A STUDY OF RESIDENTIAL WATER CONSUMPTION IN BANDAR SRI PERMAISURI, CHERAS

by

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A report submitted in fulfilment of the requirements for the degree of Bachelor of Applied Science (Sustainable Science) with Honours

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THESIS DECLARATION

I hereby declare that the work embodied in this report is the result of the original research and has not been submitted for higher degrees to any universities or institutions.

.....

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Date: 24 December 2020

I certify that the Report of this final year project entitled 'A Study of Residential Water Consumption in Bandar Sri Permaisuri, Cheras' by Maisarah binti Musa, matric number E17A0080 has been examined and all correction recommended by examiners have been done for degree of Bachelor of Applied Science (Sustainable Science) with Honours Faculty of Earth Science, University Malaysia of Kelantan.

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Supervisor

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A Study of Residential Water Consumption in Bandar Sri Permaisuri, Cheras

ABSTRACT

This study analyses residential water consumption data from Bandar Sri Permaisuri, Cheras obtained through a questionnaire-based survey. The data was analysed by simple statistical analysis and Pearson Correlation Coefficient Analysis to find out the relationship between water management and attitude and behaviour of the residents. The results indicated water consumption strongly varied in a different way among the surveyed households. Thus, by studying the water management in Bandar Sri Permaisuri, Cheras can provide an insight option for decision-makers and civil society into the patterns of residential water consumption and the potential to reduce it. Therefore, this study aims to study the attitude of the residents on consuming water in the right way. The percentage of residents that have knowledge of water management and practice it is 69.9 %. The percentage of residents that practising good attitudes in consuming water is 67.3%. There was a significantly positive relationship between water management and household size. The study also a significantly positive relationship between water management and residents' attitude towards water consumption. However, their attitudes in consuming water are lower than their management of water.

Kajian Penggunaan Air Bagi Penduduk Bandar Sri Permaisuri, Cheras

ABSTRAK

Kajian ini menganalisis maklumat berkaitan penggunaan air yang diguna oleh penduduk Bandar Sri Permaisuri yang dikaji melalui kaedah kaji selidik. Maklumat yang diperoleh telah dianalisa menggunakan kaedah penganalisa mudah dan Analisis Pekali Korelasi Pearson untuk mengkaji hubungan antara pengurusan air dan sikap dan tingkah laku penduduk. Hasilnya menunjukkan penggunaan air sangat berbeza dengan cara yang berbeza di antara isi rumah yang dikaji. Justeru, dengan mengkaji pengurusan air di Bandar Sri Permaisuri, Cheras dapat memberikan pilihan bernas bagi para pembuat keputusan dan masyarakat awam mengenai pola penggunaan air kediaman dan potensi untuk mengurangkannya. Oleh itu, kajian ini bertujuan untuk mengkaji sikap penduduk terhadap pengambilan air dengan cara yang betul. Peratusan penduduk yang mempunyai pengetahuan mengenai pengurusan air dan mempraktikkannya adalah 69.9%. Peratusan penduduk yang mengamalkan sikap baik dalam mengambil air adalah 67.3%. Terdapat hubungan positif yang signifikan antara pengurusan air dan ukuran isi rumah. Kajian ini juga menunjukkan hubungan positif antara pengurusan air dan sikap penduduk terhadap penggunaan air. Namun, sikap mereka dalam mengkonsumsi air lebih rendah daripada pengelolaan air.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

UN	United Nation
GDP	Gross Domestic Product
WHO	World Health Organization
LPD	Litre per Person per Day
GDP	Core Architecture Data Model
SPSS	Statistical Package for the Social Science
ANOVA	Analysis of Variance
SYABAS	Syarikat Bekalan Air Selangor

LIST OF SYMBOLS

α	Alpha
$>$	Greater than
$<$	Less than
$\geq$	Equal and more than
$\leq$	Equal and less than
%	Percentage
N	Frequency
N	Population size
p	Significant value
S	Sample size
n	Number of pairs of data
r	Correlation coefficient
$\sum xy$	Sum of the products of paired data
$\sum xy$	Sum of x data
$\sum y$	Sum of y data
$\sum x^2$	Sum of squared x data
$\sum y^2$	Sum of squared y data

CHAPTER 1

INTRODUCTION

1

1.1 Background of Study

Some of this century's main environmental problems are safeguarding adequate freshwater for human consumption. Water is the most dispersed commodity on our planet. Water is available everywhere, though in varying quantities, and plays a critical role in both the atmosphere and human life (On et al., 2009). Water is the human body's essential nutrient and is vital to human survival. More than 2 billion people currently lack enough water in developing nations to meet basic human needs (Girardet., 2012). Population and economic growth, including urbanization, land-use change, climate change, and pollution, could very well adversely impact earth’s future water supply, thus depriving even more people (Postel et al., 2017). Increasing the deficit, global usage of water and other natural resources per capita is increasing many times faster than the world population due to increased use in wealthy nations (Princen et al., 2003).

Water supply is never free which water must be collected, stored, treated, and distributed. That is why water is essential and the most subsidized inputs to human activity around the world. Water plays a significant part in the creation of human beings. It is a basic requirement for sustainable development and improved standards of living (Bhatti & Nasu, 2010).

Water is important for preparing foodstuffs, and food preparation requirements are included in the discussion of consumption requirements (Chang et al., 2010). Growing uses of the household consume substantial water. For one bath it can take about 30 and 40 gallons, while the average toilet uses around 5 gallons of water per flush (Dias et al., 2018). Water has many uses whether indoors or outdoors such as cooking, showering, brushing teeth, watering the lawn, and even cleaning the car and cat. The previous study stated that a person used less than 200 litres of water in a day in Malaysia in the 1970s, then the amount increased to 250 litres in the 1980s and now it is becoming more than 300 litres (Chuan, G. K., 1984). By contrast, the United Nation (U.N.) suggested water usage for Malaysia is just 200 litres (United Nation Water, 2012).

It is especially important to understand an effective used and sustainable management of water resources (Anon, 1998). So far, several studies have been performed in various parts of the world to explain how different factors affect water consumption.

Rapid urbanization and population growth creating growing demands and pressures on water supplies (Ali Hassan, 2013). In the high-demand sector, such as the Klang Valley, and specifically in Bandar Sri Permaisuri, Cheras has reached a viable limit on surface water supply production which means high demand of water

consumption in that area. Bandar Sri Permaisuri is a town located in Cheras, Kuala Lumpur and this place. Bandar Sri Permaisuri is an urban area that surrounds with housing development such as condos, apartments and terraces.

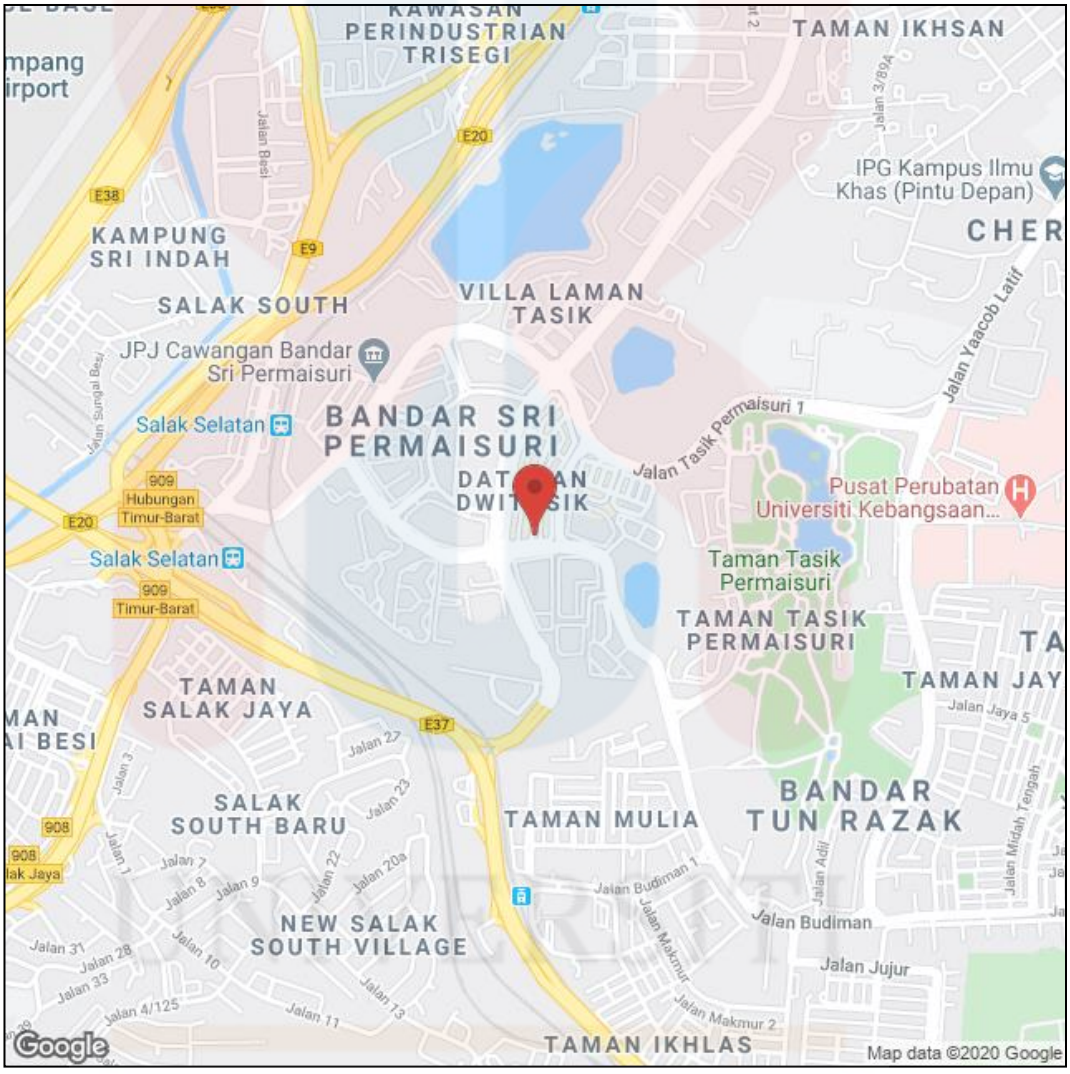

Figure 1.1 shows the map of Bandar Sri Permaisuri, Cheras, Kuala Lumpur

(Source: Google Map, 2020)

In an urban area, when there is a crisis about water shortage, the new source of water will be developed. Nevertheless, given the ever-increasing demand for water, the traditional approach is no longer sustainable. Water demand management which

emphasizes water conservation measures would be the appropriate approach (Seng et al., 2009).

Therefore, it is important to know the pattern of domestic water consumption per household in the context of environmental change. Important factors such as the number of family members and different type of house can contributing to higher levels of consumption in various states of Malaysia.

Even though sustainability has become central to urban planning in recent years, few estimates of the per capita use of water or energy by residential type have been made and policy is often shaped by the notion that broad economic, technical or regulatory measures will be effective in reducing water consumption intake maximum. The research is an attempt to understand some of the behavioural aspects of water consumption in Bandar Sri Permaisuri. It is important to know about water conservation to reduce and manage water consumption efficiently. Water conservation means efficiency in use or all measures to reduce water consumption. Level of conservation water among residents should be increased such as involving conservation water, watching documentaries, installing good and effective water-saving devices and other ways to use water more efficiently. Good and positive behavioural and attitude also help to achieve more conservation targets (Cary, 2008). This will make the goals of achieving stable and efficient water consumption in a good way. Many cities' perceptions and actions may be influenced by their predominant society, societal interaction, network infrastructure, and urban temperature trends.

1.2 Problem Statement

The planet is continuously confronted with water problems and so billions of individuals and ecosystems suffer from water deficits over the years, either periodically or indefinitely. Increasing use of water also triggered extensive growth in all sectors such as manufacturing, commercial, residential, and farming. As the population in a certain area increase, the demand for water in the area also increases. Residential sector water use is, surprisingly, the third-largest source of water. However, this case becomes worse in the urban area. It is because a lot of housing is being built in this city. Then the situation forces the inhabitants to face the water shortage to obtain adequate clean water supply to satisfy the demands of all the daily activities needed.

Based on the Water Supply & Sewerage Planning Guidelines that have been published in 2010, the number of consumers will increase as the world population growing (Supply, 2014). If the Gross Domestic Product (GDP) of population increase, water demand of the resident in the urban area also increases as well. Consumption of water increases too. Therefore, water management demands will also occur in the future and this may cause improper water management. Water will become as domestic use referring to activities of indoors and outdoors. Over-usage of water from these activities will exaggerate the actual consumption of water. As proposed by the United Nations for Universal Regulation, an individual's total water use must be just 230 litres per person a day (Union, 2010).

Residents likewise tend to use water excessively unconsciously because of inefficient water appliances. This condition arose due to lack of knowledge of water equipment while performing the outdoor or indoor activities. Their attitude and

behaviour towards conservation water are not good due to the low level of knowledge and their ego to keep on wasting their water consumption in the household. This situation will become worse if they do not have any motivation or initiative to change their behaviour and attitude.

1.3 Objectives

The objectives of this study are:

i) To identify factors that affecting consumption of water among household in Bandar Sri Permaisuri.

ii) To study attitude, behavioural and level of awareness among resident in Bandar Sri Permaisuri pertaining conservation of water.

1.4 Scope of Study

In this study, various scopes of studies will be identified. The area focuses on determining the consumption of residential water in Bandar Sri Permaisuri, Cheras zone. This research will only focus on the residential sector, primarily among households in urban areas. This study will focus on the use of household water by residents and the knowledge they used to use water for their daily routine.

The study is conducting at Bandar Sri Permaisuri, Cheras, Kuala Lumpur in coordinate (3° 5′ 54.44″ N, 101° 42′ 42.68″ E). This area was chosen because it located in the urban area that has many housing developments such as apartment, condominium and others.

The main targeted respondents to be interviewed are household or household heads. These respondents are considered mature and could take decisions on their family's behalf.

1.5 Significant of Study

The residents' awareness of water consumption is crucial as residents are knowledgeable individual that will lead the country towards water conservation in the future. In this study, residents' behaviour in managing water consumption were evaluated. The result of this study can be used by another researcher to educate the residents on consuming and managing the water. Thus, the research is significant to improve the attitude of the residents on managing water wisely.

CHAPTER 2

LITERATURE REVIEW

2.1 Water

Water is a material consisting of the chemical elements of hydrogen and oxygen and is found in gaseous, liquid and solid states (Courbebaisse, 2015). Water is one of the most vital natural resources on Earth for any life. Surface water is the principal source. That is the location where waterfalls to the ground like rain or hail. This water is extracted from a so-called special catchment area. The catchment feeds water through rivers, streams, and creeks into a holding zone. Then, the water is collected in a natural or constructed structure, called a dam or reservoir. Dams are usually situated lower end of the valley (Otaki et al., 2003).

Water is essential to human used in each aspect such as drinking, daily routine, cleaning and also for treating method. Water supply and efficiency have also played a significant role in deciding not just where people will stay but also the nature of their lives. While there has always been plenty of fresh water on Earth, it has not always been sufficient for all needs when and where it is required, nor is it always of good

quality. Water must be regarded as a finite resource which has limits and limits on its availability and suitability for use.

2.2 Water Consumption

Through the years the world is rapidly experiencing water scarcity. Most developed countries suffer from droughts because they are mostly dry in the area (Liu et al., 2016). Compounded by global climate change, population growth and changes in living standards, this poses a terrible problem within the developing world. Water shortage is an environmental challenge, but water-sufficient countries still face water pollution constraints in providing safe drinking water. While industry and agriculture account for the majority of water demand, the proportion of household consumption in developed countries for total water usage ranges from 10 % to 30% (Millock & Nauges, 2010).

Malaysia is a land of blessedness. Malaysia receives plenty of rainfall annually and Malaysia is rich in water resources. 97% of Malaysia's water supplies are surface water and another 3% is groundwater. Malaysia has a total coastline of 4809 km and the coastline has been classified into management units for management and monitoring purposes.

Ali said that Malaysia is blessed with plenty of rainfall that has led to an abundance of water supplies, but inadequate management of water use and corruption have led to water crises that have caused hardship (Ali, 2013). Malaysia received rainfall estimated at around 2500 mm annum especially during the rainy season. Bengtsson stated that water consumption will rise in proportion to GDP growth per capita (Bengtsson et al., 2005). With economic growth rising in developing countries,

water consumption in residential areas will soon increase, and water consumption patterns will change significantly.

2.3 Residential Water Consumption

In its Recommendations for Drinking-Water Safety, the World Health Organization (WHO) defines domestic water as 'water used for all usual domestic purposes, including eating, washing and preparing food.' (Howard & Bartram, 2003). This means that water adequacy criteria extend to all these uses, not just for water use.

The definition of "affordances" incorporates the notion that individuals can in certain respects interpret the value of an entity in their world (Kurz, 2002). In addition to satisfying critical needs, water allows for the enjoyment of operating a safe, pleasant, and recreational-centred home that offers clear social status indicators. In choosing to reside in big houses with high profiles of water use, citizens disclose that they are accustomed to the affordance of water as a good that helps them to maintain a desirable lifestyle. Fewer of those citizens are attuned to the affordance of water as important, limited natural heritage. While many aspire to residential lifestyles that are high in water, wealthier households can afford this desire to act upon.

2.3.1 Indoors Use

For developing nations, roughly half of all domestic water is used indoors and half outdoors, while outdoor usage may account for as much as two-thirds of overall use in warmer climates (Mayer et al., 1999). The U.S. Energy Policy Act of 1992 set water quality requirements for indoor plumbing appliances produced after January 31, 1994, resulting in substantial water savings in newly constructed homes (Racoviceanu & Karney, 2010). Regardless of the form of accommodation, use of indoor water was shown to be constant through seasonal fluctuations and different socioeconomic classes. The variations in internal water consumption often depend on the size of the household and the ownership of the appliances (R. Willis et al., 2009). Therefore, the household scale may often be a significant factor in the calculation of demand, as such economies of production are always difficult to reach in smaller. About all houses had a tub, refrigerator, kitchen sink, toilet, bathrooms such as dishwashers (49%), numerous showers (43%), and washbasins (42%). In average, the flats had smaller space and facilities relative to the homes, which meant they had fewer showers, toilets and different laundries.

However, the total size of new single-family homes grew by 57% between 1970 and 2004 and the proportion of three or more bathrooms rose by almost 0 to 24% (Public Affairs National Association of Home Builders, 2001). The rise in size may have reversed the flexibility obtained by regulatory change and tended to improve over time water use since larger households have multiple incentives for further water usage (Hanak & Browne, 2006). With indoor equipment progressively water-intensive, the biggest scope for this residential management measures is considered to be growing the usage of freshwater (Tinker et al., 2005).

2.3.2 Outdoors Use

Usually, around 40 per cent of household water is consumed outside. Outdoor use is taken as the sum allocated to irrigation and swimming pools for the logged user. Outdoor use shows a relatively strong and positive connection to home square footage. Water features are trendy amenities for landscaping in cities and famous for water recreation. For a fact, the backyard swimming pools provide artistic and therapeutic water sources. The amount of water used for outdoor purposes (primarily irrigation) is, as expected, positively related to the size for the lot and the amount of the lot which is irrigable. For most landscapes, lawns use up to 90 per cent of water and much of the electricity. Lawns need mowing, weeding, edging, and fertilizing, and fuel and maintenance are needed for the machines.

2.3.3 Global Residential Water Consumption

There are no studies or statistical analyses in Portugal that characterize household consumption patterns, although this can be calculated approximately considering the capacity of water-consuming devices. A single-family can have the highest use of domestic water in Portugal. The percentage for single-family is 32% and cisterns are 27%. In the case of multi-family housing, the external use of water is extremely higher than single-family which increases to 68%. Around 96% of its available water is used for agriculture in Pakistan, and the remaining 4% for domestic, industrial, and other purposes. Water per capita accessibility has decreased from 5260 m^3 in 1951 to 1050 m^3 by 2010, placing Pakistan in the high-water stress nation band.

2.3.4 Local Residential Water Consumption

Consumption of water in Greater Kuala Lumpur for toilets and washing plates Lumpur is significantly higher than Thailand. This disparity may be attributed to the supply of water to customers in Malaysia (15.285 million litres of water a day in 2010). Use a low showerhead can save up to 8194 litres (33 per cent) of water when using a dual flush toilet machine will save up to 3525 litres (29 per cent) of water. However, 2240 litres (36%) of water consumption can be reduced by changes in behaviour, such as stopping teeth from running then wash your hand with soap (Bari et al., 2015).

Table 2 shows the distribution of daily average consumptions.

Use	Consumption (L/capita/day)			
	Multifamily House		Single-family House	
Cistern/Toilet	43	31%	43	27%
Taps	22	16%	22	14%
Bath/Shower	52	37%	52	32%
Washing Machine	13	9%	13	8%
Dishwashing Machine	3	2%	3	2%
Leaks	7	5%	7	4%
External Use	-	-	20	13%

(Source: Peter et al., 2015)

Water demand in Malaysia increased as well as the level of development growing. This serves as a benefit that the water needed for everyday usage was rendered readily accessible to all residents through the piped supply (Bari et al., 2015). In 2013, Malaysians averaged 210 litres of water per day, meanwhile in 2014, the average consumption of the water increased by 2 litres. This means 212 litres or around 141 1.5 litre bottles per person per day. Just 30 per cent of water use is used for actual use such as cooking and drinking, while the rest is used mainly for services such as washing vehicle, pets, and clothes.

The study has been done by (Alwi et al., 2012) had shown that use of water for domestic purpose increase from 200 (1970's) to 250 (1980's) which quantity is per capita per day. It becomes worst because it happened in the urban area where the exact average for a person is about 500 litres per person per day (LPD). The average person used should be only 230 LPD, if compare to the use of water for International Standard that recommended by the United Nations (Goh Kim Chuan, 1984). Consumption is still far beyond the World Health Organization (WHO) recommended water use, which is 165 litres per day (Weng, 2010). Penang had reported the highest water consumption per day in 2013 at 296 litres, according to the Malaysian Water Industry Guide 2014. Meanwhile Sabah is the state with the lowest water intake per day which is 109 litres (Hui et al., 2013).

2.4 Behavioural Responses to Water Conservation

'Understanding the pattern of water use is overly critical for effective and sustainable use of water supplies. Water consumption patterns are usually dependent on the socio-economic of the area and climatic factors (Gato-Trinidad et al., 2011). So far there have been researches in the various country of the world to explain how various factors affect consumption of the water. Besides, several effective water management strategies and guidelines are adopted to ensure urban water supply is safe.

Notably, programs in water demand management (WDM) are used to aid change consumers to have behaviour towards sustainable water consumption. WDM is described as 'convenient creation and implementation' strategies to control production (Savenije & Van Der Zaag, 2002). This is defined by a decrease in total water use to ensure the tool is used safely and sustainably (Brooks, 2006).

Habits are also used in this analysis as determinants of water management behaviour and behaviour. Habits can be described as relatively stable habits of behaviour, which in the past have been reinforced. Habit carried out without any careful thought and are the product of unconscious processes, as opposed to guided processes such as rational decisions (Wolters, 2014).

In Saudi Arabia, water consumption reduced by public education by 5-20%. Other determinants of the conservation and consumption of household water are climatic factors such as temperature and precipitation, household demographics such as family size and resident age, free conservation programs and policies. However, it is difficult to achieve water conservation goals and difficult to propose effective conservation practices. Factors such as lack of information and knowledge, resident unwilling to change their behaviour and low perceive the value of water might affect the attitude of people toward water conservation (Bouwer, 1988).

Consequently, simplistic methods and simplifying conclusions are frequently taken when pursuing the behavioural reform which used to minimize the water use. However, it is important to keep in mind the key influencing aspects that can be used to affect behavioural changes in household water usage. The centrality and difficulty of evolving, frequently shifting perceptions of usual actions regarding the use of household water cannot be overlooked (Dupont & Renzetti, 2013). It is important not to ignore the internal and external factors which influence the consumption of household water. Behaviours do not exist in isolation. They are affected by influences like the beliefs of a person, expected benefits and to the expectations of other people. The social context in which behaviour in water conservation occurs includes social norms and expectations regarding domestic water use, cultural mores including water

scarcity, public duty and societal stability, social behaviours and convictions (Wolters, 2014).

The differences in water conservation practices between different consumer groups are very complicated due to their varieties patterns of water use, opinion and attitude towards water consumption (Wang & Dong, 2017). This research will be conducted to understand how different consumption contributes to these water conservation effects, what the contribution of attitude and behaviour of residents' factors on these impacts and also how they play out their important roles across the area.

The average water use of Malaysians per person is over 200 litres per day which are among the region's highest. The inefficient use of water among the citizens over and above the massive population has resulted in a tremendous demand for water, which stresses the water supply available. In addition to having the expertise and skills to take the required steps, improving the way Malaysian think about and manage their water consumption is a crucial step in helping to ensure water protection for the country. Recycling water method can be used to reduce water consumption and also on saving water.

Change in water management, though, has been with the implementation of water quality legislative and reward systems. Institutional change may help the residents to achieve a program of water conservation such as installing new water-saving devices have become regulatory in each home (Goette et al., 2019).

2.4.1 Barriers to Household Water Conservation

One of the key barriers that may prevent the translation into outcomes of an individual's intentions is that the use of household water is a collective behaviour involving water using multiple household members' actions. If a person is committed to water conservation, unless other household members are committed similarly, the attitudes of that individual are unlikely to result in reduced use of household water (Addo et al., 2018). Thus, household dynamics may play an important part in requesting residential water. In line with this view, experiments presented by the expected action hypothesis suggest that expectations for water management are stronger as individuals experience emotional encouragement from significant others (Clark & Finley, 2007).

Another barrier which might inhibit the translation of intentions into actions is the household members' water-using habits (Fielding et al., 2012). There is awareness within the psychological literature that action is not necessarily fair and reasonable but is often driven by unconscious behaviours or routines (Steg & Vlek, 2009) that can be described as automatic tendencies of behaviour that occur as a result of repeated actions and practice in similar situations (Ouellette & Wood, 1998). As people, they just can develop and improve positive water use habits such as turning off taps when brushing teeth and they may also be prone to negative habits such as taking long showers which, when repeated over time might give impact on the amount of water used in the household.

2.5 Role of Community Norms and Attitudes to Water Usage and Water Saving in the Home

Human environmental perceptions are often commonly researched in ecological psychology, but their results are still low on forecasting environmentally friendly activities (Kurz, 2002). This may be because of behaviour which typically will measure tap broad environmental views or attitudes towards a very specific behaviour such as recycling water used. Environmental attitudes may be better predictors of activities, such as water and energy management, renewable transactions or soil protection if environmental attitudes and behaviours are assessed at the correct precision and situational levels (Victor Corral-Verdugo et al., 2002).

An attitude is an arrangement of the emotion of a person and patterns of behaviour. Attitude refers to self-interest towards something (Bohner & Dickel, 2011). Meanwhile, behavioural means an action to respond to an event or internal stimuli. Behaviours usually reflect on the attitude of someone (Gilbertson et al., 2011). Thus, behaviours play important roles to become a positive or negative attitude.

Conservation psychology, human environmental perceptions are often examined even though their impact on forecasting environmentally sustainable activities are still low. That may be part of the mind-set usually, interventions target general environmental values or behaviours about a very particular activity for example is recycling water (Mainieri et al., 1997). Environmental attitudes may be better predictors of activities, such as water and energy management, eco recruitment or soil conservation if environmental attitudes and behaviours are assessed at the correct precision and situational criteria (Víctor Corral-Verdugo et al., 2003).

For the summary, individuals with deeper moral attitudes regarding their cultures outlooks for their homes can drink less water net of other factors. Group mediating capacity because the connection between affluence and income is

questionable in different studies, indicators of community sentiment were weakly positive, null, or even negative (Guest et al., 2006). Environmental attitudes should, however, mediate the effect of income on consumption since the pro-environmental constituency has traditionally been the wealthy and educated public.

Attitudes and behaviours towards water use can vary from individual to individual, from the community to community, from business to business and from one point to another (Jiang et al., 2016). Particularly education is seen as essential to changing behaviour, especially among younger age groups, because of the belief that environmentally friendly behaviours can be more effectively integrated into these groups (Gilg & Barr, 2006). Jennett's research on fostering environmental consciousness through positive interactions shows that interactivity is crucial to motivating more candidates to engage in a questionnaire and think carefully about their attitude and behaviour using Squeezy Green Balls (Jennett et al., 2016).

Attitude and behavioural help to achieve water conservation targets (Keshavarzi et al., 2006). Positive and negative attitude serve as predictors of attempts to conserve the resource of water. This positive attitude more related to self-conservation behaviour and act as significant motivational force especially on protecting the water. Residents can change their habits by replacing existing water devices to use water more wisely (Bouwer, 1988). Other behavioural changes in indoor water consumption are reduce using of dishwaters by washing them when the sink is full of plates. (Russell & Knoeri, 2019).

When people considering the importance of water for survival and the attitude toward environments and this specific measure that related to the water issues are the most important in predicting water conservation in residential housing (Ramsey et al.,

2017). Negative and positive attitude enhance the environmental behaviour under normative criteria (Willis., et al., 2011). For example, negative attitude associated with hate that particularly found in a risk situation, for example, is using water improperly will be resulted in reactive action (e.g., use the water when needed) and in proactive action (e.g., participate in water reuse programs and follow proper ways on saving water that has been suggested by WHO). On other hand, a positive attitude will contribute to great environmental actions. This mechanism might explain the relationship between attitude and environmental engagement.

This study, questionnaires are using to investigate the water use pattern, opinion, and attitude of the residential in Bandar Sri Permaisuri, Cheras towards water conservation among different consumer groups. The survey is distributing into 380 residents in Bandar Sri Permaisuri, Cheras.

20

CHAPTER 3

MATERIALS AND METHODS

3.1 Site Description

Bandar Sri Permaisuri is a township in Cheras, Kuala Lumpur, Malaysia. It is located in the south of Kuala Lumpur. It is located near Bandar Tun Razak and Salak South. The major types of housing there are apartments and condominiums.

3.2 Sample Size Determination

Krejcie and Morgan (Januszyk et al., 2011) used to determine the sample size that representative as the population of the Krejcie and Morgan's sample calculation. The population of the household was 2130. Table 3.1, the sample size is between 2000 and 2200. Thus, the chosen sample size was 326.

Table 3.1 shows Krejcie and Morgan's table

N	*S*	*N*	*S*	*N*	*S*	*N*	*S*	*N*	*S*	*N*	*S*
10	10	85	70	220	140	440	205	1200	291	4000	351
15	14	90	73	230	144	460	210	1300	297	45000	354
20	19	95	76	240	148	480	214	1400	302	5000	357
25	24	100	80	250	152	500	217	1500	306	6000	361
30	28	110	86	260	155	550	226	1600	310	7000	364
35	32	120	92	270	159	600	234	1700	313	8000	367
40	36	130	97	280	162	650	242	1800	317	9000	368
45	40	140	103	290	165	700	248	1900	320	10000	370
50	44	150	108	300	169	750	254	2000	322	15000	375
55	48	160	113	320	175	800	260	2200	327	20000	377
60	52	170	118	340	181	850	265	2400	331	30000	379
65	56	180	123	360	186	900	269	2600	335	40000	380
70	59	190	127	380	191	950	274	2800	338	50000	381
75	63	200	132	400	196	1000	278	3000	341	75000	382
80	66	210	136	420	201	1100	285	3500	346	1000000	384

Note: *N* is for population size, S is a sample size *(*Source*:* Krejcie & Morgan, 1970*).*

3.3 Pilot Test and Survey

This study used a survey method by using a questionnaire to obtain on water management and attitude or behaviour of the residents on water consumption. The pilot study has been used for 30 respondents that were picked randomly (Troy & Holloway, 2004) to analyse the reliability of the survey provided. The question might be changing into something that even better if the question of the survey is not reliable. The survey question was responded by 326 residents of household in Bandar Sri Permaisuri.

3.4 Questionnaire Design

The survey was conducted from July to August 2020. A well-designed questionnaire was used in collecting the data. The questionnaire consists of Section A for demographic information which includes age, type of house respondents living in,

number of family members, occupation and marital status. The next two sections are for the collection of data that needed to achieve the objective and each of the section consists of 12 questions based on a Likert scale from 1 to 5. Section B consists of questions on respondents' knowledge of water management. Section C consists of questions on the behaviour and attitudes of the household on water consumption. The data were collected by distributing the google form to the residents of Bandar Sri Permaisuri has been answered within a week.

3.5 Content Validation

The purpose of the questionnaire validation is to review the questionnaire to determine whether the questionnaire measures the objective and address the overall topic (Verial, 2019). In this study, the questionnaire was validated by the expert which is my final year report supervisor. The validated questionnaire then was used in this study for a pilot study.

3.6 Pilot Test

Cronbach's alpha is a measure of the internal consistency or reliability between several items, measurements, or ratings (Brown, 2002). In other words, it estimates the reliability of the questionnaire (or questionnaire domain) answers, the instrumentation or ranking measured by subjects to show the stability of the instruments. The purposes of conducting the pilot study are to determine whether the respondents can understand the questions and whether the question complies with the objective (Bujang et al., 2018). Every research has flawed and reassessing the instruments and participants are required (Hassan et.al, 2006). The pilot study is crucial as it helps in identifying the problem and imperfection. The pilot test was carried out in September 2020 before

distributing the actual questionnaire. The sample size for the pilot study was 10 % of the sample size (Connelly, 2008). In this study, 30 questionnaires were distributed for the pilot test. The reliability or internal consistency of the questionnaire were tested by Cronbach' Alpha.

Cronbach 'Alpha shows the internal consistency of a test by a number between 0 to 1(Tavakol & Dennick, 2011). The acceptable internal consistency for Cronbach's Alpha is between 0.7 and 0.8 (Sham et al., 1986). The Cronbach Alpha Value for this project are 0.733, 0.739 and 0.697 according to demographic information (section A), water management (section B) and behaviour and attitude of household on water consumption (section C) respectively shown in Table 3.3. Questions that below acceptable internal consistency were removed. The finalize questionnaire then was used for data collection. The result has shown that questionnaire was reliable and consistency. A generally accepted rule is that α of 0.6-0.7 indicates an acceptable level of reliability, and 0.8 or greater than that is very good. However, higher values than 0.95 are not necessarily good, since the value might be an indication of redundancy (Ursachi et al., 2015).

24

Table 3.2: The result of Cronbach's Alpha test for Section A, Section B and Section C

Section	Reliability Statistics			
	Cronbach's Alpha	**Cronbach's Alpha Based on Standardized Items**	**N of Items**	**Internal Consistency**
A	0.733	0.745	5	Good
B	0.739	0.786	12	Good
C	0.697	0.715	13	Acceptable

3.7 Normality Test

The purpose of the questionnaire validation is to review the questionnaire to determine whether the questionnaire measures the objective and address the overall topic (Verial, 2019). In this study, the questionnaire was validated by the expert which is my final year report supervisor. The validated questionnaire then was used in this study for the pilot study.

Table 3.3: Normality test for Water Management based on the type of house

What kind of house are you living in?	Kolmogorov-Smirnov			Shapiro-Wilk		
Apartment	0.98	228	0.000	0.944	228	0.000
Condominium	0.151	66	0.001	0.939	66	0.003
Double-storey house	0.313	11	0.003	0.695	11	0.000
Other	0.106	21	0.200	0.972	21	0.779

Table 3.4: Normality test for Water Management based on number of family members

Please state the number of your family member. (including you)	Kolmogorov-Smirnov			Shapiro-Wilk		
< less than 5 people	0.204	188	0.000	0.903	188	0.000
5 to 8 people	0.156	125	0.000	0.940	125	0.000
8 to 10 people	0.189	11	0.200	0.939	11	0.508
>10 people	0	0	0	0	0	0

3.8 Data Analysis

The data from the questionnaire were analysed using Analysis of Variance (ANOVA) and Pearson's correlation analysis using SPSS software.

3.8.1 Level of Dependent Variable

The level of dependent variables such as Water Management and Behaviour and Attitude of Household on Water Consumption of residents that participate in this Final Year Project.

The level of Water Management and Behaviour and Attitude of Household on Water Consumption of residents were determined by a 5-point scale which is point 1-2 are disagree, point 3 is neutral and 4-5 agrees. These were used in understanding the level of water management and the level of behaviour and attitude of household on water consumption of residents based on the type of houses and the number of family members. There was a very simple calculation that has been done to determine the level of Water Management and the level of Behaviour and Attitude of Household on Water Consumption of residents in Bandar Sri Permaisuri. The mean for level can be found by using the formula as in Eq. (3.1)

$$\frac{\text{mean of variable's items}}{\text{a sum of items scale}} \text{ x } 5 \qquad (3.1)$$

Table 3.5: Scale for the level of water management based on the type of house

1	Low
2	
3	Moderate
4	High
5	

3.8.2 Analysis of Variance (ANOVA)

ANOVA was used in various study to determine the differences between more than two means of data (Kim, 2014). One-way ANOVA is used for one categorical independent variable (Scofield, 2018). In this study, one-way ANOVA was used to compare the mean differences in water management and attitude or behaviour of the resident on consuming water based on the type of house and the number of family members. The ANOVA method compared the relative size of variance among means of the type of house to the average variance within the type of house (Kim, 2014).

3.8.3 Pearson's Correlation Analysis

The relationships between water consumption of residents in Bandar Sri Permaisuri, attitude, behavioural and level of awareness among resident in Bandar Sri Permaisuri pertaining conservation of water were determined using Pearson's correlation. The strength of the relationship was shown by its correlation coefficient, r. The value of correlation coefficient starts from -1 to 1. Zero correlation confidence represent no relationship between the two data. Strong positive relationship will be shown by r = 0.7 and perfect correlation by r = 1 (Taylor, 1990).

Based on the result, the correlation between water management of residents in Bandar Sri Permaisuri, attitude, behavioural and level of awareness among resident in Bandar Sri Permaisuri pertaining conservation of water were determined. The formula for the correlation coefficient, *r* as in Eq (3.2)

$$r = \frac{n\,(\Sigma xy) - (\sum x)\,(\sum y)}{\sqrt{[\,n\sum x^2 - (\sum x)^2\,]\,[\,n\sum y^2 - (\sum y)^2\,]}} \qquad (3.2)$$

Where,

n = number of pairs data

∑xy = sum of the products of paired data

∑xy = sum of x data

∑y = sum of y data

$\sum x^2$ = sum of squared x data

$\sum y^2$ = sum of squared y data

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

Parameters that have been used for demographic data are age, type of house, number of family members, occupation, and also marital status.

4.2 Demographic Information

Table 4.1 presents the results of the respondents' demographic information. The respondents were heads of the in Bandar Sri Permaisuri, Cheras Kuala Lumpur. Most of them (37.7%) was the 40s, where the age group mean was 40s years old and followed by 20s (27.3%), 50s (20.9%) and 30s (14.1%). The present study found that the type of house mostly obtained for a living (69.9%) as their highest is an apartment, followed by a condominium (20.2%), others (6.4%) and double-storey house (3.4%).

Meanwhile, the household size ranged from one to ten members, with a mean of fewer than five people for the whole sample. A majority of 326 respondents (41.7%) were government servants, private sectors (25.8%), not working at all (24.5%), and others (8%). 75.5% of residents of Bandar Sri Permaisuri with jobs had less than 10

family members in a house. A majority of the respondents (62.9%) are married. Another 27.3% are singles. 5.8% and 4.0% are widowed and divorced, respectively.

Table 4.1: Descriptive statistics for respondents, n= 326

Demographic Characteristics	Frequency	Percentage (%)	Mean	Standard Deviation
Age				
20s	89	27.3		
30s	46	14.1		
40s	123	37.7	2.52	1.103
50s	68	20.9		
What kind of house are you living in?				
Apartment	228	69.9	1.46	0.840
Condominium	66	20.2		
Double-storey house	11	3.4		
Other	21	6.4		
Please state the number of your family members. (including you)				
< 5 people	189	58.0	1.45	0.562
5-8 people	126	38.7		
8-10 people	11	3.4		
> 10 people	0	0		
Occupation				
Government servant	136	41.7	1.99	0.992
Private sector servant	84	25.8		
Not working	80	24.5		
Other	26	8.0		
Marital status				
Married	205	62.9	1,53	0.825
Single	89	27.3		
Divorced	13	4.0		
Widowed	19	5.8		

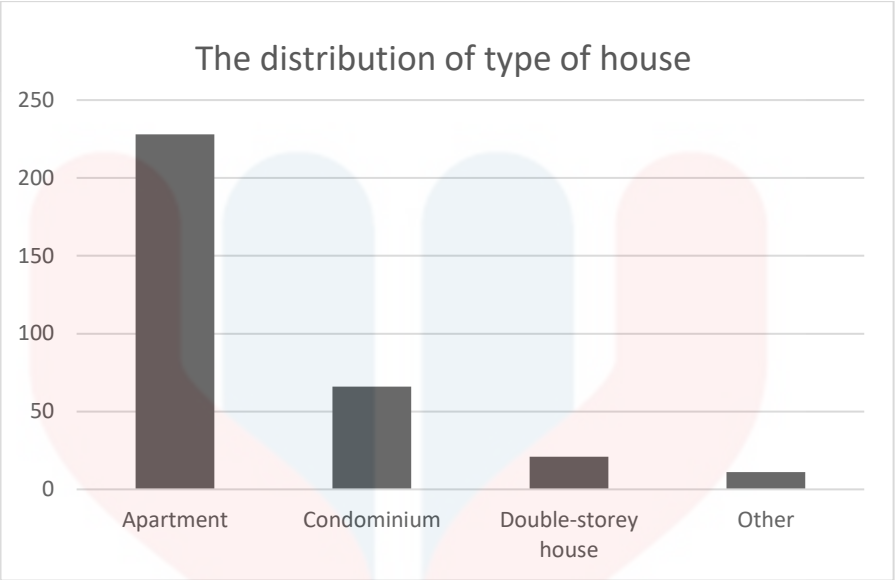

Figure 4.1: The distribution of the type of house

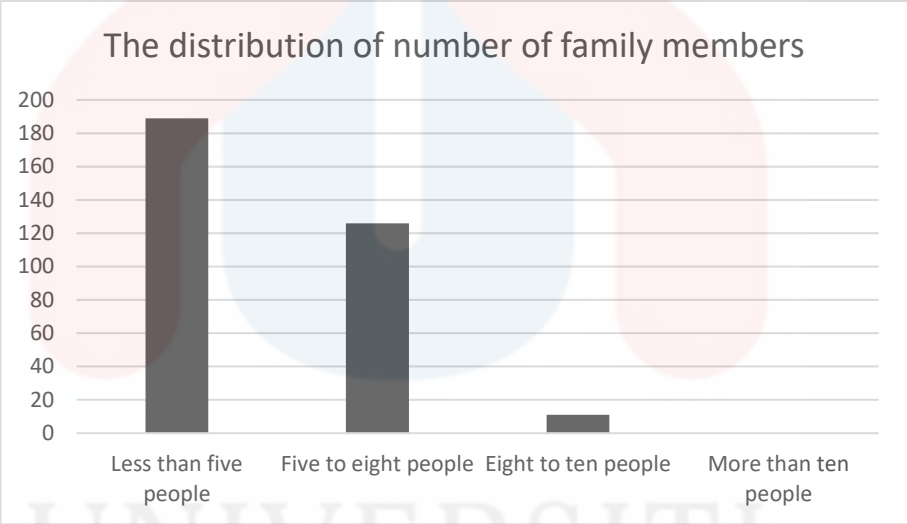

Figure 4.2: The distribution of the number of family members

4.3 Water Management

About 69.99 % showed positives feedback on water management in Bandar Sri Permaisuri with 59 respondents agreed that they used tap water as a source to get water and 65 respondents mentioned that they used water frequently (Table 4.2). According to Table 4.2, 103 respondents agreed that they used washing machine not more than and meanwhile, 105 respondents agreed about the statement given. From the result

obtained, 102 respondents agreed that they used more than 10 minutes for a shower in their home while 65 respondents agreed with that. There were 190 of respondents were agreed that their family practised water management in the household. 247 respondents also think that it is important to be exposed to water management. 215 of the respondents disagree about the statement of they do not care about water management, meanwhile, there were 7 respondents agreed that they do not care about water management. According to the Table 4.2, 231 of the respondents of Bandar Sri Permaisuri agreed to think that it is important to be exposed to water management meanwhile only one of the respondents have not disagreed about the statement.

Only 45 respondents have the range cost of their water bills are less than RM50 per month. According to Table 4.2, there were 196 of the respondents tried to manage their water consumption more wisely to reduce their water bills for the upcoming month if the current water bill too costly. From that, they have the initiative to reduce their consumption from waste.

The variations in the overall knowledge-based on types of house and number of a family member were examined. A one-way between subjects' ANOVA was conducted to compare water consumption in types of house and number of family members.

Table 4.2: Water management

Note: *n*: 326, Std. Deviation: 4.43, Percentage: 69.9%

Water Management	**Strongly disagree**		**Disagree**		**Neutral**		**Agree**		**Totally Agree**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
I use tap water as a source to get water.	2	0.6	2	0.6	20	6.1	59	18.1	243	74.5
I use water very frequently.	1	0.3	1	0.3	18	5.5	65	19.9	241	73.9
I am not using my washing machine more than three times a day.	43	13.2	28	8.6	47	14.4	105	32.2	103	31.6
I use more than 10 minutes for a shower.	13	4	20	6.1	126	38.7	102	31.3	65	19.9
My family and I are practising water management in the household.	3	0.9	4	1.2	61	18.7	68	20.9	190	58.3
I think it is important to practice water management effectively.	1	0.3	1	0.3	24	7.4	53	16.3	247	75.8
I do not care about water management.	215	55	46	14.1	37	11.3	21	6.4	7	2.1
I think that it is important to be exposed to water management.	1	0.3	6	1.8	28	8.6	60	18.4	231	70.9
The range cost of my water bill is more than RM 50 per month.	17	5.2	28	8.6	127	39	93	28.5	61	18.7
I try to manage my water consumption more wisely to reduce my water bill for the upcoming month if the current bill too costly due to my high consumption.	2	0.6	6	1.8	47	14.4	75	23	196	60.1
I do not think it is my responsibility to reduce the cost of water bills.	196	60.1	48	14.7	27	8.3	40	12.3	15	4.6
I know my effort in managing water consumption is effective when my water bill costs lower than my last bill.	1	0.3	2	0.6	33	10.1	79	24.2	211	64.7

4.3.1 Level of Water Management

4.3.1.1 The Type of House

The calculation to determine the level of water management was done and the result shows that the level of water management based on the type of house which is apartment is 3.82 and it is means moderate (yellow colour). The mean for a condominium is 3.91, meanwhile the means for a double-storey house and other are 3.89 and 3.69, respectively. According to the scale Table 3.5, the level of the water management for condominium, double-storey house and others are moderate which are in yellow. among Bandar Sri Permaisuri's residents is at category moderate which in yellow colour.

4.3.1.2 The Number of Family Members

The calculation to determine the level of water management was done and the result shows that the level of water management based on the number of family members which is less than five people is 3.83 which means moderate (yellow colour). The mean for five to eight people is 3.82, meanwhile, the means for eight to ten people and more than ten people are 4.05 and 0, respectively. According to the scale Table 3.4, the level of the water management for a household that has five to eight people is moderate which is in yellow. The mean for eight to ten people is high which is in green colour and meanwhile, the mean for the household that has more than ten people is low which is in red.

Table 4.3: Level of water management based on the type of house

Water management	Mean
Apartment	3.82
Condominium	3.91
Double-storey house	3.89
Other	3.69

Table 4.4: Level of water management based on the number of family members

Water Management	Mean
< 5 people	3.83
5 to 8 people	3.82
8 to 10 people	4.05
>10 people	0

A one-way between subjects' ANOVA was conducted to compare the water management based on the type of house. The findings showed that the type of house in Table 4.5 was significantly differenced with p = 0.050. The result is significant because its p-value is equal to 0.05.

4.3.2 ANOVA of Water Management

Table 4.5: ANOVA of water management based on the type of house.

Factor		N	Mean	Std. Deviation	F	Sign. (p-value)
Type of house	Apartment	228	45.85	3.98	2.63	0.050
	Condominium	66	46.94	3.67		
	Double-storey house	11	46.73	3.35		
	Others	21	44.24	6.74		
	Total	326	45.69			

According to Table 4.6, the findings for the number of family members showed that the result was a significant difference with p = 0.001 and it has a smaller number than 0.05.

Table 4.6: ANOVA of water management based on the number of family members.

Factor		N	Mean	Std. Deviation	F	Sign. (*p*-value)
Number of family members	Less than five people	189	45.95	3.58	2.35	0.001
	Five to eight people	126	45.83	4.61		
	Eight to ten people	11	48.64	7.02		
	More than ten people	0	0	0		
	Total	326	45.69			

4.4 Behaviour and Attitude of Household on Water Consumption

Based on Table 4.7, about 235 respondents strongly disagreed that they did not always turn off the tap after using it meanwhile only 33 respondents disagreed. This shown that Bandar Sri Permaisuri's residents concern on managing water wisely. While the environmental concern is 'an important indirect determinant of specific environmental behaviour' (Fransson & Garling, 1999) future research should consider a broader spectrum of attitudes toward behaviours themselves. (Fransson & Garling, 1999) suggest that 'habit, norms, and situational constraints are all factors that influence behaviour' and that the findings may be both self-identified and likely more closely linked to values or utilitarian outcomes (Randolph & Troy, 2008).

Most respondents which are 238 respondents put water in a container to wash cooking ingredients such as chicken, vegetable, fishes and fruits rather than washing them directly from the flowing tap water to reduce water consumption. 191

respondents of Bandar Sri Permaisuri often talk about a plan on saving clean water for the future purpose in case of the water shortage happen once again (Table 4.7). This attitude helps in reducing the demand for water consumption in that area. Most of the residents willingly to report to the authorities if there is any water shortage happening in their residents. This responsibility is good for everyone so that the residents can consume back the water in a short time. However, only 175 respondents knew that Bandar Sri Permaisuri often face water shortage and the majority of them which are 191 respondents know the latest water shortage last up to two days. 257 of the respondents use mineral water that they bought from the nearest supermarket as their temporary source of water if there is a water shortage.

Majority of the residents in Bandar Sri Permaisuri used various size and type of containers such as basin and tanks to store the water that has been supplied by the Syarikat Bekalan Air Selangor (SYABAS) when the water shortage happens. They also store the water just in case for future use even though if the water shortage has been recovered. Most of them also are thankful that they always have enough water supplies and they will always be thankful for having endless water supplies before losing it.

The variations in the overall attitudes based on the type of house and the number of family members were examined. A one-way between subjects' ANOVA was conducted to compare the attitude of the residents based on the type of house and family members in Table 4.10 and Table 4.11.

Table 4.7: Behaviour and attitudes of consuming water

	N	%	N	%	N	%	N	%	N	%
I do not always turn off the tap after I use it.	235	72.1	38	11.7	20	6.1	19	5.8	14	4.3
I put water in a container to wash cooking ingredients rather than washing them directly from flowing tap water in order to reduce water consumption.	23	7.1	18	5.5	51	15.6	68	20.9	166	50.9
My family and I do not often talk about a plan on saving clean water for future purpose in case of water shortage happen.	150	46	41	12.6	69	21.2	48	14.7	18	5.5
Everyone in my house should manage water consumption together.	0	0	4	1.2	30	9.2	64	19.6	228	69.9
I will report to the authorities if there is any water shortage happening in my residents.	0	0	12	3.7	44	13.5	79	24.2	191	58.6
Does Bandar Sri Permaisuri often face water shortage?	13	4	34	10.4	104	31.9	132	40.5	43	13.2
Are the latest water shortage lasts up to two days?	21	6.4	35	10.7	79	24.2	116	35.6	75	23
I use mineral water that I buy from the supermarket as my temporary source of water if the water shortage happens.	14	4.3	11	3.4	44	13.5	61	18.7	196	60.1
I use basin, tank, and various size of containers to store the water that is supplied by SYABAS when water shortage happens.	4	1.2	5	1.5	22	6.8	67	20.7	226	69.8
I will still store the water just in case for the future use even though if the water shortage has recovered to my high consumption.	5	1.5	10	3.1	37	11.3	71	21.8	203	62.3

Table 4.7 (continued)

I am thankful that I always have enough water supplies.	1	0.3	3	0.9	25	7.7	57	17.5	240	73.6
I am not going to be thankful for having endless water supplies only before losing it.	182	55.8	27	8.3	60	18.4	35	10.7	22	6.7

4.4.1 Level of Behaviour and Attitude of household on water consumption

4.4.1.1 The Type of House

The calculation to determine the level of behaviour and attitude of household on water consumption was done and the result shows that the level of behaviour and attitude of household on water consumption based on the type of house for the apartment is 3.64. The means for condominium, double-storey house and others are 3.72, 3.73 and 3.44, respectively. According to the scale Table 3.4, that the level of behaviour and attitude of household on water consumption for condominium, double-storey house and others are moderate which is in yellow.

4.4.1.2 The Number of Family Members

The calculation to determine the level of water management was done and the result shows that that the level of behaviour and attitude of household on water consumption based on the number of family members which is less than five people is 3.68 which means moderate (yellow colour). The mean for five to eight people is 3.59 and that is mean moderate too. Meanwhile, the means for eight to ten people and more than ten people are 3.63 and 0, respectively. According to the scale Table 3.4, the mean for eight to ten people is high which is in green colour and meanwhile, the mean for the household that has more than ten people been low which is in red.

Table 4.8: Level of behaviour and attitude of household on water consumption based on the type of house

Behaviour and Attitude of Household on Water Consumption	Mean
Apartment	3.64
Condominium	3.72
Double-storey house	3.73
Other	3.44

Table 4.9: Level of behaviour and attitude of household on water consumption based on the number of family members

Behaviour and Attitude of Household on Water Consumption	Mean
< 5 people	3.68
5 to 8 people	3.59
8 to 10 people	3.63
>10 people	0

A one-way between subjects' ANOVA was conducted to compare the behaviour or attitude of the household on water consumption based on the type of house. The findings showed that the type of house in Table 4.10 was significantly difference with $p = 0.021$. The result is significant because its p-value is less than 0.05.

Table 4.10: ANOVA of behaviour or attitude of household on water consumption based on the type of house

Factor		N	Mean	Std. Deviation	F	Sign. (*p*-value)
Type of House	Apartment	228	43.68	4.13	3.29	0.021
	Condominium	66	44.61	3.90		
	Double-storey house	11	44.82	5.40		
	Others	21	41.29	7.11		
	Total	326	43.60			

According to Table 4.11, the findings for the number of family members showed that the result was no significant difference with $p = 0.080$ and it has a larger number than 0.05.

Table 4.11: ANOVA of behaviour and attitude of household on water consumption based on the number of family members

Factor		N	Mean	Std. Deviation	F	Sign. (*p*-value)
Number of family members	Apartment	188	44.21	4.11	2.54	0.080
	Condominium	125	43.10	4.45		
	Double-storey house	11	44.55	7.62		
	Others	0	0	0		
	Total	326	3.71			

4.5 Relationship between Water Management and Behaviour and Attitude of Household on Water Consumption

This section was analysed the correlation between water management and behaviour or attitude of household on water consumption. According to Table 4.12, it shows that the water management has significant, strong, and also a positive

correlation with behaviour or attitude of household on water consumption with correlation coefficient (r-value) of 0.402 which is $p < 0.01$.

Table 4.12: Correlation between water management and behaviour or attitude of household on water consumption

Factors		Dependent Variable
		Attitude or behaviour
Water management	Pearson Correlation	0.402**
	Sign. (2-tailed)	0.000

N = 326

$p < 0.05$ level

**. Correlation is significant at the 0.01 level (2-tailed).

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The main objective of the study was to identify factors that affecting consumption of water among household in Bandar Sri Permaisuri. The results from the study showed that type of house and the different number of family members influence the water management and attitude or behaviour of the household on water consumption. In this study, it showed that residents in Bandar Sri Permaisuri really know about water consumption. The knowledge and information about water consumption can easily obtain from reading materials, lectures, and also social media.

The second objective of the study was to study attitude, behavioural and level of awareness among resident in Bandar Sri Permaisuri pertaining conservation of water. For this objective, the study used the one-way ANOVA to compare the mean difference. The behaviour or attitude of household on water consumption based on the type of house was significantly difference meanwhile, the findings for the number of family members showed that the result was no significant difference.

The result also stated that the correlation between water management and behaviour or attitude of household on water consumption was significant, strong, and also a positive correlation with behaviour or attitude of household on water consumption.

5.2 Recommendation

Based on the findings in this study, several improvements needed to enhance environmental awareness among students. First, environmental coursework such as environmental education subject should be included in all university courses. This is because the result showed that only students that involved in environmental coursework have a better understanding of environmental and pollution. The field activity can be included in the coursework such as awareness campaign helps students to practise the theory they learned on real life. Teachers also can share their knowledge and skills to make the learning process fun.

Several countries have promoted a lot of rebate programme for the installation of water-efficient technologies. Currently, the government of Malaysia is providing discounts on a range of efficient items including rainwater tanks, dual flush toilets and a water-efficient showerhead. However, there is also a lack of public reaction, stringent laws, and regulations as well as effective government and public sector policies.

The results of this study would also be highly useful for water protection, such as eliminating any pollution and non-revenue water, increasing public knowledge of water conservation, as well as being useful for the implementation of new strategies to conserve water by efficiency. However, the present study advises the promotion of water-efficient appliances, a behavioural solution focused on water conservation, and

the creation of special training for future generation for the potential reduction of water consumption in Malaysia.

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APPENDIX A

Survey Question

Section A: Demographic Information

1. Age
    a. 20s
    b. 30s
    c. 40s
    d. 50s

2. Where do you live?
    a. Apartment
    b. Condominium
    c. Double-storey house
    d. Other

3. Number of family members?
    a. Less than five
    b. Five to eight
    c. Eight to ten
    d. Ten or more

4. Occupational?
    a. Government servant
    b. Private sector servant
    c. Not working
    d. Other

5. State your marital status.
    a. Married
    b. Single
    c. Divorced
    d. Widowed

Section B: Water Management

Question	Likert scale				
	strongly disagree	disagree	neutral	agree	strongly agree
1. I use tap water as source to get water					
2. I use water very frequently.					
3. I am not using my washing machine more than three times a day.					
4. I use more than 10 minutes for a shower.					
5. My family and I are practicing water management in the household.					
6. I think it is important to manage the water management effectively.					

Section B: (continued)

7. I do not care about water management.					
8. I think that it is important to be exposed to water management.					
9. The range cost of my water bill is more than RM 50 per month.					
10. I try to manage my water consumption more wisely to reduce my water bill for the upcoming month if the current bill too costly due to my high consumption.					
11. I do not think it is my responsibility to reduce the cost of water bills.					
12. I know my effort in managing water consumption is effective when my water bill costs lower than my last bill.					

Section C: Behaviour and Attitude of household on water consumption

Question	**Likert scale**				
	strongly disagree	disagree	neutral	agree	strongly agree
1. I do not always turn off the tap after I use it.					
2. I put water in a container to wash cooking ingredients (chicken, vegetables etc.) rather than washing them directly from flowing tap water in order to reduce water consumption.					
3. My family and I does not often talk about a plan on saving clean water for future purpose in case of water shortage happen.					
4. Everyone in my house should manage water consumption together.					

Section C (continued)

5. I will report to the authorities if there is any water shortage happening in my residents.					
6. Do Bandar Sri Permaisuri often face water shortage?					
7. Is the latest water shortage lasts up to two days?					
8. I use mineral water that I buy from supermarket as my temporary source of water if the water shortage happen.					
9. I use basin, tank and various size of containers to store the water that is supplied by SYABAS when water shortage happens.					

Section C (continued)

10. I will still store the water just in case for the future use even though if the water shortage has recovered.					
11. I am thankful that I always have enough water supplies.					
12. I am not going to be thankful for having endless water supplies only before losing it.					