	0.579	5.00
3	S3_Q19 Pollution through human activities cause problems for freshwater resources.	4.59	0.628	5.00
4	S3_Q20 The availability of fresh water is very less and limited at global level.	4.28	0.805	4.00
5	S3_Q21 Our society is facing water shortages and pollution issue.	4.29	0.770	4.00

Although section 7 has the lowest mean value as compared to the other sections, there are different opinion and perception of respondents in regards to the questions answered in section 7 namely S7\_Q53, S7\_Q54, S7\_Q55, S7\_Q56, S7\_Q57, S7\_Q58, S7\_Q59 and S7\_Q60. Table 5 is about the application on water conservation.

**Table 5:** Application on water resource conservation

No.	Questions	Mean	Standard Deviation	Median
1	S7_Q53 I reported water leakage issue in the toilet to the college management for immediate action.	4.02	0.932	4.00
2	S7_Q54 I closed the tap whenever I came across with running water (not in use).	4.37	0.799	5.00
3	S7_Q55 I give advice to my friends when they practice water-wastage.	3.85	0.984	4.00
4	S7_Q56 I support the approaches to avoid wastage of water.	4.31	0.722	4.00

5	S7_Q57 I always practice water savings in college.	4.15	0.804	4.00
6	S7_Q58 I am concerned about the level and condition of water supply in college.	4.06	0.895	4.00
7	S7_Q59 I am aware of the cause of water disturbance in college.	4.02	0.922	4.00
8	S7_Q60 I am willing to use harvested rainwater in my daily basis.	3.49	1.140	4.00

S7\_Q55 (I give advice to my friends when they practice water-wastage) has the lowest mean value which is 3.85 (standard deviation 0.984) followed by S7\_Q60 (I am willing to use harvested rainwater in my daily basis) with mean value of 3.49 (standard deviation 1.140). Both S7\_Q55 and S7\_Q60 have mean values lower than 4.00. According to a study, harvested rainwater usually used as a domestic storage for washing cars, plants watering and for laundry [5]. Their study found that most people has low willingness to use harvested rainwater for shower and cooking due to the fact that rainwater have not undergo proper treatment which can make it safe to consume. However, they also explained that the respondents are willing to use harvested rainwater for external use [5]. For example, using harvested rainwater for toilet cleaning and floor mopping. These alternatives could support the water conservation effort.

#### 4. CONCLUSIONS

This study has successfully investigated the level of awareness of Universiti Kebangsaan Malaysia's students on the importance of water resources and their water conservation practices. Section 3 on awareness level has the highest mean value of 4.4856 (standard deviation 0.6740). The mean value of section 3 explained that the awareness level of respondents on the importance to conserve water resource is high. The knowledge of water resource conservation is very high especially amongst the students in Universiti Kebangsaan Malaysia (UKM). There is positive relation to the level of awareness and the practices done to support water resource conservation.

The existing rainwater harvesting system called MyRAWAS is an innovation which could help to solve the water shortage issue at UKM that have high potential to be patent and commercialize. In addition, this pilot project gives positive impact to the society by promoting a greater awareness of the importance of freshwater as a valuable resource that need to be conserved. New scientific knowledge pertaining to the concept of sustainability and rainwater harvesting system was also gained by students and local community through campaigns and courses. The installation of the rainwater harvesting system can promote significant water saving, thus reduce water bills and demand on university's water supply by using rainwater for flushing toilets, washing clothes, watering the garden and other domestic uses.

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