International Journal of Marine Engineering Innovation and Research, Vol. 9(1), March. 2024. 114-121
(pISSN: 2541-5972, eISSN: 2548-1479)

Water Conservation Practices viewed from Community Socio-Psychological Factors (Case Study: Bandar Lampung City, Indonesia)

Rifka Noor Azizah[1], Dwi Marisa Putri [2], Ahmad Daudsyah Imami[3], Elinda Mutiara[4], Yulisa Putri[5], Nasrul Putra[6], Dion Awfa[7], Rahma Yanda[8], Zenia F. Saraswati[9], Endang Setiawati[10], Wisnu Prayogo[11]
(Received: 4 March 2024 / Revised: 9 March 2024 /Accepted: 9 March 2024)

***Abstract*— Climate change that is happening at this time affects the decrease in the availability of water in the world. Urban areas, especially coastal areas, will have a more significant impact on water scarcity. Coastal areas in Indonesia, such as Bandar Lampung City, are mainly concerned in this study. Therefore, a study was conducted to determine the variables that influence water conservation practices in Bandar Lampung, which focuses on social psychological factors with four independent variables. By knowing the independent variable that has the highest level of influence, an approach to conservation efforts at the individual level can be approached. Data were obtained using a closed questionnaire with answer options using a Likert scale. Data analysis used simple linear regression and stepwise regression. The simple linear regression results show that the variable social norms (X4) are the highest variable with a value of R2 0.0385. In stepwise regression, the variable attitude towards conservation (X1), the benefits obtained (X2), individual control behavior (X3), and social norms (X4) simultaneously have a coefficient of determination value of R2 0.06127, where the social norms variable align with sample linear regression results on water conservation practices. These social norms can be used as a reference by stakeholders such as Perumda, Regional Government, NGOs, etc., through individual approaches in mapping strategies for increasing water conservation practices.**

Keywords— Water conservation practices, stepwise regression, bandar lampung, climate change

I. INTRODUCTION

Climate change is a critical issue widely discussed at the world level today. As a tropical country on the equator, Indonesia will face direct climate change impacts [14]. A report by the IPCC in 2013 [24] explained that urban areas, especially coastal areas, will feel a more significant impact from climate change. Current climate change will affect the decrease in water availability and utilization of water [3]. Based on the World Water Forum II, which was held in The Hague in March 2000, Indonesia is projected to experience a water crisis due to the drought and also caused by poor water management such as inefficient use of water.

Bandar Lampung is one of the coastal cities in Indonesia affected by several impacts of climate change, so it has the potential to experience drought [29]. Based on the 2010 Bandar Lampung city resilience strategy document states that some of the impacts of climate change, such as increasing air temperatures and drought, have been felt throughout the city of Bandar Lampung. Based on these problems, this study will analyze how water conservation practices in Bandar Lampung City align with the impacts of climate change [5]. Therefore, water resource conservation is needed to adapt to climate change in Indonesia, one of which is in Bandar Lampung [27]. Water conservation is essential to apply, especially in areas experiencing drought. UU no. 23 of 1997 concerning Environmental Management explains that the conservation of natural resources is essential to ensure the use of non-renewable Water Resources, and management that is important to ensure the availability of renewable natural resources (such as water) while maintaining and increasing the quality of its value. [33]. Water conservation is one of the main essential factors in ensuring water availability. Water conservation practices carried out by the community are intended to increase water volume, improve water quality according to its designation, and increase the supply of regional water needs.

Communities have many driving factors for environmentally friendly behavior, including water conservation practices [30]. One of the driving factors used in this study is intended behavior. This factor is built by several factors, namely social norms, attitudes

Rifka Noor Azizah, Departement of Environmental Engineering, Institut Teknologi Sumatera, Lampung Selatan, 35365, Indonesia.
Dwi Marisa Putri, Departement of Environmental Engineering, Institut Teknologi Sumatera, Lampung Selatan, 35365, Indonesia.
Ahmad Daudsyah Imami, Departement of Environmental Engineering, Institut Teknologi Sumatera, Lampung Selatan, 35365, Indonesia.
Elinda Mutiara, Departement of Environmental Engineering, Institut Teknologi Sumatera, Lampung Selatan, 35365, Indonesia.
Yulisa Putri, Departement of Environmental Engineering, Institut Teknologi Sumatera, Lampung Selatan, 35365, Indonesia.
Nasrul Putra, Departement of Environmental Engineering, Institut Teknologi Sumatera, Lampung Selatan, 35365, Indonesia.
Dion Awfa, Departement of Environmental Engineering, Institut Teknologi Sumatera, Lampung Selatan, 35365, Indonesia.
Endang Setiawati, Departement of Environmental Engineering, Institut Teknologi Sumatera, Lampung Selatan, 35365, Indonesia.
Rahma Yanda is with Departement of Water Engineering, Institut Teknologi Sumatera, Lampung Selatan, 35365, Indonesia.
Zenia F. Saraswati is with Departement of Urban and Regional Planning, Institut Teknologi Sumatera, Lampung Selatan, 35365, Indonesia. Rahma Yanda is with Departement of Water Engineering, Institut Teknologi Sumatera, Lampung Selatan, 35365, Indonesia.
Wisnu Prayogo is with Departement of Civil Engineering, Universitas Negeri Medan, Medan, 20221, Indonesia.

and beliefs, and individual behavior control [1]. This component of the Theory of Planned Behavior has been widely carried out in previous studies in the world [9] and in Indonesia [22], which have successfully predicted the behavior of water conservation practices in society. Therefore, attitudes towards conservation, benefits obtained, individual control behavior, and social norms are this study's independent variables, and water conservation practices are the dependent variables. The following table shows previous research on independent variables influencing water conservation practices.

Applying sustainable water conservation practices requires awareness, understanding, and appreciation [34]. Several previous studies have researched the relationship between attitudes and beliefs (about water and the environment) and how it relates to water consumption behavior [21][13]. Studies on the influence of social and psychological factors on water conservation practices in Indonesia still need to be completed and focus on the island of Java [22]. For this reason, this research was conducted to know the contribution of variables in social psychological factors influencing water conservation behavior on the island of Sumatra, especially Bandar Lampung City as one of the economic centers on the southern part of Sumatra Island.

II. RESEARCH METHODS

A. Study Location

Bandar Lampung City is the capital of Lampung Province which is the center of regional government, social, political, educational, economic, and cultural activities. Geographically, Bandar Lampung City is located at 5° 20' to 5° 30' south latitude and 105° 28' to 105° 37' east longitude. The area of Bandar Lampung City is 197.22 km2, with an average altitude of 77.08 meters above sea level. Located at the southern tip of the island of Sumatra, Bandar Lampung is one of the provincial capitals with the busiest activities. Bandar Lampung is currently divided into 20 sub-districts and 126 sub-districts, with the Kemiling sub-district as the broadest area, 24.24 km2. Bandar Lampung consists of coastal areas, hilly areas, slightly undulating highland areas, the Lampung Bay area, and the small southern islands. The population in 2021 of Bandar Lampung City will reach 1,184,949 people. Based on the results of sample calculations using the Isaac and Michael method, the required number of samples is 384 respondents. Using the Stratified Random Sampling method, rounding off the sample to 500 respondents was carried out to anticipate outlier data. Figure 1 shows the distribution of 500 sampling locations throughout Bandar Lampung City.

The normality test resulted in the final amount of data, namely 464 respondents. The socio-demographic characteristics of the 464 respondents in this study sample included: based on gender, 30% of the respondents were male, and 70% were female respondents; based on age, the average age of the respondents was 44.76 years, where the youngest respondent was 13 years, and the oldest was 83 years; Based on the level of education, almost half of the respondents (48%) had a high school education, the remaining half consisted of 3% who did not go to school, 17% finished elementary school, 15% junior high school, and 17% tertiary education; based on occupation, 2% of the total respondents are civil servants, 32% traders, 5% private employees, 1% farmers, 6% laborers, and 55% others (mostly homemakers, others are contractors, teachers, consultants, firefighters, security, students/students, etc.); based on income level 13% of respondents have income <Rp. 1,250,000, 48% earn Rp. 1,250,000-Rp. 3,000,000, 23% earn >Rp. 3,000,000-Rp. 5,000,000, >Rp. 5,000,000-Rp. 15,000,000 income was expressed by 7% of respondents, and 9% of respondents stated that they had income > Rp. 15,000,000; based on the number of family members, more than half of the respondents (60.7%) had 4-6 family members; and based on water sources, as many as 26% are PDAM water users, and the other 74% are groundwater users.

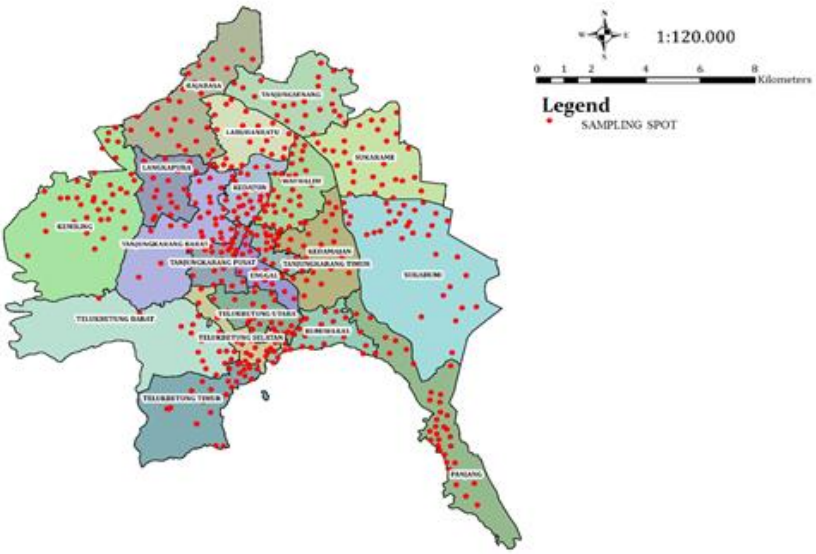

Figure 1. Study Location

B. Operational Variable

This research consists of 4 independent variables and one dependent variable. The dependent variable is Water Conservation Practices as an effort to maintain the existence and sustainability of the condition, nature, and function of water resources so that they are sufficient to meet the needs of living things, both now and in the future. In comparison, the independent variables include X1, X2, X3, and X4. An explanation of each independent variable has been described in (Table 1) above.

C. Questionnaire Formation

This study uses a research reference (Tong et al., 2017) in forming a questionnaire. Apart from that, adjustments to the conditions of the study locations, namely ablution activities, because ablution in Indonesia are activities that use large amounts of water (Department of Settlement and Regional Infrastructure, 2002). Another adjustment is related to the utilization of rainwater, which also has the potential to become a water source in Indonesia. According to research (Amala et al., 2023), households must manage rainwater properly. Based on these adjustments, a questionnaire was designed, which was then tested for the instrument's feasibility through validity and reliability tests. Questions that passed the due diligence resulted in independent variable measurement instruments in 13 question items where X1 was explained by 5 question items, 4 question items explained X2, X3 was explained by 2 question items, and variable X4 was explained by 2 question items (Table 2). Meanwhile, the dependent variable, Water Conservation Practices (Y), was measured using 11 question items (Table 3).

The questionnaire is closed with answer options using a Likert scale. The Likert scale measures attitudes, opinions, and perceptions of a phenomenon (Sugiyono, 2014). Statements on this questionnaire are positive statements to measure a positive scale so that they are given a score of 5, 4, 3, 2, 1—Likert scale points to indicate agreement or disagree answers to the statements displayed in the questionnaire. The greater the number of points selected, the more the respondent agrees with the questionnaire statement. The Likert scale points described are as follows: 5 = strongly agree; 4 = agree; 3 = mediocre/enough; 2 = disagree, and 1 = strongly disagree.

D. Data Analysis

The questionnaire is closed with answer options using a Likert scale. The Likert scale measures attitudes, opinions, and perceptions of a phenomenon (Sugiyono, 2014). Statements on this questionnaire are positive statements to measure a positive scale so that they are given a score of 5, 4, 3, 2, 1—Likert scale points to indicate agreement or disagree answers to the statements displayed in the questionnaire. The greater the number of points selected, the more the respondent agrees with the questionnaire statement. The Likert scale points described are as follows: 5 = strongly agree; 4 = agree; 3 = mediocre/enough; 2 = disagree, and 1 = strongly disagree.

$$Y = a + \beta X \quad (1)$$

Description: Y = dependent variable/value to be predicted; a = constant; b = regression coefficient value; and x = independent variable

The stepwise regression method is used to analyze the relationship of variables in stages to determine how the variables in socio-psychological factors simultaneously affect water conservation practices. It is one of the methods in linear regression. This method obtains the best variable model/relationship (Wohon et al., 2017). Determining the best model for the stepwise method is seen through the R square value, which tends to be stable, and close to the data's variance value (Hapsery & Lubis, 2019). This study used stepwise linear regression to see the effect of variable X (attitudes towards conservation, benefits obtained, individual control behavior, and social norms) on variable Y (water conservation practices). So based on the results of the gradual regression analysis, the value of r squared with the model with the best correlation among the other models. The formulation of stepwise regression is as follows:

$$Y = a + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + e \quad (2)$$

TABLE 2.
INDEPENDENT VARIABLE QUESTIONNAIRE

Variable	Code	Question
X1	1S	A beautiful and untouched environment is important and vulnerable to destruction.
	2S	In recent years, there have been more and more disasters.
	3S	Humans have the right to change nature in meeting their daily needs.
	4S	Water is a very important natural resource.
	5S	Reducing water use is an effort to protect the environment.
X2	1H	Saving water can solve the problem of lack of water supply.
	2H	Adopting water conservation practices is essential in solving the current problem of water scarcity.
	3H	Water conservation measures will reduce your water bill significantly.
	4H	Water conservation actions will significantly change the environment for the better.
X3	1K	Saving water doesn't change my daily lifestyle.
	2K	Saving water does not require extra effort and time.
X4	1N	Neighbors, friends, family members, and people around me practice water saving
	2N	The whole community participates in water-saving campaigns and carries out water-saving practices

TABLE 3.

QUESTIONNAIRE DEPENDENT VARIABLE

Variable	Code	Question
Water Conservation Practices (Y)	1P	I always turn off the tap when brushing my teeth, washing my face and hands
	2P	I always turn off the tap when I'm washing my hair or body soap.
	3P	I usually wash clothes by fulfilling the capacity of the washing machine/full*
	4P	I use hand rinse water to use as water for the next activity. NB: an example of the next activity referred to is cleaning the bathroom
	5P	I wash fruit and vegetables in a basin (container) and avoid washing them in running water
	6P	I don't open the maximum faucet while doing ablution**
	7P	I clean dust in the garage and/or patio with a broom/mop, without using a wate hose
	8P	I reuse the washing machine rinse water to water the garden or as toilet flush water
	9P	I don't water the garden regularly
	10P	I only wash the vehicle when it is very dirty
	11P	I collect rainwater as an alternative water source

Information: *Respondents who did not use a washing machine scored the lowest (1 out of 5); **Respondents who use dipper get the lowest score (1 out of 5).

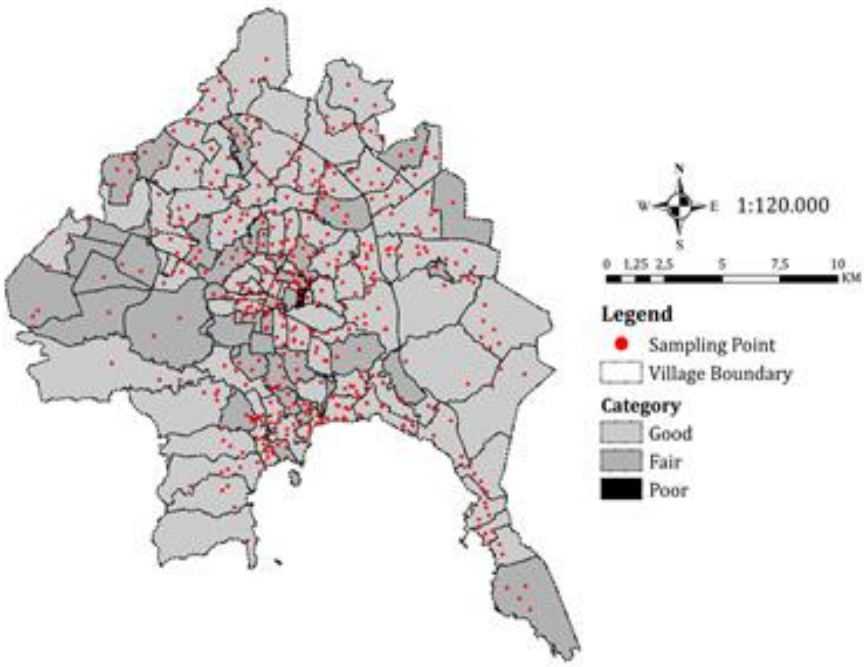

Figure 2. Water Conservation Practice in Bandar Lampung Province

III. RESULT AND DISCUSSIONS

Figure 2 shows that good conservation practices dominate several areas in Bandar Lampung. Around eight sub-districts implement poor conservation, equivalent to 40% of the total sub-district. Poor assessment of conservation practices is closely related to socio-psychological and demographic factors in the study area. Socio-demographic factors in the study locations are discussed in depth in the following discussion sub-chapter.

Making changes in a society that cares about sustainable water conservation practices requires instilling awareness, understanding, and appreciation of the environment and water (Willis et al., 2011). Misunderstanding the risk of water scarcity can hinder changes in social behavior (Turner et al., 2011). The overall value of coefficient 4 of the simple linear regression equation is positive, so it is concluded that it has a unidirectional relationship. Thus the higher the community's X1 or X2 or X3, or X4 value, the better the level of conservation carried out. The analysis results present the correlation value (R2), Sig, and the (constant) value of water conservation practices and a beta of each independent variable. The relationship of each variable to water conservation practices is shown in (Table 4) below.

TABLE 4.
SIMPLE LINEAR REGRESSION

Mathematical Models	*Sig.*	R^2
Y~BX1 + C	***	0.02221
Y~BX2 + C	***	0.02264
Y~BX3 + C	**	0.01741
Y~BX4 + C	***	0.03853

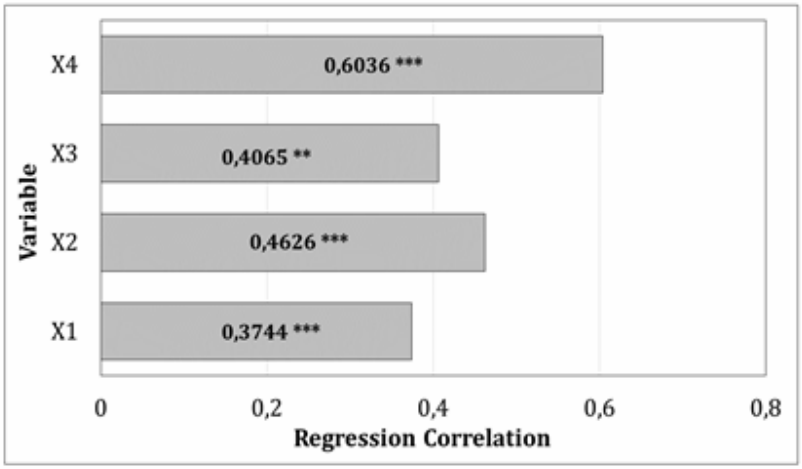

Figure 3. Coefficient Simple Regression

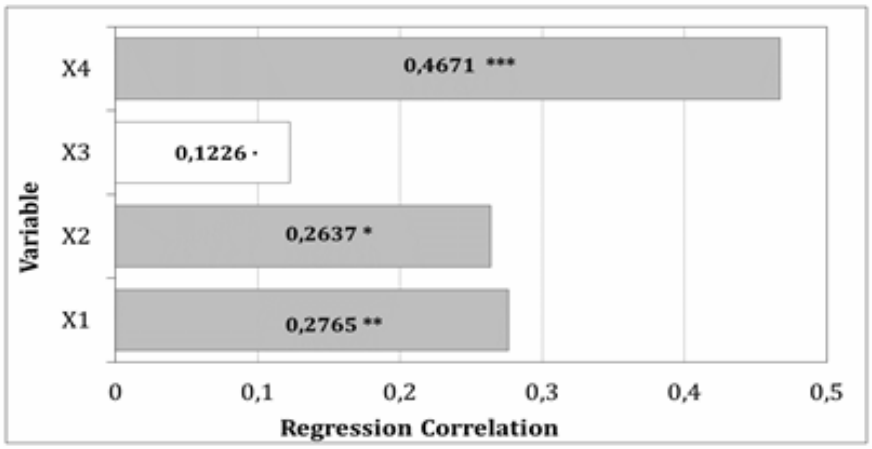

Figure 4. Coefficient Stepwise Regression

The coefficient of determination of the four variables is obtained in the range of 0.01741-0.03853. The model with the best coefficient is X4, namely R2 0.03853 at the significant level (0.001). In comparison, the variable with the lowest coefficient of determination is variable X3, namely R2 0.01741. The coefficient values of 4 simple linear regression equations are all positive. Simple linear regression analysis showed that the variables X1, X2, and X4 were found to be significant at 0.1% ($P<0.001$), while X3 was significant at the 1% level ($P<0.01$). In (Figure 2) it can be seen that the simple linear regression coefficient concludes that X4 has a more immense influence than the other variables, namely 0.6036. It can be interpreted that every change in X4 results in a Y of 0.6036. The highest to the following lowest regression coefficient values are X2, X3, and X1, respectively, 0.4626, 0.4065, and 0.3744. It means that any change in variable X results in a change in Y equal to the value of the regression coefficient. In (Table 5) presents the relationship (factors) of social psychology simultaneously to water conservation practices. Meanwhile, (Figure 3) (Figure 4) identifies the best variable based on simple regression analysis and multiple social psychological factors based on the coefficient/estimated value obtained.

TABLE 5.
STEPWISE REGRESSION

Mathematical Models		VIF	R	Sig.
Y = BX1 + BX2 + BX3 +BX4 +C	Intercept	-	0,06127	***
	X1	1.05		*
	X2	1.17		.
	X3	1.23		
	X4	1.12		**

The relationship between the variables X1, X2, X3, and X4 simultaneously on Y has an effect of (R2) 0.06127. The obtained Variance Inflation Factor (VIF) is in the range of 1.05-1.23, so it fulfills the multicollinearity-free requirement (VIF < 10). Based on the probability value, the value obtained by variable X4 has the best value, which is significant at the 1% level with P=0.001. Meanwhile, X1 is significant at the 5% level with P=0.013, and X2 at the 10% level with P=0.066. In comparison, X3 was found to be insignificant with P=0.399. The results of the stepwise regression coefficient found that X4 also has the highest value, namely 0.4671. Therefore, it can be interpreted that every change in X4 results in a change in Y of 0.4671. The subsequent stepwise regression coefficient values are X1, X2, and X3, respectively, 0.2765, 0.2637, and 0.1226, so that it can be interpreted that each change will result in a change in Y of 0.2765, 0.2637, and 0.1226.

The regression diagram shoe the percentage influence of the independent variable (x) on the dependent variable (y) (Janie, 2012). In (Table 4) the results of simple linear regression conclude that the variable that contributes the most to changes in community water conservation practices based on simple linear regression is X4. Thus the results of stepwise linear regression (Stepwise Regression) obtain the primary variable as a social psychological factor simultaneously influencing Y is X4. Based on the analysis results (Table 5), the predictor variable X3 is assessed as a variable that does not affect water conservation practices in Bandar Lampung City. It is because the correlation of X3 to Y produces a negligible value (p-value > 0.1) that the white part of the diagram illustrates the insignificant variable (Figure 4). Based on the results, the most significant influence of social psychology studied on Y, either or simultaneously, is owned by variable X4. Because of the four variables, X4 has the best significance level. Research is supported (Singha et al., 2022), showing that people's intention to save water increases when they see others doing it too. It explains that the population tends to do everything because it imitates what has been done and many people in the surrounding environment. Thus of the four best model variables, variable X2 produces the most negligible significance, which is significant at the 5% level (*), compared to variables X1 (**) and X4 (***).

A. Attitudes towards conservation practices (X1)

Attitude is an individual's subjective assessment of whether an 'attitude object' is seen as beneficial or detrimental (Bohner & Dickel, 2011). In this case, the attitude towards conservation cannot be seen clearly regarding the advantages and disadvantages of the respondent's research. Attitudes generally change as individuals learn and experience (Sponarski et al., 2016). For example, someone can demand frugality if he has experienced feeling deprived (Liu et al., 2011). In this case, attitudes towards conservation can be of great value if the domination of the population has experienced a water crisis or lack of air.

B. Benefits derived from water conservation practices (X2)

The benefits here are the results expected of individuals for water conservation behavior. Someone will expect a reward or result for their behavior [25]. In this case, the benefits of water conservation practices consist of reduced water bills, sufficient water for consumption, and protected nature (Tong et al., 2017). Benefits can change individual behavior due to positive or negative consequences of this behavior [19]. Thus, an increase in behavior will occur in individuals who believe in these consequences. In this case, the ordinary people of Bandar Lampung have their water source, namely groundwater. Therefore, without water bills and abundant water availability, the benefits offered are not enough to influence the water conservation actions they carry out.

C. Individual control behavior towards water conservation practices (X3)

The results obtained in this study are different from studies conducted in Japan, whose results stated that the most dominant component in water conservation behavior is individual awareness of scarce water issues [28]. Behavioral change is synonymous with risk; a person takes action to change if he knows what risks will be faced [20]. In this case, water resources in the Sumatra Area, especially Bandar Lampung, are still classified as abundant, so the threat of water scarcity is not a driver of behavioral change [4]. Furthermore, Knickmeyer (2019) states that the highest behavioral level in responding to change is people who live in urban/city countries where each individual has to compete. This supports that the study area is not classified as urban but semi-urban. Furthermore, behavioral change can be used to develop intervention actions (West et al., 2020). This can support if an area, such as the capital city of Jakarta, with its urban status, has a highly driven behavior change so that intervention actions can be applied.

D. Social norms in water conservation practices (X4)

Social norms have been proven to direct individual behavior without coercion, one of which is to overcome environmental problems and increase environmental care behavior [23]. This can be seen in the results of this study, where the contribution of the social norm variable (X4) has the most crucial significance level. Several studies associate social norms with cultural aspects. The condition of the people of Bandar Lampung, which is not yet fully categorized as urban, has a communal culture that also supports the contribution of social norms variables. The people in the study area still adhere to the life philosophy of the people of Lampung, namely Sakai-sambayan, which, in essence, is to show a high sense of participation and solidarity in various social activities (Fitria, 2016). So the people of Lampung will feel less respected if they cannot participate in community activities. This is also in line with a study by UNICEF in the city of Bandar Lampung, which states that in implementing drinking water and sanitation programs, it

is necessary to implement social inclusion in water conservation programs [16].

There are several ways to increase conservation efforts, one of which is through water bills. Related parties generally make water bills a solution often used to improve water conservation behavior. However, several studies have reported that developing countries relying on water bills to improve people's conservation habits tend to produce disappointing results [10]. In addition, according to the findings (Tong et al., 2017), information openness and communication between water users (in this case, the community), institutions, and authorities help build trust, which will increase social norms and the capacity for individual control behavior in water conservation. Findings [10] also state that household water consumption can be reduced quickly, one of which is if people understand their level of water consumption. Through social and psychological conditions, these efforts are determined. Previous research [22] also discussed the relationship between social psychology and water conservation practices, focusing on West Java's upstream part. The results of this study found that variable X3 influenced the community conservation initiatives in the villages of Sanca and Cibeusi. Unlike in this study, the main factor is variable X4. The main factors of social psychology are sometimes different, depending on the psychological characteristics of the community. For this reason, the main factors influencing water conservation practices in Bandar Lampung City can be targeted in increasing their water conservation efforts.

IV. Conclusion

This research aims to find out the main variables that are the key to water conservation behavior to target community initiatives to reduce the amount of water use. The results of linear regression analysis, both simple and multiple (stepwise), show that the variable social norms (X4) is a significant variable and is known as the variable with the best contribution to influencing water conservation practices in Bandar Lampung City. While the correlation with the highest coefficient of determination based on the results of stepwise regression analysis found that the mathematical regression model involving three variables (Y = X1 + X2 + X4) has the highest value (0.062). Individual control behavior assessed based on the results of the analysis does not have a significant influence on community water conservation behavior. It is based on the magnitude of the p-value X3 > 0.1 so that the correlation of the four dependent variables on water conservation practices simultaneously obtains a coefficient of determination <correlation without the X3 variable. This is the first research in Indonesia on water conservation with a psychological approach, where conservation is an essential element in the SDGs environmental pillar. In addition, these results can be used as a reference by stakeholders from Perumda, Regional Government, NGOs, etc., in mapping strategies for increasing water conservation practices by the community so that water scarcity in coastal areas due to climate change can be mitigated. Suggestions for further research are to analyze other socio-demographic factors not studied in this study (such as marital status, water bills, household size/age of children, working status, home ownership, and several rooms).

Acknowledgements

Funds for carrying out this research came from the ITERA Research Grant 2022 (No. B/763g/IT9.C1/PT.01.03/2022).

References

[1] Ajzen, I. (1991). Organizational Behavior and Human Decision Processes. The Theory of Planned Behavior, 50(2).

[2] Amala, Z., Setiyawan, A., Sarli, P., Soewondo, P., & Awfa, D. (2023). Water and Sanitation Service: A Prority to Improve Quality of Slum Areas in Pontianak City Based on Stakeholders' Preferences. International Journal of GEOMATE, 24(102), 85-92.

[3] Aprile, M. (2017). Water Conservation Behavior and Environmental Concerns: Evidence from A Representative Sample of Italian Individuals. Journal of Cleaner Production, 159, 119-129.

[4] Ariyanto, L. (2022). Alokasi Air DAS Sekampung sebagai Upaya Pengelolaan Sumber Daya Air Berkelanjutan. Journal of Infrastructural in Civil Engineering (JICE), 03(01), 1-7. doi:https://doi.org/10.33365/jice.v3i01.1483

[5] BPLH. (2009). Status Lingkungan Hidup Kota Bandar Lampung. Jakarta: Badan Pengelolaan Lingkungan Hidup.

[6] Caurberghe, V., Vanquez-Casaubon, E., & Van de Sompel, D. (2021). Perceptions of water as commodity or uniqueness? The role of water value, scarcity concern and moral obligation on conservation behavior. Journal of Environmental Management, 292(112677).

[7] Corral-Verdugo, V. (2021). Personal Normative Beliefs, Antisocial Behavior, and Residential Water Conservation. Environmental and Behavior, 38(3), 406-421.

[8] Departemen Permukiman dan Prasarana Wilayah. (2002). Pedoman/Petunjuk Teknis Manual Sistem Penyediaan Air Minum Perkotaan Edisi Pertama. Jakarta: Departemen Permukiman & Prasarana Wilayah.

[9] Diaz, J., Odera, E., & Warner, L. (2020). Delving deeper: Exploring the influence of psycho-social wellness on water conservation behavior. Journal of environmental management, 264.

[10] Fan, L., Wang, F., Liu, G., Yang, X., & Qin, W. (2014). Public Perception of Water Consumption and Its Effects on Water Conservation Behavior. Water, 6(6), 1771-1784.

[11] Fu, Y., Wu, W., & Gao, J. (2015). Simulation and conservation of the end use water based on behavior intervention modelling. Procedia Engineering, 119, 761-770.

[12] Hapsery, A., & Lubis, R. (2019). Penggunaan Metode Stepwise Pada Pemodelan Perencanaa Track Quality Index (TQI) untuk Kereta Api Semicepat Indonesia. MUST: Journal of Mathematics Education, Science and Technology, 4(1), 144-122.

[13] Hassell, T., & Cary, J. (2007). Literature Review. In Promoting Behavioral Change in Household Water Consumption. Victoria: Smart Water.

[14] Iman, M., Irawan, E., Setiawan, B., & Abdurrahman, O. (2017). Air Tanah untuk Adaptasi Perubahan Iklim di Malang, Jawa Timur: Penilaian Risiko Penurunan Ketersediaan Air. RISET: Geologi dan Pertambangan, 27(1), 47-64.

[15] Janie, D. (2013). Statistik Deskriptif & Regresi Linier Beganda dengan SPSS (A. Ika, Ed.). Semarang: University Press.

[16] Kementerian PPN and UNICEF. (2022). Collaboration For Recovery And Resilience Through Better Wash Access For All (A Compendium Of Wash Best Practices In Indonesia ed.).

[17] Knickmeyer, D. (2019). Social factors influencing household waste separation: A literature review on good practices to improve the recycling performance of urban areas. Journal of Cleaner Production. doi:https://doi.org/10.1016/j.jclepro.2019.118605

[18] Koop, S., Van Dorssen, A., & Brouwer, S. (2019). Enhancing domestic water conservation behaviour: A review of empirical

studies on influencing tactics. Journal of Environmental Management, 247, 867-876.

[19] Mahdavi, T. (2021). Application of the 'theory of planned behavior' to understand farmers' intentions to accept water policy options using structural equation modeling. Water Science and Technology Water Supply, 21(3), 2720-2734.

[20] Moiron, M., Laskowski, K., & Niermela, P. (2020). Individual Differences in Behaviour Explain Variation in Survival: a meta-analysis. Ecology Letters, 23, 399-408. doi:doi.org/10.1111/ele.13438

[21] Nancarrow, B., Smith, L., & Syme, G. (1996). The Ways People Think about Water The Ways People Think About Water. Journal of Environmental Systems, 25(1).

[22] Nugroho, P., Rahayu, A., Juliani, R., Cahyo, A., Ankhoviyya, N., Gumilar, E., & Nugroho, A. (2022). Understanding Resident Intention and Behavior toward Water Conservation Initiative in the Upstream of West Java, Indonesia. Jurnal Sylva Lestari, 10(1), 12-25.

[23] Pambudi, Y., & Wisuantari, N. (2021). Moderation of Social Norms and Personal Involvement of Pro-Environmental Behavior. Jurnal Psikologi Teori dan Terapan, 11(2), 83-99. doi:http://dx.doi.org/10.26740/jptt.v11n2.p83-99

[24] Ratna, I. (2012). Gejala Perubahan Iklim, Dampak dan Strategi Adaptasinya pada Wilayah dan Komunitas Nelayan di Kecamatan Bluto, Kabupaten Sumenep. Jurnal Masyarakat & Budaya, 14(3), 439-46666.

[25] Rotter, J. (1996). Generalized Expectancles For Internal Versus External Control of Reinforcement Psychologycal Monographs. General and Applied, 80(1).

[26] Sanchez, C., Esper, F., Diaz, A., & Rubio, R. (2020). Understanding In-Room Water Conservation Behavior: The Role of Personal Normative Motives and Hedonic Motives in A Mass Tourism Destination. Journal of Destination Marketing & Management, 2(12).

[27] Setyowati, R., & Susilowati, F. (2019). Pendekatan MItigasi dan Adaptasi Perubahan Iklim Melalui Reklamasi Lahan dan Konservasi Air. Construction and Material Journal, 1(3), 2655-9625.

[28] Singha, B., Eljamal, O., Karmaker, S., Maamoun, I., & Sugihara, Y. (2022). Water conservation bahavior: Exploring the role off social, psychological, and behavioral determinants. Journal of Environmental Management, 317, 115484.

[29] Sitadevi, L. (2016). Membangun Ketahanan Kota terhadap Dampak Perubahan Iklim: Studi Kasus Kota Bandar Lampung. Jurnal Perencanaan Wilayah dan Kota (Journal of Regional and City Planning), 27(3), 190-207.

[30] Stern, P. (2000). New Environmental Theories: Toward A Coherent Theory of Environmentally Significant Behaviorz. Journal of Social Issue, 56(3), 407-424.

[31] Sugiyono. (2014). Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R&D. Jakarta: Alfabeta.

[32] Turner, M., Skubisz, C., & Rimal, R. (2011). Theory and Practice in Risk Communication: A Review of The Literature and Visions For The Future. The Routledge handbook of health communication, 174-192.

[33] Wardani, A. (2021). Konservasi Sumber Daya Air Guna Terjaganya Kualitas Serta Entitas Air Baku. PISCES: Proceeding of Integrative Science Education Seminar, 1(1), 117-126.

[34] Willis, R., Stewart, R., Panuwatwanich, K., Williams, P., & Hollingsworth, A. (2011). Quantifying the influence of environmental and water conservation attitudes on household end use water consumption. Journal of environmental management, 92(8), 1996-2009.

[35] Wohon, S., Hatidja, D., & Nainggolan, N. (2017). Penentuan Model Regresi Terbaik dengan Menggunakan Metode stepwise (Studi Kasus: Impor Beras di Sulawesi Utara). Jurnal Ilmiah Sains, 17(2), 80-88.