

Understanding the Residential Water-Saving Behavior: Basis for Sustainable Water Resources Management in Cabuyao, Sta. Rosa and Biñan, Laguna

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Abstract

This study focused on the demand side initiatives towards water conservation by examining the behavior and practices of the residential water consumers in the cities of Cabuyao, Sta. Rosa, and Biñan, Laguna. The study examined the effect of attitude, subjective norms, perceived behavioral control on residential conservation intention and determined the effect of intention on residential conservation behavior. The study also tested the mediating effect of intrinsic and extrinsic motivation on the relationship between intention and behavior. The research employed a quantitative, descriptive, and casual research approach and gathered the data through online and dissemination of printed quick-response code forms. A total of 151 residential households were collected from the said three cities in Laguna using a purposive sampling. The results revealed that subjective norms are significant predictors of residential conservation intention while attitude and perceived behavioral control are not significant predictors of intention. Extrinsic motivation shows a partial mediation while intrinsic motivation does not mediate the relationship between intention and behavior. These findings supported the complexity in understanding water conservation behavior.

Keywords: Water Conservation; Residential Conservation Behavior; Intention; Intrinsic and Extrinsic Motivation; Water Resources Management

1. INTRODUCTION

1.1. Background of the Study

Water is critical and vital to human societies and ecosystems. Every individual plays an important role in the sustainability of water resources. Residential consumers can contribute to this by conserving and reducing their water consumption and by engaging in proper waste management and disposal. Unfortunately, households with the ability to engage in these activities are often unaware of the significance of water savings and the effective methods to reduce water consumption. Also, human activities and the increasing effect of climate change have put unprecedented strain on water resource systems in local and global communities. Hence, the need for water conservation and to adopt such behavior is necessary to combat the pressing global issue on water scarcity. Water scarcity is driven by factors such as population growth, climate change, pollution, urbanization, and poor water management and has a wide-reaching consequence to economic progress, food security, and ecosystems. Addressing this multifaceted challenge requires collaboration between governments, institutions, and individuals to ensure the long-term sustainability and security of this vital resource. Globally there are more than 1.1 billion people experiencing lack of access to safe drinking

water, and there are nearly 2.6 billion people who lack basic sanitation services. The problem of water scarcity keeps on rising, especially in developing countries.

According to a report by the United Nations, there has been a twofold increase in water usage worldwide over the last century. Also, there are approximately 1.2 billion people across the globe who live in areas that have problems with water availability and sufficiency to meet the demands of its people. In addition to the physical water scarcity, the economic scarcity has been a major contributor to water security. Currently, over 1.6 billion people are facing economic water shortage because people also have financial burdens limiting access to the existing water sources (Mishra et al., 2021).

The Philippines, a country that is part of Southeast Asia, has a total population of more than 109 million people based on the report of PhilAtlas last 2020 census. The country has 17 regions, 81 provinces, 146 cities, 1,488 municipalities and 42,046 barangays to count off. In the province of Laguna situated in Region IV-A occupying the central section of Luzon has a total population of 3,382,193 at the last 2020 census with an annual population growth rate of 2.31% in 2015-2020. The said country is known as the Pearl of the Orient Seas and has approximately 7,641 islands making it second in rank from Asia and seventh in the world that has the highest number of islands. The country is abundant with water bodies and resources but also has several issues and challenges on water resources management. In 2019, the Executive Director of National Water Resources Board (NWRB), Dr. Seville D. David Jr. outlined these issues such as unabated extraction of groundwater due to rapid urbanization and industrialization, inadequate sewerage and sanitation facilities, watershed degradation, deteriorating health of river and coastal systems and indiscriminate land use development which affects the quality and quantity of the water. Other practices of people and businesses in the country which includes direct dumping of domestic solid waste in rivers and lakes and direct wastewater discharges of domestic and industries to the bodies of water contaminate the water and groundwater and create adverse impact on water quality and water sources of the country. Extreme events such as El Niño, La Niña, floods, drought, and landslides caused by climate change also pose threats to water security and sustainability.

The studies of Kumar et al. (2020) and Arcadio et al. (2023) highlighted water pollution issues in the said country. Kumar's study discussed the severe pollution in the Santa Rosa Sub-Watershed located in the province of Laguna while Arcadio's research revealed that there is a high density of microplastics which needs for better plastic waste management in Laguna de Bay, the largest lake in the country situated also in Laguna with an area of approximately 900 square kilometers. This lake is the second largest inland freshwater lake in Southeast Asia which could be potentially used as the primary water source in the province but unfortunately due to water quality issues and pollution made by various sectors which includes agricultural runoff, industrial discharges, and informal settlements around the lake. The water is severely polluted with high levels of pollutants. If water is not suitable for direct consumption, hence adequate treatment is necessary which is costly. This makes water districts, water concessionaires and other businesses in Laguna and consumers to use other alternative sources for water use such as the groundwater sources (deep well) and springs for production, distribution, and consumption of water. To address water quality issues and challenges on the locale, specifically on the province of Laguna, collaboration and environmental protection initiatives are necessary to achieve sustainability on water management and development, issues and challenges remain putting all stakeholders to act responsively and conserve water resources to ensure sustainable and safe water supply in the community and on the society at large.

Groundwater is widely recognized in low-income areas as the major source for water supply. The proportion of households using groundwater compared with other sources is rarely documented, with national and global information focusing on facilities rather than resources consumed (Carrard et al., 2019). Anchored on the study of Gibson et al. (2023) entitled “Integrating the Theory of Planned Behavior and Motivation to Explore Residential Water-Saving Behaviors,” this study examines the factors affecting residential customer in adopting water conservation behavior. The household customers of the various providers of water services, specifically in the cities of Cabuyao, Sta. Rosa, and Biñan are the respondents of this research. The objective of the study is to examine if attitudes, subjective norms, perceived behavioral control are the factors that affect the intention of residential customers in adopting water conservation behavior; determine if intention affects the residential conservation behavior, and test if intrinsic and extrinsic motivation mediates the relationship of the intention and behavior.

1.2. Review of Related Literature

The Theory of Planned Behavior (TPB) is an established framework for persuasive communication in which people should consciously analyze or reflect on a behavior that they are performing. TPB describes behavioral intentions as attitudes, subjective norms, and perceived behavioral control over a certain behavior, such as water conservation. Behavioral intentions are believed to be the best predictor of behavior. An individual's attitude toward an action is their appraisal of the positive or negative effects of practicing a given behavior. Subjective norms are a person's belief concerning if a particular conduct will be accepted by people who are important to them. According to Gibson et al. (2023), strengthening consumers' subjective norms toward water conservation is crucial to improve their desire to act in water conservation. The perceived behavioral control relates to a person's perception of how difficult it is to carry out a given activity and if they have control over the decision to carry it out. When an individual has both strong self-efficacy and autonomy, the behavior is more inclined to occur than when these attributes are lacking.

Gibson et al. (2023) findings revealed that attitude and subjective norms have a direct effect on residential conservation intention while perceived behavioral control does not have a direct effect on the intention. Residential conservation intention also has a direct effect on residential conservation behavior. On the mediating variables, to check if intrinsic motivation and extrinsic motivation mediate the relationship between residential intention and behavior, this is supported and rejected respectively. The theory is commonly employed to explore the motivations behind behaviors related to conservation, particularly in the context of water conservation. Many studies on water conservation utilizing TPB aim to comprehend the intention to conserve water by introducing supplementary variables to expand the framework. Almulhim and Abubakar (2023) examined the attitude of the households to water conservation in Saudi Arabia towards sustainable communities. The study looks at the relationship between household attitudes, information sources, and water conservation policies in Saudi Arabia. The findings show that more than half of participants believe that water should be conserved, yet three-quarters disagree that they are obligated to conserve water. Water conservation behaviors were shown to be substantially linked with socio-economic characteristics. Also, the study emphasizes the relevance of human attitudes in designing effective water conservation strategies and combining top-down public awareness initiatives with bottom-up programs based on school curricula which can help policymakers in building an effective water conservation programs and policies.

The case study of GRZYB and WAWRZAŁA (2023) investigated the attitudes and practices of generation Z towards water conservation. The study revealed that Generation Z has specific characteristics

that can lead to disagreements in teamwork. Also, leaders who aim for a better knowledge of these characteristics and attitudes can collaborate more effectively with representatives of this generation. The study of Erskine et al. (2023) revealed that personal water conservation behavioral intent was positively correlated with water conservation contribution behaviors and personal water conservation behavioral intent and income level are significant predictors of contribution behaviors. According to the study of Singha et al. (2023), families are more likely to adopt water conservation practices and use less water if they have a positive attitude, greater awareness and responsibility for water issues, stronger emotions, habits, and participation in water-saving activities or campaigns. Pham et al. (2023) used the theory of planned behavior and the norm activation model to investigate the willingness to pay (WTP) of the respondents in Ho Chi Minh City, Vietnam on e-waste recycling. The model revealed that subjective/social norms, moral/personal norms, inconvenience of recycling, perception of e-waste pollution, age, home ownership, and income significantly affected WTP for e-waste recycling.

Si et al. (2022) expanded the theory of planned behavior in their study by incorporating environmental concerns, perceived risk, and information publicity. These factors were considered in predicting the overall water-saving intentions of Jinan, China residents who were knowledgeable about the city's water resources and policies. The study revealed that water-saving intentions were most directly influenced by attitude and information publicity. Additionally, subjective norms and perceived behavioral control showed notable direct impacts on water-saving intentions, while environmental concerns and perceived risk exerted significant indirect effects on the intention. Ghali-Zinoubi (2022) extended the theory of planned behavior, integrating environmental conscious consumption, cultural factors as a moderator and examine the direct relationships between behavior and its predictors without the mediation of intention. The study revealed environmental concern, perceived consumer effectiveness, and willingness to be environmentally friendly are all major motivators for environmentally conscious customers' behavior. The cultural factor collectivism greatly improves the relationships between environmentally conscious consumer behavior and its predictions while long-term orientation plays a favorable, but insufficient moderating role.

Shenaq (2021) defined intrinsic motivation as the motivational behavior that came from within the individual while doing the task rather than the motivation that stems from various external rewards which is extrinsic motivation. Warner and Diaz (2021) used TPB to examine how TPB variables and connectedness to water as new variables to explain the factors influencing the intention of an individual to engage in landscape irrigation practices. Their findings indicated that subjective norms, perceived control, and water connection positively affects behavioral intent in landscape irrigation, while attitude was not significantly related.

The study of Russell & Knoeri (2020) considered habits as an influencing factor in household water conservation. The result of their research explains that attitudes, norms, and habits of the households significantly affects their intention to conserve water, highlighting the habits as the most influential predictor for water conservation intentions and self-reported water bills. The authors emphasized the importance of altering deeply ingrained water conservation habits as a vital strategy for effectively managing urban water demand. Bollinger et al. (2020) used variance from movers to identify the causal peer effects on residential water conservation during the summer. The author used high-resolution remote sensing pictures to gather evidence which shows that switching from green to dry landscaping significantly reduces water consumption. Also, peer effects may not be as strong without a price signal, suggesting a link between information and pricing. These findings can guide water use policies in regions facing periodic droughts. The study of Araya et al. (2020) found that public perceptions of conservation do not coincide with utilities' desired use outcomes. This misalignment is further influenced by seasonality and the metric used to assess residential conservation. There was significant variability in the socio-demographic and geographic characteristics that impacted

perceptions and usage outcomes. Understanding the misalignment between utility perceptions and usage outcomes can lead to tailored conservation programs that improve public understanding and correct misconceptions, ultimately increasing the effectiveness of conservation efforts.

The study of Warner et al. (2020) indicated that despite having a strong personal and social norms of city water users on water conservation, it did not translate into conservation as expected in the theory. The study suggested that recognizing the origin of irrigation water can offer valuable insights into outdoor water usage patterns, emphasizing the importance of incorporating such knowledge into strategies aimed at promoting residential water conservation. Eanes and Zhou (2020) learned that perceived behavioral control predicts fertilizer/pesticide avoidance and mulching, while beliefs and attitudes towards adopting lawncare best management practices (BMPs) positively correlate with mulching and support for a municipal chemical ban. They also found significant but inconsistent relationships between independent variables such as social norms, gender, education level, age, and property ownership status and the dependent variables of interest.

Intrinsic motivation has been assessed in various studies using attitudes as a metric. The study of Bopp et al. (2019) defined the attitudes as an individuals' inclinations to engage in a behavior driven by their positive or negative evaluations of that behavior. Schultz et al. (2019) study used a tool to promote residential water conservation. The households receive a printed water reports on their previous water consumption and compared with similar homes in the area. The result of the study indicated that households who received a printed report decrease their water consumption by 8.35% in the subsequent 6 months compared to similar households that did not receive the printed reports. It also showed that the effect was significant for high-consuming households, and the discrepancy between household consumption and similar homes influenced the amount of water savings. Ali et al. (2019) explored the relationships among social norms, aesthetics, and HOA regulations and water conservation. The findings found that when consumers placed a higher-than-average value on aesthetics and experienced stronger social support for conservation, home irrigation users were more likely to conserve water.

1.3. Significance of the Study

This study investigated the factors affecting the residential water consumers in Cabuyao, Sta. Rosa and Biñan, Laguna to conserve water. This utilizes the theory of planned behavior and motivation to understand the intention and behavior of the households in water-saving.

Sustainable water management benefits the residential water consumers and the communities to enjoy clean and potable water. Also, a reliable supply of water to household consumers improves sanitation, reduces problems associated with waterborne diseases and improves the overall hygiene of consumers. The reliability of water supply and diminishing concerns on water-related issues contributes to public health and to political stability and security of the community, benefiting the local government and other agencies to reduce its healthcare expenditures connected to waterborne diseases and use their funds in other public services.

1.4. Research Framework

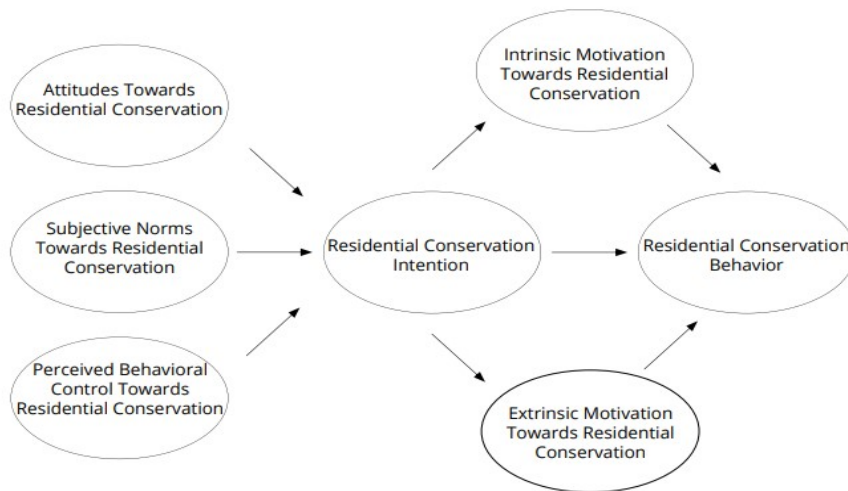
1.4.1. Conceptual Framework

This study is based on the conceptual framework used by Gibson et al. (2023) in their study entitled “Integrating the Theory of Planned Behavior and Motivation to Explore Residential Water-Saving Behaviors”. The study analyzed the direct effect of attitude, subjective norms, and perceived behavioral

control towards residential conservation intention, the direct effect of intention towards residential conservation behavior, the mediating effect of intrinsic and extrinsic motivation on the relationship between intention and behavior and the indirect effect of attitude, subjective norms, and perceived behavioral control on behavior. The result of the study revealed that there is a significant direct effect of attitude and subjective norms on intention while perceived behavioral control does not have a significant direct effect on intention. The intention had a significant direct effect on intention. Intrinsic motivation mediates the relationship of intention and behavior while extrinsic motivation does not mediate the relationship between intention and behavior. Furthermore, attitude and subjective norms have a significant indirect effect on behavior. Meanwhile, perceived behavioral control does not have a significant indirect effect on behavior.

Figure 1. Conceptual Framework

Source: Integrating the Theory of Planned Behavior and Motivation to Explore Residential Water-Saving Behaviors By Kristin E. Gibson, Alexa J. Lamm, Kevan W. Lamm and Jessica Holt (August 2023)



1.4.2. Operational Framework

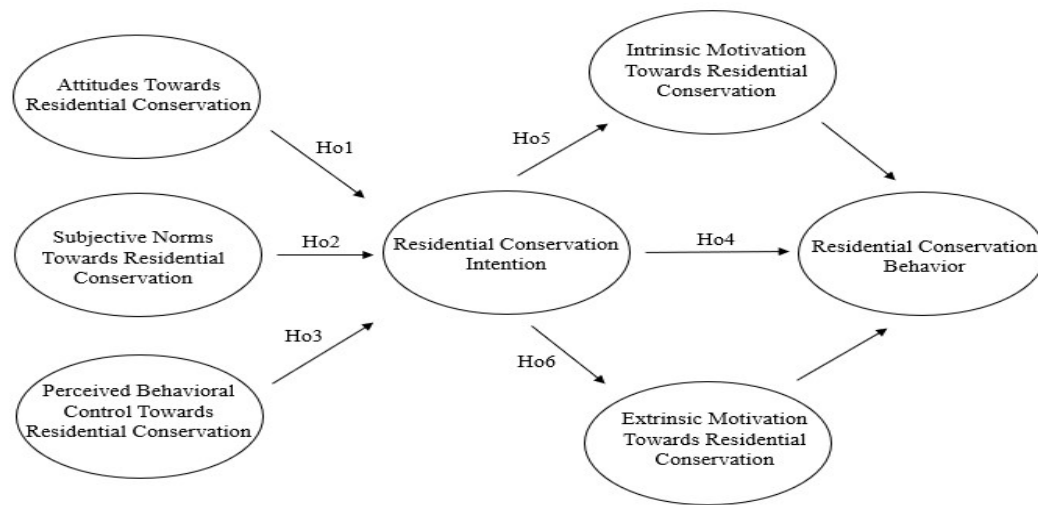
As reflected in Figure 2, this study tests the preliminary findings of Gibson et al. (2023) by using motivation as the mediating variable between intention and behavior. The study tests if residential conservation intention of water consumers in the said locale in Laguna is affected by attitudes, subjective norms, perceived behavioral control. The study also tests the effect of intention on behavior. This study further determined if intrinsic and extrinsic motivations mediate the relationship between intention and behavior.

The attitude towards residential conservation is an individual evaluation of the positive and negative outcomes of performing a specific behavior such as water conservation. Subjective norms towards residential conservation are the individual belief about whether performing a specific behavior such as water conservation would be approved by people who are important to them. Perceived behavioral control towards residential conservation refers to an individual perception of how challenging it is to perform a specific

behavior such as water conservation and whether they have control over making the decision to perform such behavior. Residential conservation intention refers to an individual expressed commitment, willingness, or plan to engage in activities and behavior such as water conservation.

Intrinsic motivation towards residential conservation relates to personal interests and enjoyment of the action such as water conservation while extrinsic motivation towards residential conservation stems from external pressure and rewards in which persons execute an action such as water conservation to attain some external results. Residential conservation behavior refers to the action, practice, and habit adopted by an individual within a residential setting with the explicit purpose of conserving resources particularly on water conservation.

Figure 2. Operational Framework



1.5. Objectives of the Study

This study is aimed to understand the behavior of residential water consumers in Cabuyao, Sta. Rosa and Biñan, Laguna and to address the pressing global issue on water scarcity whereas practices of businesses and habits of residential consumers plays significant on current and future state conditions of all water sources. Hence, the following are the detailed objectives of this study:

1. Examine the effect of attitudes, subjective norms, and perceived behavioral control on residential conservation intention;
2. Determine the effect of residential conservation intention on residential conservation behavior;
3. Test the mediating effect of intrinsic motivation on the relationship between residential conservation intention and behavior; and

4. Test the mediating effect of extrinsic motivation on the relationship between residential conservation intention and behavior.

1.6. Hypotheses

The following hypotheses are tested in the study:

Ho1: Attitudes towards residential water conservation do not have a significant effect on residential conservation intention.

Ho2: Subjective norms towards residential water conservation do not have a significant effect on residential conservation intention.

Ho3: Perceived behavioral control towards residential water conservation does not have a significant effect on residential conservation intention.

Ho4: Residential conservation intention does not have a significant effect on residential conservation behavior.

Ho5: Intrinsic motivation towards residential water conservation does not mediate the relationship between residential conservation intention and residential conservation behavior.

Ho6: Extrinsic motivation towards residential water conservation does not mediate the relationship between residential conservation intention and residential conservation behavior.

The above hypotheses are used as the guiding principles on the data analysis made to determine the relationship among variables presented in the study.

2. MATERIALS AND METHODS

This study explores the factors influencing the residential water consumers in Laguna to perform water-saving behaviors. The researcher explored and examined the variables presented in the hypothesis and evaluated its combined predictive capacity and analyzed the behavior of households towards water conservation. The researcher gained a deeper understanding of the factors shaping residential water-saving behaviors and contribute to the literature related to water conservation.

2.1. Research Design

This research employed descriptive-correlational research design. The study described the attitudes, subjective norms, perceived behavioral control, intention to conserve, conservation behavior, and the intrinsic and extrinsic motivation of the respondents. It is correlational as it tested the effect of conservation intention on conservation behavior and the mediating effect of intrinsic and extrinsic motivation on the relationship between intention and behavior.

2.2. Locale of the Study

The cities of Cabuyao, Sta. Rosa, and Biñan in Laguna were selected as the locale of this study in consideration of the severe pollution of Santa Rosa Sub-Watershed and Laguna de Bay reported in the study of Kumar et al. (2020) and Arcadio et al. (2023) which poses threats to the community and in water sources of the said locale. Meanwhile, the total number of households of the said three cities is 341,053 equivalents to a population of 1,174,256. The city of Cabuyao has 100,875 households equal to a population of 354,449. The city of Sta. Rosa has 112,458 households equal to a population of 413,639 and Biñan with 117,720 households equal to a population of 406,168 as presented on the data of Philippine Statistics Authority (PSA) last 2020 census report.

2.3. Respondents of the Study

The respondents of this research were the residential water consumers connected to a water service provider aged eighteen (18) and above living in Cabuyao, Sta. Rosa and Biñan, Laguna.

2.4. Sampling Design

Using GPower, with an effect size of 0.15, 0.05 error and 0.95 power, a minimum of 146 residential water consumers were required for this study. However, the study used 151 samples to present the characteristics of the population. A printed quick-response code survey form was created for the respondents to access the online form at their own convenience. The distribution of the online survey form was through various channels, including social media, email, and other relevant online platforms while printed quick-response code survey form were distributed manually and responses were collected online.

2.5. Research Tools and Instruments

The researcher utilized the survey instrument used in the study of Gibson et al. (2023). The attitudes, subjective norms, perceived behavioral control, intrinsic and extrinsic motivation, residential conservation intention, and residential conservation behavior are the variables of this research. A pilot test was conducted to other locales to detect and resolve any concerns related to the clarity, wording, and functionality of the survey instrument. All variables used in the instrument passed the reliability test with 0.952, 0.783, 0.886, 0.881, 0.847, 0.798, 0.816 Cronbach alpha values respectively for the said variables. The passing Cronbach alpha is 0.70 while the overall Cronbach alpha value during pilot test was 0.939 which is considered excellent.

Table 1 below shows the overall Cronbach's alpha of 0.941 indicating a very high level of internal consistency across all variables in the study. The items used to measure the constructs have collectively demonstrated a strong reliability to capture the intended psychological purpose of this research. The data indicated that the measures used to assess attitude, subjective norms, perceived behavioral control, intrinsic motivation, extrinsic motivation, intention, and behavior demonstrated a high level of internal consistency, providing confidence in the validity of the findings derived from these measurements.

Table 1. Reliability Results of the Variables of the Study

Variables	Number of Items	Cronbach's Alpha
Attitude	7	0.927
Subjective Norms	6	0.881
Perceived Behavioral Control	5	0.915

Intrinsic Motivation	7	0.921
Extrinsic Motivation	3	0.889
Intention	9	0.837
Behavior	5	0.807
Overall	42	0.941

The survey questionnaire consisted of two (2) parts, the first part covers the profile of the respondents in terms of city residence, sex, age, educational attainment, income of the family, home ownership, total number of family members living in their house, average monthly water consumption of the family in cubic meter and the water service provider of the participant. The second part of the survey questionnaire covers the attitudes, subjective norms, perceived behavioral control, intrinsic and extrinsic motivation, residential conservation intention, and residential conservation behavior.

To measure attitude, a five-point semantic differential scale was used on 7 pairs of bipolar adjectives. A five-point Likert scale with as 1 = Strongly Disagree and 5 = Strongly Agree were used to measure the subjective norms, perceived behavioral control, intrinsic and extrinsic motivation. Also, a five-point Likert scale with as 1 = Very Unlikely and 5 = Very Likely were used to measure the residential conservation intention and residential conservation behavior. Table 2 below shows the specification of the survey instrument used in the study.

Table 2. Specification of the Questionnaire

Variable	Response Category	Number of Questions	Response
Bipolar adjectives			
Attitude	Five-point Semantic Differential Scale (1-5)	7	Bad : Good
			Harmful : Beneficial
			Worthless : Valuable
			Unpleasant : Pleasant
			Not acceptable : Acceptable
			Foolish : Wise
			Not essential : Essential
Subjective Norms		6	
Perceived Behavioral Control	Five-point Likert Scale (1 – SD, 5 – SA)	5	Strongly Disagree to Strongly Agree
Intrinsic Motivation		7	
Extrinsic Motivation		3	
Intention	Five-point Likert Scale (1 - VU, 5 – VL)	9	Very Unlikely to Very Likely
Behavior		5	

2.6. Data Analysis and Interpretation

The researcher used the frequency and percentage distribution to summarize and present the demographic profile of the respondents. The following table below shows the mean data analysis and interpretation of all variables used in the study.

Table 3. Mean Data Analysis and Interpretation for Attitude

Semantic Differential	Adjectival Rating	Mean Range	Verbal Interpretation
5	Very High	4.20 - 5.00	Extremely Positive
4	High	3.40 - 4.19	Moderately Positive
3	Moderate	2.60 - 3.39	Moderate
2	Low	1.80 - 2.59	Moderately Negative
1	Very Low	1.00 - 1.79	Extremely Negative

Table 4. Mean Data Analysis and Interpretation for Subjective Norm, Perceived Behavioral Control, Intrinsic and Extrinsic Motivation

Likert Scale	Adjectival Rating	Mean Range	Verbal Interpretation
5	Strongly Agree	4.20 - 5.00	Very High
4	Agree	3.40 - 4.19	High
3	Neutral	2.60 - 3.39	Moderate
2	Disagree	1.80 - 2.59	Low
1	Strongly Disagree	1.00 - 1.79	Very Low

Table 5. Mean Data Analysis and Interpretation for Intention and Behavior

Likert Scale	Adjectival Rating	Mean Range	Verbal Interpretation
5	Very Likely	4.20 - 5.00	Very High
4	Likely	3.40 - 4.19	High
3	Undecided	2.60 - 3.39	Moderate
2	Unlikely	1.80 - 2.59	Low
1	Very Unlikely	1.00 - 1.79	Very Low

The researcher used regression analysis to test the null hypothesis 1, 2, 3 and 4. If p-value is less than 0.05, it means that the effect is significant. In this study, the mediating variables are the intrinsic and extrinsic motivation towards residential water conservation. To investigate null hypothesis 5 and 6, regression analysis was also used to interpret the result. If p-value is less than 0.05, Ho4 and Ho5 of the study are accepted indicating that intrinsic and extrinsic motivation mediates the relationship intention and behavior.

2.7. Ethical Considerations

This paper has undergone ethics review and adhered to the guidelines of the institutions and other organizations to ensure integrity and credibility of this research. The researcher obtained an informed consent to ensure that all participants and stakeholders involved in the study have fully understood the nature, objectives, and their contributions to the study. The data and all other information gathered, including the personal information of all the participants were treated with confidentiality in accordance with the Republic Act No. 10173 of the Philippines. Acknowledging and respecting the diverse perspectives on water use, the researcher prevents reinforcing stereotypes or inadvertently imposing values that are not appropriate to the participants' environment.

The study also adhered to proper citation and recognition practices, acknowledging the attribution and intellectual contributions of previous researchers, scholars, and sources that influenced and molded this study. The results of this research were presented accurately and responsibly to disseminate the correct information of the findings. The study advocated for an ethical approach on water-saving behavior research to develop an effective action plan and innovative program to the providers of water services in the said locale of the study, thus, promoting sustainable water practices with respectful exploration on the global concern for water security and sustainability of water resources.

3. RESULTS AND DISCUSSION

3.1. Descriptive Statistics

The demographic profile of the 151 respondents of this study is shown in the Appendix B. Table 6 below shows the overall analysis made on independent and dependent variables of the study. It indicates that respondents hold an extremely positive attitude towards conservation effort same level with subjective norms, and respondents perceived that social pressure towards conservation behaviors is very high. Also, respondents felt that they have complete control over their ability to engage in conservation behaviors as indicated of the very high rating on perceived behavioral control. On the mediating variables, respondents are highly motivated internally to engage in conservation behavior while extrinsic motivation showed a moderate level to participate in water conservation behavior. Meanwhile, respondents show a high intention to engage in conservation behavior. Additionally, it demonstrates a very high level of engagement in actual conservation behavior. In terms of variability, extrinsic motivation towards conservation behavior shows more variation in responses, indicating that respondents have different levels of importance placed on extrinsic factors used in the study.

Table 6. Descriptive Statistics for the Variables of the Study

Variables	Mean	Std. Deviation	Verbal Interpretation
Attitude	4.74	0.43	Extremely Positive
Subjective Norms	4.37	0.64	Very High
Perceived Behavioral Control	4.44	0.66	Very High
Intrinsic Motivation	4.12	0.71	High
Extrinsic Motivation	3.05	1.24	Moderate

Intention	3.91	0.69	High
Behavior	4.34	0.63	Very High

The results support Singha et al. (2023) findings that families are more likely to adopt water conservation practices and use less water if they have a positive attitude, greater awareness and responsibility for water issues, stronger emotions, habits, and participation in water-saving activities or campaigns.

3.2. Effect of Attitudes, Subjective Norms, and Perceived Behavioral Control on Residential Conservation Intention.

Table 7 presents the effects of attitude, subjective norms, perceived behavioral control towards residential water conservation on residential conservation intention. Results showed that attitude (p-value = 0.391, $p > 0.05$) was not significant, subjective norms (p-value = 0.003, $p < 0.05$) was significant while perceived behavioral control (p-value is 0.552, $p > 0.05$) did not have a significant effect on residential conservation intention. The standard coefficient of attitude, subjective norms and perceived behavioral control was 0.080, 0.330 and 0.068 respectively, indicating that subjective norms with standard coefficient value or Beta of 0.330 had the greatest contribution to intention. Also, 18.6% of intention can be attributed to changes in attitude, subjective norms, and perceived behavioral control. Given the p-value of 0.000 which is less than 0.05, the model was considered significant.

Table 7. Effect of Attitude, Subjective norms, and Perceived Behavioral Control on Residential Conservation Intention

Coefficients ^a						
	Unstandardized Coefficients		Standardized Coefficients			
Model	B	Std. Error	Beta	t	Sig.	Interpretation
(Constant)	1.428	.574		2.490	.014	
Attitude	.129	.150	.080	.860	.391	Not Significant
Subjective Norms	.356	.117	.330	3.029	.003*	Significant
PBC	.071	.119	.068	.596	.552	Not Significant
R ² = .186 F-value = 11.198 p-value = .000 *Significant						

a. Dependent Variable: Intention

The results of the study showed that only subjective norms have significantly affected the residential conservation intention. Hence, rejecting hypothesis 2 while supporting hypothesis 1 and 3 of this study. According to Gibson et al. (2023), strengthening consumers' subjective norms toward water conservation is crucial to improve their desire to act in water conservation. Also, Si et al. (2022) revealed that subjective norms have a notable direct impact on water-saving intentions. Furthermore, Warner and Diaz (2021) on landscape irrigation practices stated that attitude does not significantly affect behavioral intention while subjective norms do. Although attitude is not significant as opposed to Si et al. (2022) that water-saving intentions were most directly influenced by attitude and information publicity, Almulhim and Abubakar

(2023) emphasized the relevance of attitudes in designing an effective water conservation strategy, combining top-down public awareness initiatives with bottom-up programs.

3.3. Effect of Residential Conservation Intention on Residential Conservation Behavior

Table 8 below revealed the effect of residential conservation intention on residential conservation behavior. The intention has a standard coefficient 0.612 and p-value of 0.000 which is less than 0.05 indicating a significant effect on behavior. The model has 0.374 R^2 indicating that 37.4% of behavior can be attributed to the variation of intention. With a p-value of 0.000, the model was considered significant.

Table 8 Effect of Residential Conservation Intention on Residential Conservation Behavior

Coefficients ^a						
Model	Unstandardized Coefficients			Standardized Coefficients		
	B	Std. Error		Beta	t	Sig.
1						
(Constant)	2.181	.233			9.381	.000
Intention	.552	.059		.612	9.437	.000*
Significant at the .05 level (2-tailed).						
R ² = .374						
F-value = 89.051						
p-value = .000						
*Significant						

a. Dependent Variable: Behavior

The finding of the current study was supported by the findings of Erskine et al. (2023) that personal water conservation behavioral intent was positively correlated with water conservation contribution behaviors and personal water conservation behavioral intent and income level and the said variables are significant predictors of behavior. Also, Gibson et al. (2023) indicated that intention has a direct effect on residential conservation behavior.

3.4. Mediating Effect of Intrinsic Motivation on the Relationship between Residential Conservation Intention and Behavior.

Table 9 below shows the regression analysis used to investigate the mediating effect of intrinsic motivation on the relationship between residential conservation intention and behavior of this study. Model 1 results indicated that intention (p-value is 0.000) is a significant predictor of behavior, $B = .552$, $SE = .059$, $p < .05$. Referring to Model 2, intrinsic motivation with p-value of 0.114 was not a significant predictor of behavior, $B = .097$, $SE = .061$, $p > .05$. The intention remained significant (p-value is 0.000) with the presence of intrinsic motivation. $B = .517$, $SE = .062$, $p < .05$. A small change in R^2 was found from .374 (p-value = .000) in Model 1 to .385 (p-value = .114) in Model 2, which was not significant.

Table 9. Mediating Effect of Intrinsic Motivation on the Relationship between Residential Conservation Intention and Behavior.

		Coefficients ^a					R ²	R ² change	Sig F Change
		Unstandardized Coefficients		Standardized Coefficients					
Model		B	Std. Error	Beta	t	Sig.			
1	(Constant)	2.181	.233		9.381	.000	.374	.374	.000*
	Intention	.552	.059	.612	9.437	.000*			
2	(Constant)	1.921	.283		6.781	.000	.385	.011	.114
	Intention	.517	.062	.572	8.287	.000*			
	Intrinsic	.097	.061	.110	1.591	.114			

a. Dependent Variable: Behavior

b. *Significant

The result of this study opposed the findings of Gibson et al. (2023) which indicated that intrinsic motivation mediates the relationship between residential conservation intention and residential conservation behavior particularly on water saving behavior.

3.5. Mediating Effect of Extrinsic Motivation on the Relationship between Residential Conservation Intention and Behavior

Table 10 below shows the regression analysis to investigate the mediating effect of extrinsic motivation on the relationship between residential conservation intention and behavior. Model 1 indicated that intention (p-value is 0.000) was a significant predictor of behavior, $B = .552$, $SE = .059$, $p < .05$. Model 2 revealed extrinsic motivation (p-value is 0.000) was a significant predictor of behavior, $B = -.151$, $SE = .033$, $p < .05$, with intention remaining to be a significant predictor of behavior ($B = .651$, $SE = .059$, $p < .05$), thus indicating a partial mediation. A change in R^2 was found from .374 (p-value = .000) in Model 1 to .452 (p-value = .000) in Model 2, which were both significant.

Table 10 Mediating Effect of Extrinsic Motivation on the Relationship between Residential Conservation Intention and Behavior.

		Coefficients ^a					R ²	R ² change	Sig F Change
		Unstandardized Coefficients		Standardized Coefficients					
Model		B	Std. Error	Beta	t	Sig.			
1	(Constant)	2.181	.233		9.381	.000	.374	.374	.000*
	Intention	.552	.059	.612	9.437	.000*			
2	(Constant)	2.259	.219		10.316	.000	.452	.078	.000*
	Intention	.651	.059	.720	11.027	.000*			

Extrinsic	-.151	.033	-.299	-4.581	.000*
a. Dependent Variable: Behavior					
b. *Significant					

The result of this study opposed the findings of Gibson et al. (2023) which indicated that extrinsic motivation does not mediate the relationship between residential conservation intention and residential conservation behavior particularly on water saving behavior.

3.6. Conclusions and Recommendations

The study provides a valuable insight on the factors that influence water conservation behavior. The study found out that individuals' subjective norms are significantly associated with residential conservation intention. Also, extrinsic motivation partially mediates the relationship between intention and behavior specifically on the engagement on water conservation activities. Table 11 below summarizes the results of the hypothesis of the study.

Table 11 Summary of the Results on the Hypothesis of the Study

Hypothesis of the Study	Result
Ho1: Attitude towards residential water conservation does not have a significant effect on residential conservation intention.	Failed to reject
Ho2: Subjective norms towards residential water conservation do not have a significant effect on residential conservation intention.	Rejected
Ho3: Perceived behavioral control towards residential water conservation does not have a significant effect on residential conservation intention.	Failed to reject
Ho4: Residential conservation intention does not have a significant effect on residential conservation behavior.	Rejected
Ho5: Intrinsic motivation towards residential water conservation does not mediate the relationship between residential conservation intention and residential conservation behavior.	Failed to reject
Ho6: Extrinsic motivation towards residential water conservation does not mediate the relationship between residential conservation intention and residential conservation behavior.	Rejected

The study revealed that residential water consumers in Cabuyao, Sta. Rosa and Biñan in Laguna are affected by subjective norms to influence their intention for water conservation. Also, extrinsic motivation partially mediates the relationship between intention and behavior. Providers of water services in the said locale should utilize these factors to influence its residential consumers to adopt water conservation practices and behavior.

To enhance the residential conservation intention and behavior, collective effort and collaboration of individuals, communities, providers of water services, industries, governments, and other bodies is necessary. Recognizing that water resources management is a shared responsibility, stakeholders can work together to ensure that this vital resource is preserved and protected for future generations. Collective action will lead to a

more resilient and sustainable approach for water management, benefiting the people, businesses, and the planet.

Furthermore, given the results of this study on the influence of attitude and perceived behavioral control on residential conservation intention, it is recommended for future researchers to delve deeper into these aspects or test these results for collective and comparison of behaviors of residential customers to other cities and municipalities in Laguna. Understanding why these variables did not show significant effects can provide valuable insights into the nuances of water conservation behavior in the province.

3.7. Limitations of the Study

There are several potential limitations of the study concerning water conservation behavior. One of them could be the use of self-report measures. Even though the high Cronbach's alpha values indicated strong internal consistency among survey items, self-report measures are susceptible to social desirability bias and memory recall issues. It is possible that the participants may overestimate their actual water conservation behavior and answer the supplied questionnaires in a socially desirable manner, leading to inflated or inaccurate data. Participants may also struggle to accurately recall their past behaviors, especially if the behaviors occurred some time ago, which could introduce recall bias in the study. While survey measures presented good reliability, the validity of the findings regarding actual water conservation behaviors could be compromised due to these potential biases inherent in self-report data.

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