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Residential Water Conserving Behaviors in Muzaffarabad (Ajk): Household Profiles and Dispositional Predictors

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ABSTRACT

The present study was designed as a preliminary step to investigate water conserving behaviors in Pakistan, taking Muzaffarabad as a case. Specifically, the objectives included were:1. To develop household profiles for residential water conserving behaviors,2. To explore residential water conserving behaviors,3. To investigate relationship between water conserving behaviors and water bill, and 4. To determine dispositional predictors of residential water conserving behaviors and water bill. The participants comprised of 30 male and 30 female residents of Muzaffarabad with age range of 20 to 60. In order to measure water conserving behaviors, a 7-item questionnaire was used, while dispositonal predictors were assessed through a 17-item questionnaire. The demographic information was collected on following variables: age, gender, family size, income, education, and occupation. Descriptive analysis showed that females, housewives, participants with low education, of age range 41-50, with family size 7 to 9 reported more water conserving behaviors. Analysis of frequencies for response categories of water conserving indicators suggest that participants reported to take short showers and use of minimal water in the kitchen to conserve water, but do not collect and use grey water. As anticipated, negative and significant correlation between water bill of last month and residential water saving behaviors was observed. Moreover, Multiple Regression Analysis showed that habits, personal obligation, and community identity contributes significantly to water conserving behaviors, whereas attitudes, community identity, and intention accounts for significant contribution in water supply charges. The study discusses implications of the present study.

KEYWORDS: Water conserving behavior; planned behavior theory; household profiles

1.INTRODUCTION

Over-population and climate variability challenges have made it important to investigate community- and individual–based water saving behaviors (Bates et al, 2008; Russell & Fielding, 2010). Though 75% of the earth is covered with water, only 1% is freshwater, fit for human consumption (SWCD, 2015). Human beings depend heavily on water for their survival; an average person consumes one gallon of water daily, an average US single family uses 70-100 gallons of water, while an average Pakistani family uses 20-30 gallons of water (Qureshi, 2011). Various studies have suggested that there is a steady decline in the availability of freshwater worldover. It has been found that increase in world population, environmental changes, agricultural and industrial development, urbanization, and better quality of life have put an extensive demand on the availability of usable water (see, for instance, Adams, 2014; Fielding, Russell, Spinks, &Mankand, 2012; UN, 2009). According to Hussain (2015), the availability of freshwater has decreased around 60% per capita from 1950 to 2000 globally. This has resulted in water scarcity[1], droughts and food insecurity. Around 43 countries in the world such as China, India, Sub-African regions are water stress[2] (UN Development Program, 2006; Vörösmarty, Green, Salisbury, &Lammers; 2000). In January 2015, World Economic Forum declared "water crisis as the No. 1 global risk, based on impact on society."

Among many measures that are globally adopted for 'future water security' and to decrease the vulnerability for water shortage and water rationing, behavior-based water conservation is considered as 'a critical component of the effective and environmentally sustainable management of municipal water supplies'

1Water scarcity means water supplies below 1000 cubic meter per capita per annum.
2Water stress means water supplies below 17, 000 cubic meter per capita per annum.

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(Dolnicar, Hurlimann, &Grunc, 2012). As cited by NaeemQureshi (2011), India added 20 million gallon of water in New Delhi by using conservation strategies. According to Washington State Department of Ecology (n.d.), water conservation is defined as using water efficiently and avoiding waste of water. While water conserving behaviors refers to any actions that reduce the amount of water used or enable water to be used more efficiently (Brooks, 2006). Water conserving behaviors or actions are further classified into efficiency behaviors and curtailment behaviors (Gardner & Stem, 1996). According to Russell and Fielding (2010), 'efficiency behaviors refer to one-off behaviors such as installing water-saving shower heads or rainwater tanks that facilitate ongoing water savings. In contrast, curtailment behaviors refer to individuals' actions that conserve water such as only washing full loads of clothes, taking shorter showers and turning off the tap while brushing teeth.'

1.1 LITERATURE REVIEW

Given the importance of water in human life and stability of ecosystems, it is imperative to understand the psychological processes associated with water conservation behaviors and the socio-cognitive and affective factors that contribute to water saving behaviors. Contemporary psychologists have highlighted the role of understanding the key psychological and social drivers of water conservation behaviors in order to develop sustainable water management schemes and policy (Steg&Vlek, 2009). As noted by Dolnicar and colleagues (2012), 'Being aware of these factors will inform water managers, governments and public policy officers of how best to encourage water conserving behaviors, and thus reduce the need to augment existing water supplies.'

Studies have shown that in metropolitan cities, households are biggest consumers of water. For instance, in a study conducted by Victorian Government, Australia (2004c) it was observed that Melbourne residential area consumes 59% of municipal water and that most of the residents underestimate the amount of water consumed by them (Department of Environment, Sports, and Terroritories, 1996). Such data led Hassell and Cary (2007) to suggest that a large amount of water can be saved by studying common people's perception and attitudes toward water and thereby develop policies and programs to influence them to change their apathicand environment non-friendly behavior.

Hassell and Cary (2007)have given an extensive review of the theoreticalmodels which are used by environmental psychologists to understand the psychological and social mechanisms involved in water conserving behaviors. Broadly, most of the models can be categorized as intrinsic or extrinsic theories. Intrinsic models include those theories that explain water conserving behaviors based on predictors internal to a person such as values, habits, perception, affect, while extrinisic models focus more on external predictors including social pressure, government policies, socio-economic status (Jackson, 2005). However, as pointed out by Hassell and Cary (2007), theories which integrate internal and external predictors are most powerful in determining water saving behaviors. Over the years, the Theory of Planned Behavior (TBP; Azjen&Fishben, 1980), an integrated theory, has received much empirical support in the research on water conservation (see, for instance, Clarke & Finely, 2007; Russell & Fielding, 2010; Stern, 2000; Trumbo & O'Keefe, 2005). The Theory of Planned Behavior (TBP) proposes that all behaviors can be predicted on the basis of intentions, which, in turn, are determined by attitudes, social norms, and perceived behavioral control. Within this framework, attitudes are refered to as positive or negative evaluation of a behavior; social norms indicate significant other's beliefs about that behavior; while perceived behavioral control reflects one's perceived self-efficacy to perform that behavior. Research has shown thatperceived behavioral control has direct bearings on actual behavior performed. According to the model, an individual who has a favourable attitude towards water conservation, believes that others also support water conservation, and think that water conservation can be done easily is more likely to be motivated to engage in water saving behaviors.

Several studies have provided empirical supportto this model. Clark and Finely (2007) studied the efficiency ('intention to install water-saving appliances') and curtailment ('intention to use less water') intentions to implement water saving behaviors among Bulgarian residents. As predicted, a significant and a high correlation was found between intention and its determinants with water conserving behaviors. Similarly, Lam (2006) explored predictors of intentions to conserve water in households of Taiwan. He found that attitudes, social norms, and self-efficacy were most significant predictors of installing dual-flush toilet system. In another study conducted by Hartland, Staats, and Henk (1999) in Holland observed that besides the model proposed by TPB, personal norms or moral obligation significantly contributed to the intention to turn off tap while tooth brushing. Trumbo and O'Keefe (2011) applied TPB on American people to investigate water

saving behaviors. Their results suggest that the model significantly accounts for intentions to conserve water. In addition, their study also showed that environmental values and self-efficacy are also important predictors of water saving behaviors. In yet another study, Chang (2013) found subjective norms, beliefs regarding local water resources, water conservation education and attitudes toward frugality significantly correlated with water conservation behaviorsin China.

One of the most important advantages of this theory is its flexibility to add new variables on need basis (Burton, 2004). Recently, Spink and colleagues (2011) have advocated Expanded Theory of Planned Behavior (ETPB) to understand how people decide to engage in water saving behaviors. Their research showed that positive attitudes, habits, personal obligation, self-identity, community identification and intentions, significantly contributed to residential water saving behaviors (Russell & Fielding, 2010).The results revealed that personal or moral obligation and habits contributed most strongly in curtailment of water use. Spinks et al explained that individuals who feel that it is their moral obligation to save water are more likely to conserve water in contrast to those who lack this sense of responsibility. In psychological research, there is a consensus that past behaviors or habits play an important role in the actions that we perform, i.e., people perform behavior because of repitionrather than on the basis of reasoning and rational choice. Several studies have examined the impact of habits on water consumption behavior. For instance, Gregory and DeLio (2003) found that low water users actually used less water, took less showers per week, only did washing when loadful compared to high water users. Furthermore, the researchers also reported that people who perceive themselves as water conservers are more likely to exhibit curtailment behavior and install water efficient appliances. For such people self-identity is a key driver of less water consumption.

Research in the area of residential water conservation has also emphasized the significance of associating contextual and demographic factors such as gender, age, education, family size, family income with water saving behaviors. According to Russell and Fielding (2010), there is inconclusive data on relating age with water withdrawal. Some investigations have yielded a positive link between old aged people and water saving behaviors (Clark & Finely, 2006) while others have shown that old people report less intention for water saving (Kantola et al, 1992). Similar non-linear relationship has been observed between education and water conserving behaviors. While some studies have found that highly educated individuals were likely to exhibit water saving behaviors (Lam, 2006), others yielded contrasting results (Clark & Finely, 2007). On the other hand, income has found to be consistently linearly related with water consumption. That is, high income people tend to consume more water as compared to low income individuals. Another study compared gender, income and education with water consumption.Women, lower income participants, and individuals with high school education were generally found to exhibit more water conserving behaviors (Spinks et al, 2011).

1.2. The Present Study. Shortage of water and supply has always been a critical issue in Pakistan. In 2003, World Bank categorized Pakistan as a water-stress and presently as a water-scarce country, surpassing African countries like Ethiopia. As cited by Hussain (2015), water supplies per capita have reduced around 77% within the years 1950-2000 in Pakistan; the water supplies are around 1200 m^3 per person per annum. Most of the cities in Pakistan are receiving restricted supplies of water. Water specialists have pointed out that unless sustainable and radical water harvesting and planning procedures are developed, Pakistan will soon be suffering from drought and famine at massive scale (APR, 2013). Accordingly, the present study was designed as a preliminary step to investigate water conserving behaviors in Pakistan, taking Muzaffarabad as a case. Specifically, the objectives included were:

1. To develop household profiles for residential water conserving behaviors.
2. To explore residential water conserving behaviors.
3. To investigate relationship between residential water conserving behaviors and residential water bills of last month.
4. To determine dispositional predictors of residential water conserving behaviors and water bill.

In the light of the review of the literature presented above, there are two critical issues that must be addressed. The first one is the measurement of water conserving behaviors. In the present research, conceptual framework given by Dolnicar et al (2012) was used to measure water conserving behaviors. Moreover, there is a consistent debate among researchers that people who subjectively report that they practice water saving behaviors may not be *actually* performing those behaviors. In such cases, water bills may provide an objective method of measuring water conserving behaviors (Spink et al, 2011). Therefore, water bills of the participants

were also recorded in the study to impartially measure the major variable.

The second issue of the present research work pertained to the theoretical framework to be followed for investigation of dispositional predictors of water saving behaviors. As discussed above, the Expanded Theory of Planned Behavior (ETPB; Spink et al, 2011) provides a most recent and parsimoniuos guide to study water consumption and saving behaviors and has been found to be effective in implementing water conserving behaviors. Thus, the present study utilized ETPB in order to explore multidimensional psych-social drivers of water saving behaviors in Pakistan.

Finally, the present research selected households to investigate water saving behaviors with precise focus on water curtailment behaviors.

2. Method.A cross-sectional study design was used in the present research. Details are presented below.

2.1. Participants. The participants comprised of 30 male and 30 female residents of Muzaffarabad. Their ages ranged from 20 to 60. The respondents were selected through conventient sampling technique.Relative frequency percentage was computed on demographic characteristics of the participants in order to get descriptive information on the respondents. Details are presented in Table 1.

Table 1

Relative Frequency Percentages for Demographic Variables of Respondents (N=60)

Demographic Variables	Relative Frequency %
Gender	
Male	50%
Female	50%
Age Groups	
20-30	54%
31-40	26%
41-50	10%
51-60	10%
Education	
Matriculate	33%
Above Matriculation	67%
Occupation	
Housewives	24%
Businessman	41%
Government Employees	35%
Family Size	
3-6	46%
7-9	34%
10-12	20%

2.2. Instruments. Following instruments were used in the present research to measure study variables. Before the main study, a pilot study was carried out to translate the scales into Urdu language through forward procedure. In addition, the cultural relevance of all items of the scales was also assessed. The participants for this phase comprised of 3 psychologists who were familiar with translation procedure and had command over Urdu and English languages.

2.11.Water Conserving Behavior Scale (Dolnicar, Hurlimann, &Grunc, 2012). In order to measure water conserving behaviors, a 7-item questionnaire (Dolnicar, Hurlimann, &Grunc, 2012), with each item anchored on 3-point rating scale was used. As reported by Dolnicar and colleagues, the scale has demonstrated high internal consistency and validity (2012). Water bill of the last month was also used as a measure of water saving behavior.

2.12. Household Water Use Survey (Spinks et al, 2011). The possible dispositional variables such as attitudes, habits, personal obligation, intention, and self-and community identity were assessed through a

17-item questionnaire (Spinks et al, 2011). All items were placed on a 5-point rating scale. Spinks et al has established the Household Water Survey as a reliable and valid measure (2011).Since the study was intended to measure only curtailment behaviors related with water conservation, only relevant items were included in the final questionnaire.

2.13. Demographic Information Sheet. Demographic information of participants was collected on following variables: age, gender, family size, income, education, and occupation.

3. RESULTS AND DISCUSSION

Descriptive and inferential statistical analysis of data yielded following results.

3.1. *Objective No. 1& 2: To develop household profiles for residential water conserving behaviors and explore residential water conserving behaviors.*

In order to construct household profiles, mean values for residential water conserving behaviors were computed for Gender, Level of Education, Occupation, Age Groups, and Family Size, as shown in Figure 1. Figure 1 indicate that females, housewives, participants with low education, of age range 20-30 and 41-50, with family size 7 to 9 report more water conserving behaviors as compared to other groups for each category. As cited in the introduction section, these results endorse previous fingings that females and less educated participants show more water conserving behaviors than their counterparts (Gregory & Di Leo, 2003; Spinks et al, 2011). As regards age, the young adult group (age range 20-30) have been found to show highest water conserving behaviors, closely followed by another age group from 41-50. Interestingly, the oldest group has reported less water curlailment behavior. As proposed by Makki et al (2012), old people may be less careful in consuming water because they may be retired and at home most of the time. The results also depict that family size may also have an impact on water saving practices. A family of 4-6 people is least likely to employ water saving behaviors.

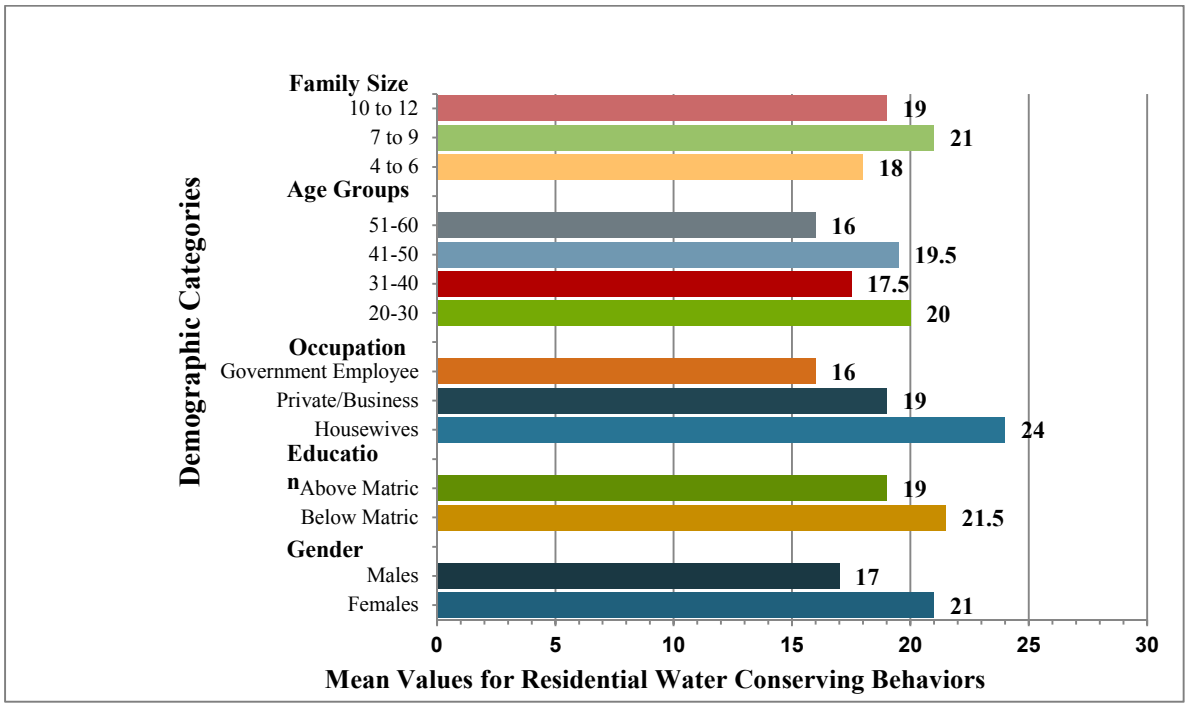

***Figure 1*: Household Profile for Residential Water Conserving Behaviors**

Relative frequency percentage was determined for individuals who perceive themselves as low, moderate, or high water conservers. In addition, frequency percentages for each item of water conserving behaviors was calculated to compare level of agreement to disagreement of respondents on specific water saving behavior.

The results are shown in Table 2 and Figure 2.

Table 2

Relative Frequency Percentages for Categories of Water Conserving Behaviors (N=60)

Categories for Water Conserving Behaviors	*f*%
Low	28%
Moderate	31%
High	43%

Table 2 signifiesthat 43% of participants believe that they practice high water saving behaviors as compared to 31% and 28% who believe that they moderately and conserve little water, respectively. Analysis of frequencies for response categories of water conserving indicators suggest that participants reported to take short showers and use of minimal water in the kitchen to conserve water, but do not collect and use grey water or rain water (Figure 2).There may be number of reasons for this finding. Foremost, Pakistani citizens may not be aware of the fact that water can be recycled by using grey or rain water. Secondly, they may not have procedural knowledge on how to collect grey or rain water. Lastly, cultural and religious values related with cleanliness may act as barrier in conserving water in this manner. Interestingly, the lowest agreement has been received on closing the tap while tooth brushing. In short, these findings may provide insight into the phenomenon of water saving behaviorsin Pakistan and have profound implications for water management awareness schemes and policies.

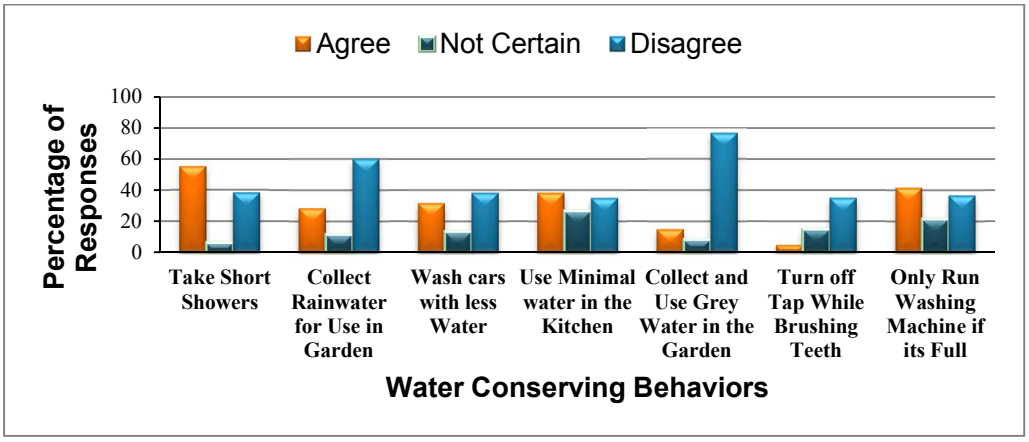

***Figure 2*: Frequency of Responses for Items of Water Conserving Behaviors**

3.2. *Objective No. 2: To determine relationship between residential water conserving behaviors and water bill.*

Pearson correlation coefficient was calculated between residential water conserving behaviors and water bills of the last month. Table 3 shows that both variables are significantly and negatively associated with each other. This means that people who employ water conserving behaviors are going to have smaller water bills.

Table 3

Correlation between Residential Water Conserving Behaviors and Water Bills of the Last Month (N=60)

	Water Bill of Last Month
Residential Water Conserving Behaviors	r = -.35, p<.01

3.3. *Objective No. 3: To explore the dispositional predictors of residential water conserving behaviors and water bill.*

Multiple regression analysis was performed to find out impact of various dispositional predictors of residential water conserving behaviors and water bills of last month.

Table 4
Summary of Multiple Regression Analyses Predicting Water Conserving Behaviors and Water Bill from Psycho-social Variables (Standardized Beta Coefficients) (N=60)

	Water Conserving Behaviors	Water Bill of Last Month
Intention	.11	.31***
Attitudes	.05	.25**
Habit	.36***	.09
Personal Obligation	.15*	.15*
Self-identity	.27**	.03
Community-identity	.28**	.39**
ΔR^2	15.7**	18.2**

Note: Water Conserving Behaviors: $F(6, 54) = 2.84$, $p<.01$; Water Bill of Last Month: $F(6, 54) = 2.99$, $p<.01$
$^{***}p<.000$; $^{**}p<.01$; $^{*}p<.05$

According to standardized beta coefficients presented in Table 4, habits, personal obligation, self-identity and community identity contributes significantly to water conserving behaviors, whereas attitudes, community identity, personal obligation, and intention accounts for significant contribution in water supply charges. The model accounted for almost 16% variance in the water conserving behavior and 18% in the water billing. The data obtained supports the findings by other researchers. The dispositional variable 'habit' was found to most strongly predict water curtailment behavior. As stated above, habit or automatic response has been studied extensively as a psychological driver of motivation to curtail water wastage (Gregory & Di Leo, 2003; Trumbo & O'Keefe, 2005). This finding has an important implication. As noted by Russell and Fielding (2010), 'there may be a need to design interventions that help people to break established patterns of water using behavior that result in high water use.' Moreover, the results depicted in Table 4 show that people who perceive themselves as water conservers and relate harmonically with the community are more likely to practice water conserving behaviors. As obersved by Spinks et al (2011), the results also showed a significant contribution of personal or moral obligation in water saving behaviors, though not as strongly as found by them. The results of the present study also yielded non-significant contributions of intentions and attitudes in water curtailment behavior. This finding is surprising, considering that all other factors (found to be significant) are predictors of 'intention' according to the ETPB and TPB model. Further research is needed to explain the new finding.

However, as displayed in Table 4, attitudes and intention accounts for significant variance in water bill of last month. It may be that fear of lack of water supply may influence them to have a positive attitude and complete intention to pay monthly bills. Community identity has been found to be the strongest predictor of water bill followed by personal obligation. Spinks et al (2011) has pointed out that 'creating a culture of water conservation, within the household and within the broader community, may promote willingness to engage in water conserving actions.' People who identify with their community and feel moral obligation are more likely to create norms of water conservation within the community and household.

4. Conclusion. Whether there is shortage or scarcity of water or not, adopting water conserving behaviors, just like other natural resources, have to be developed as a habit with a conscious intention. The findings of the present study substantially support the previous data as far as household profiles are concerned (Chang, 2013; Spinks, et al, 2011). However, there appears to be a discrepancy between the extent of contribution of dispositional predictors found in the present study and existing data, suggesting that there may be other factors functioning in water conserving behaviors in Pakistan, such as water frugality. Moreover, preference for different water saving actions also seem to vary according to regions. For instance, dual flush system, which is considered an important water saving strategy in aforementioned researches was found to be culturally irrelevant in the pilot study of the present investigation. On the basis of the results obtained, the present study proposes following recommendations:

1. Mixed method approach should be applied to extensively understand psycho-social determinants of water conserving behaviors in Pakistan.
2. An indigenously developed measure of water conserving behaviors is required.
3. Public awareness programs should be planned.

This study is first of its kind in Pakistan. Despite the fact that Pakistan is facing serious problems because of water shortages, not much planning and research is witnessed. Among other water management and technical programs, it must be realized that Psychology can play a very important role in various parameters related with

water conservation and harvesting. As noted by Theodori and Fox (2009), 'Conservation is one of the most cost-effective tools we have in meeting the growing demand for water ….The 2007 United States Water Plan indicates that conservation accounts for nearly 23 percent of the projected additional water supply needed in 2060 in Texas.' The present study, though small in scale, is an effort to initiate future researches on investigating psycho-social drivers of water conserving behaviors and standardized plans to implement them effectively in Pakistan.

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