

Article

The Water Paradox of Bandung: Rich in Rain, Poor in Policy

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Abstract: Water availability is an important aspect of life. With the increasing number of humans with the same water cycle, it is possible that water scarcity will occur, including in Bandung City, especially in Jatisari Village, Buahbatu District. Public awareness and regulation of water use are required. This study aims to analyze the influence of environmental communication on community behavior with the intervening variable of cognitive dissonance in household water use in Jatisari Village; explore environmental communication carried out and what the obstacles are; and also explore the scope of water policies in Bandung City. This study uses a mixed method with analysis using SPSS 25 and ATLAS.ti 23.1. The results of the Sobel test showed that the mediation coefficient of 0.0288 was significant, which means that cognitive dissonance has significant mediating influence in the relationship between environmental communication and perceptions for behavioral change. Meanwhile, environmental communication in Bandung City Government and non-Bandung City Government to maintain the sustainability of water has shown collaboration involving various stakeholders. Although there is much progress, there are still obstacles that need to be overcome, especially in coordination between actors and increasing public awareness. Also, six policies on water were found but showed that there is no policy that specifically regulates water conservation, water distribution, and limits on water use to support water availability. This is likely due to the absence of parameters that can convince the government to make policies on water conservation, for example, through the Water Scarcity Assessment Index.

Keywords: water policy; water scarcity; water management; water company; behavior



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1. Introduction

Water is very vital for the processes experienced by living things, including humans [1,2]. Clean water is one of the most important commodities for daily life, namely for drinking, bathing, cooking, washing, and others. Therefore, water must be managed properly [3]. Recent rapid population growth, economic development, and accumulated disaster risks, along with climate change, have exacerbated the problem of water scarcity [4–7]. Moreover, as one of the SDGs, sustainable water management has been affected due to the COVID-19 pandemic [8,9].

Cities around the world are facing urban problems, such as water scarcity due to increasing population, exacerbated by urban expansion and water pollution problems [10–13]. Clean water management depends on population condition, technology, and cultural-political aspects [14]. Indonesia has experienced steady urbanization, which is projected

to contribute 50 million urban residents between 2014 and 2050 [15]. The following is a comparison of water production per population in Indonesia.

As seen in Figure 1, West Java Province is in the 11th lowest position in the comparison of water production per population. The ratio of water production per capita was 8.69 points in 2020, 8.48 points in 2021, and 8.71 points in 2022. These figures show fluctuations in the last three years, which are influenced by variations in the level of clean water production and changes in population. In detail, the following is the ratio of clean water production per population in regencies and cities in West Java Province.

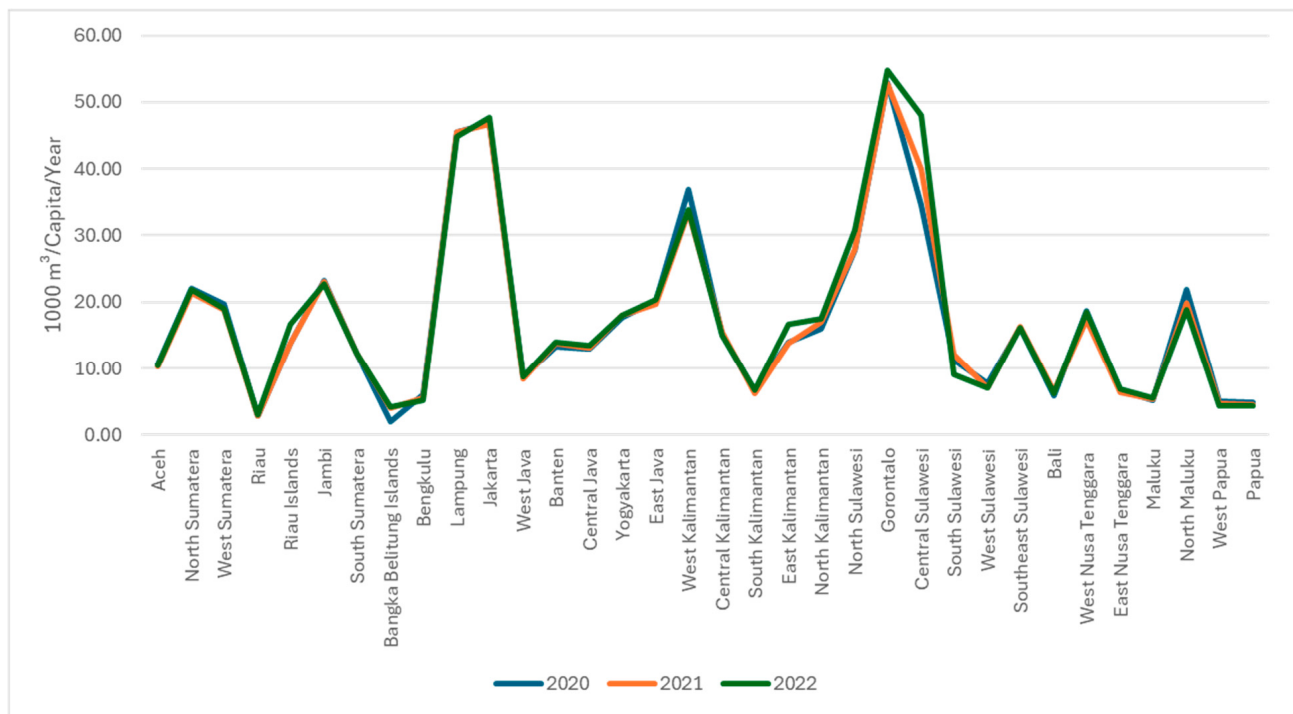


Figure 1. Comparison of water production per population in Indonesia by province. Source: processed from the Central Statistics Agency, 2023.

Reflected in Table 1, it shows that there were fluctuations throughout 2020–2022 from the comparison of clean water production per population in various districts and cities in West Java Province. The city of Bandung experienced a decline of −4.59 points in the three years. This was influenced by the decrease in clean water production and the increase in population in the three cities. Of the three cities, Bandung City is the city with the highest population growth rate, namely a total of 40,000 people in the 2020–2022 period.

As stated by data from the Indonesian Meteorology, Climatology, and Geophysics Agency, West Java Province in 2022 was the fourth highest rainfall in national level. For specific rainfall in Bandung City, it can be seen in Table 2. The precipitation in Bandung City from 2021 to 2023, which is quite high at the first and fourth quarters of the year. In Table 2, the red color indicates low rainfall, yellow indicates medium rainfall, and green indicates high rainfall. However, high rainfall can be a challenge for an area, especially when it is connected to the increasingly complex issue of climate change [16,17].

Since 1980, the clean water crisis in Bandung City has been felt and has become more rapid in the 1990s. The groundwater level in Bandung City has decreased significantly since 1980, when initially the groundwater in aquifers was 15 m below the ground, while in 2004, the groundwater level was shown to be at a depth of 86 m from the local land. This occurs in several locations in Bandung City and its surroundings, such as the Rancaekek, Dayeuh Kolot, and Kebon Kawung areas. In National Disaster Management Agency

(BNPB) Regulation No. 2 of 2012, it is known that environmental vulnerability to drought threats has a weight and parameter assessment.

Table 1. Comparison of water production per population (1000 m³/capita/year) based on regency and city in West Java Province.

Regency/City	Comparison of Water Production per Population (1000 m ³ /Capita/Year)		
	2020	2021	2022
Cianjur	2.89	2.89	2.55
Sukabumi	3.52	4.39	3.97
Purwakarta	4.22	4.46	4.44
Majalengka	4.68	4.83	4.92
Cirebon	4.85	4.3	4.48
Ciamis	5.02	4.94	8.1
Bekasi City	5.73	5.01	5.17
Subang	5.96	5.9	7.21
Garut	5.99	0.44	4.75
Sumedang	6.54	6.5	6.45
Bogor	8.03	8.26	9.74
Karawang	9.02	9.32	9.17
Kuningan	9.54	9.47	10.87
Bekasi	12.13	13.59	14.78
Tasikmalaya City	12.98	12.99	9.79
Indramayu	14.81	15	15.15
Banjar City	16.21	13.99	14.43
Bandung City	20.17	15.72	15.58
Sukabumi City	35.46	34.5	34.02
Cimahi City	49.54	49.03	39.46
Bogor City	54.16	55.3	55.67
Cirebon City	81.21	79.42	78.71
Bandung	Data not available	Data not available	Data not available
Tasikmalaya	Data not available	Data not available	Data not available
Bandung Barat	Data not available	Data not available	Data not available
Pangandaran	Data not available	Data not available	Data not available
Depok City	Data not available	Data not available	Data not available

Note: Source: processed from the Central Statistics Agency, 2023.

Based on Perumda Tirtawening, the regional water company in Bandung City, previously known as PDAM, one of the sub-districts in Bandung City, namely Buah Batu Sub-district, is included in the top 10 sub-districts with the highest water needs in Bandung City. The total water requirement in Buah Batu Sub-district in 2021 was 209.4 L per second. When compared to the distribution of settlements in Buah Batu Sub-district, especially Jatisari Village [18,19].

The condition in Jatisari Village, it can be seen in Figure 2 circled in red, which shows that the water distribution pipe network does not cover the entire area. As a result, people

tend to use groundwater sources that are difficult to access and often have to buy water from the private sector, such as tankers. With a population of 9381 people and a density of 7952 people/km² in 2022, meeting water needs in Jatisari Village is a challenge in itself. Jatisari Village was chosen as the object of research based on several reasons, namely because the people in Jatisari Village obtain water sources from groundwater sources and buy them. However, the groundwater sources in Jatisari Village also have poor quality. In addition, the Perumda Tirtawening services are limited in Jatisari, causing the largest amount of water use to come from water purchased by residents.

Table 2. Rainfall (mm) per month in Bandung City from 2021 to 2023.

Month	Rainfall (mm) per Month in Bandung City		
	2021	2022	2023
January	146.4	59.5	67
February	153.9	117.1	111
March	292.5	238.9	200
April	177.3	336.2	276
May	239	146.9	269
June	92.4	150.6	90
July	33.2	98.5	24
August	91.8	29.9	30
September	73	182.2	18
October	218.4	366.7	62
November	454.3	307.2	239
December	198.5	277.7	365
	High rainfall		
	Medium rainfall		
	Low rainfall		

Note: Source: processed from the Central Statistics Agency, 2023.

As it relates to policy, the implementation of policies related to water resource management in Bandung faces various challenges, especially in coordination among government agencies. In the context of environmental protection, water consumption policies set by the government need to consider water sustainability [20]. The government designs water management policies to prevent increases in water consumption and to be sensitive to new challenges like climate change [21]. Mayor Regulation Number 26 of 2022, which regulates the distribution of drinking water, has not fully addressed the needs of vulnerable areas such as Jatisari Village, where only a small part of the area is served by PDAM pipes. Water policy is an important factor that contributes to people's behavior in using water [22].

On the other hand, it is important to assess water supply and consumption in a region [23]. One tool that can be used is the Water Scarcity Index (WSI). WSI consists of three assessments: the water resources available index, the precipitation index, and the use-to-resource ratio index [24]. The absence of an evaluation tool such as the WSI results in the absence of a water crisis zone map that can guide resource allocation. This assessment is quite adaptive to dynamic objects, so it is important to involve the WSI in water policies and water system plans [23], especially in addressing anthropogenic changes, such as population growth [25]. This is reflected in Bandung with a population growth of 40,000 in the last three years and no WSI available.

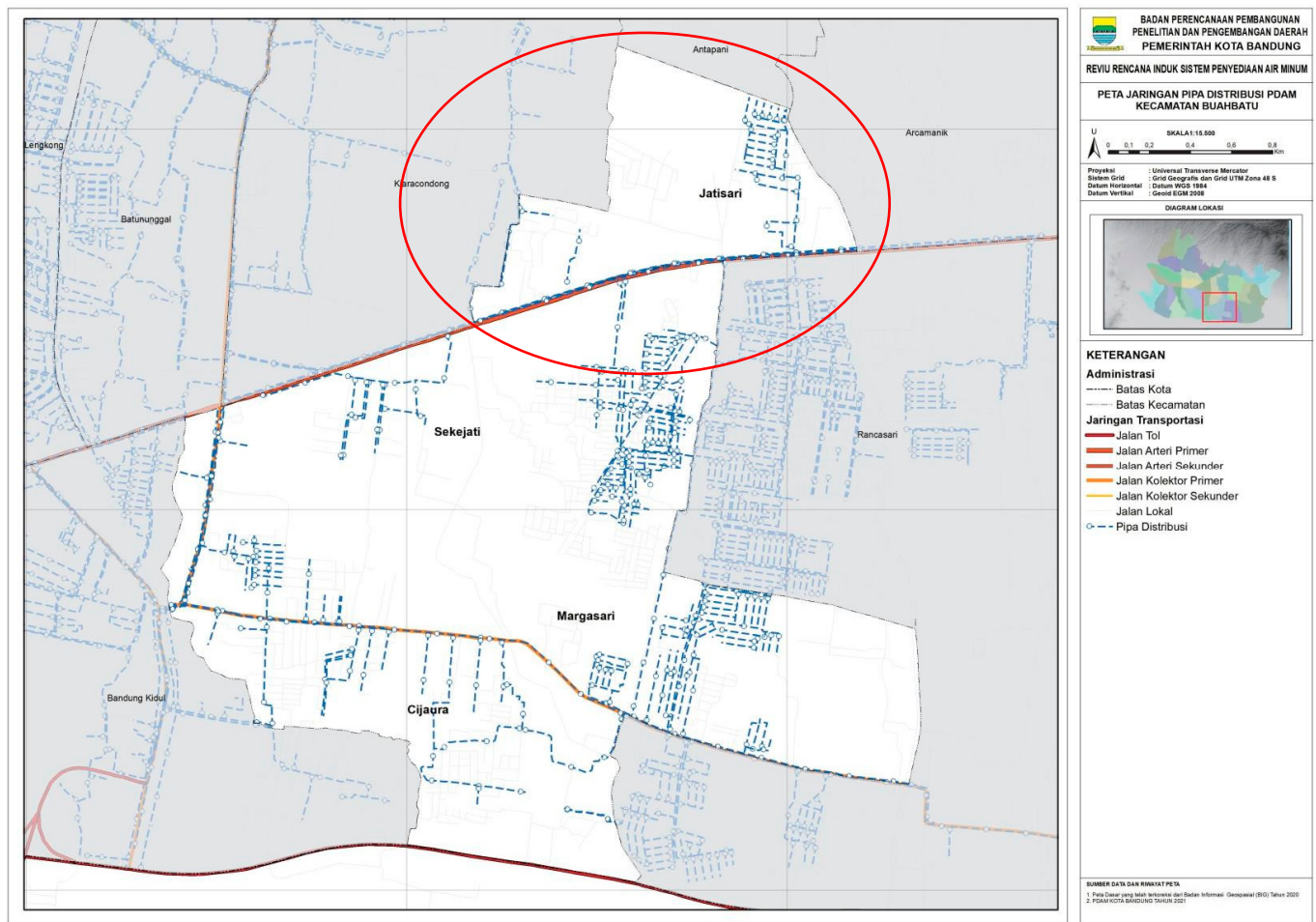


Figure 2. Buahbatu District water distribution pipeline network map. Source: evaluation of the drinking water sector development in 2023.

Public understanding regarding water conservation and wise water use is important because one of the most common causes of drought in Indonesia is the long dry season. Because Indonesia, including the city of Bandung, has a tropical climate, there are only two seasons, namely the rainy season and the dry season, so the dry season is quite common. According to the Indonesian National Disaster Management Agency, drought is a temporary reduction in water supplies below normal in the atmosphere and on earth and can be interpreted as a relationship between water availability below water needs [26]. There are types of droughts, namely meteorological drought caused by low rainfall or prolonged dry season, which causes drought [26].

While the supply of groundwater is mainly reduced due to the emergence of many new industries, the dry season, which is too long, causes the availability of clean water to run low and current water reserves to reach 2530 km³/year in Indonesia, nationally [27]. The prolonged dry season has been affected by El Niño and the Indian Ocean Dipole (IOD) as climate phenomena [28]. These conditions triggered a decrease in rainfall, while when they happened together, they emerged as a firespot. Although it seems abundant, only 0.3% of global water resources can be used [29]. Therefore, humans should not be calm, considering that the water crisis has begun to be felt by several regions in Indonesia; even regional drinking water companies have been forced to rotate the water so that all regions have the same opportunity to obtain a clean water supply [27]. Water use and understanding assessment provides an opportunity for stakeholders to develop consistent methods, collect comprehensive information, and address potential water issues [30].

Although education on water conservation is growing [29], challenges in changing people's behavior remain. In environmental communication efforts to facilitate behavior change, perception and cognitive dissonance factors must be considered [31]. Cognitive dissonance, which is psychological discomfort due to inconsistencies between beliefs and actions, can affect how environmental messages are received and implemented [32]. Assessing the impact of cognitive dissonance, either as a barrier or driver of behavior change, is a crucial aspect in designing effective communication. By using the concept of cognitive dissonance, which identifies inconsistencies between individual beliefs and actions and understands the thought conflict that arises internally [33], it can be assessed how psychological discomfort affects the motivation for behavioral change towards environmental concern, especially water-saving behavior. This study will assess the relation among these three variables by answering the questionnaire with several questions that represented each variable. The respondents are people in Jatisari village who related to this phenomenon. Therefore, with the education provided by the government and other parties, binding policies are needed to regulate public water consumption [34].

Based on the results of document searches from the Scopus database with the keyword “environmental communication”, 1373 scientific papers were found using English. The results of data retrieval from Scopus were visualized using the Vosviewer application and can be seen in Figure 3.

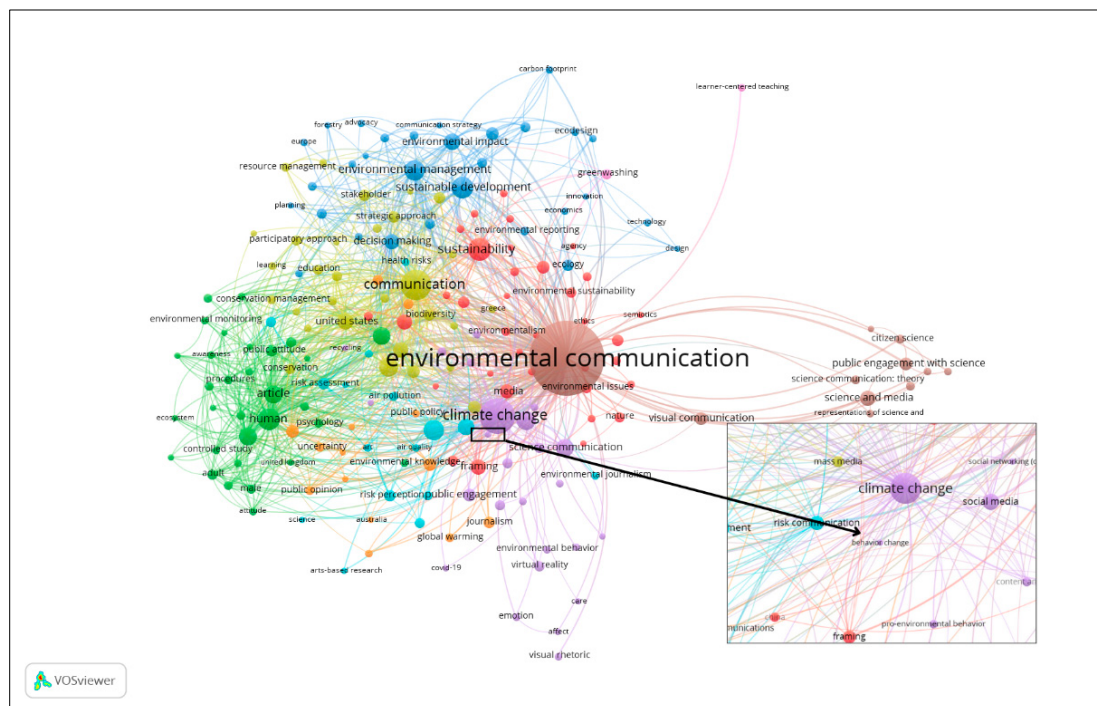


Figure 3. VOSviewer visualization of the Scopus database with the keyword “environmental communication” (1373 scientific papers).

The analysis results show that there are 194 words that appear more than six times, with “environmental communication”, “communication”, and “climate change” as the most frequently used, divided into six clusters. Environmental communication functions to disseminate information to change perceptions and encourage sustainable actions, but the existing literature focuses more on the energy sector, conservation, and environmental policy, as seen in the VOSviewer bibliometric analysis. This visualization shows how communication related to the environment and perceptions related to behavior change are in different clusters with different densities. This suggests that there is a lack of deep

studies linking these two because the interactions appear to be quite weak. Therefore, this allows for opportunities for cross-subject collaboration.

Drawing from the discussions presented throughout this section, the research questions in this study include (1) how does environmental communication influence community behavior with the intervening variable of cognitive dissonance in household water use in Jatisari Village, Buahbatu District, Bandung City?; (2) how is environmental communication carried out (government and non-government) in an effort to maintain the sustainability of clean water and what obstacles are found?; and (3) how is the scope of water policies in Bandung City concerning water availability? Therefore, the purpose of this study is to analyze the influence of environmental communication on community behavior with the intervening variable of cognitive dissonance in household water use in Jatisari Village, Buahbatu District, Bandung City and explore environmental communication carried out (government and non-government) in an effort to maintain the sustainability of clean water and what obstacles are found, and explore the scope of water policies in Bandung City.

2. Theoretical Background

2.1. Environmental Communication

Environmental communication plays an important role in shaping public understanding and engagement with environmental issues. At its core, communication can be broadly defined as “mutual understanding”, a concept that emphasizes shared understanding between individuals and groups [35]. Effective environmental communication relies on coorientation, which highlights the alignment and shared perspectives among individuals and their informational context. Diverse audiences not only disseminate but also understand and internalize environmental messages thanks to this relational dynamic. General models of communication provide a structural basis for understanding this process, but environmental science and communication often require unique frameworks that account for the complexity of environmental issues and their social impacts. By bridging the gap between scientific knowledge and public understanding, these customized models effectively convey and act upon environmental messages.

Hansen [36] underscores the importance of communication as a key medium for raising public awareness of environmental issues. Media platforms serve as arenas to discuss, oppose, and resolve these issues, highlighting their role in facilitating public discourse. Environmental communication not only informs but also shapes people’s perceptions of environmental risks and responses. In addition, environmental communication is interpreted as a “crisis discipline”, essential for equipping society to respond to environmental signals that impact human and ecological well-being. This ethical orientation reflects the challenges of modern risk society, where the role of humans in environmental degradation requires strategic communication to encourage sustainable behaviors and policies [33]. In summary, environmental communication integrates fundamental communication principles with customized strategies to address the unique challenges of conveying complex environmental information. By fostering shared understanding, aligning perspectives through coorientation, and utilizing the media as a public arena, the discipline enhances society’s capacity to effectively address environmental issues. Its ethical imperative lies in the promotion of responses that protect human communities and natural systems, in line with broader goals of sustainability and resilience.

2.2. Cognitive Dissonance

Festinger came up with the idea of cognitive dissonance theory (CDT), which is a basic way to understand the psychological tension that happens when attitudes and behaviors do

not match up [37]. According to the theory, individuals fundamentally strive to maintain internal consistency and harmony among their beliefs, attitudes, and actions. Inconsistency causes a state of psychological discomfort that is like a drive, which makes people try to get rid of it by changing their thoughts, behaviors, or attitudes to get them in line [37].

The two-way connection between attitudes and behaviors is at the heart of CDT. It shows how differences between these ideas cause discomfort that people try to overcome [38]. The process of resolving cognitive dissonance involves assessing resistance to change, with shifts occurring in the least resistant component of either attitude or behavior [39]. Further elaborates on this dynamic by defining cognitive dissonance as a negative state arising from conflicting cognitions. To reduce this discomfort, individuals may incorporate new “consonant” cognitions or modify existing ones to create coherence. This adaptive response underscores the explanatory power of the theory in understanding human behavior in situations where beliefs and actions are incongruent.

Cognitive dissonance reflects a broader cognitive awareness of conflict between knowledge and experience, which often signals the need for conceptual change [40]. In such scenarios, individuals adjust their mental frameworks to better align with apparent reality, thus reinforcing CDT’s role in facilitating learning and adaptation. When there is internal conflict, CDT becomes an important part of understanding what drives people, especially when it comes to making changes to how they think and act in order to restore balance.

2.3. Perception to Behavior Change

Individual perceptions play an important role in influencing behavior change. Irwin M. Rosenstock in 1974 states that a person’s health behavior is influenced by their beliefs about susceptibility to a disease, the seriousness of the disease, the benefits of preventive measures, and the perceived barriers to taking such measures. For example, a person may be more motivated to quit smoking if they believe they are susceptible to lung disease, perceive the disease as serious, see significant benefits from quitting, and feel able to overcome barriers to quitting [41].

Schoenfeld and Cumming emphasize that perception is inseparable from behavior and plays an important role in behavior change. They contend that perception, not just a sensory process, embeds itself in behavioral responses, particularly through discrimination and adaptation to stimuli. The steps in perceptual behavior are linked, and the first responses determine the next steps. This shows how perception affects adaptive and goal-oriented behavior. The fact that these things are connected shows how important perception is in changing people’s behavior by helping them understand and react to cues in their environment [42].

2.4. Previous Studies

The study by Hurlimann [43] investigated how communication shapes community perceptions of the risks associated with recycled water use in Australia. It used a telephone interview-based survey of 162 households in Mawson Lakes, an area with a dual water supply system that delivers recycled water for non-drinking purposes such as toilet flushing and gardening. The survey, part of a long-term study, collected data on perceptions of risks associated with recycled water following implementation of the system. Most questions used Likert scales to analyze the relationship of risk perception with the variables of communication, trust, and integrity of the water authority. Results showed that 33% of respondents perceived recycled water as risky. Trust in the water authority, access to accurate information, and perceived fairness in policy implementation significantly negatively correlated with this risk perception. In contrast, effective communication, transparency, and integrity within the water authority significantly increased community trust and decreased

risk perception. This study confirms that strategic and trust-based communication plays an important role in shaping community perceptions of the risks of using recycled water.

This study emphasizes the importance of timely, accurate, and transparent communication by water authorities to build public trust and reduce risk perception. Public trust in the authority's honesty and goodwill can be increased through good communication. This may eventually affect how well recycled water management technologies are accepted by the public.

3. Materials and Methods

This study uses a mixed method that combines the use of qualitative and quantitative research approaches in scientific research as shown in Figure 4. Combination research is research that combines quantitative and qualitative research procedures and techniques in research simultaneously or sequentially [44]. Quantitative research is a technique for statistically analyzing data collected through questionnaires, surveys, or manipulating pre-existing statistical data to understand research problems [45]. This quantitative research is obtained from the results of a survey of the community. The results of quantitative data analysis will be generalized to all groups or populations to explain a problem [45]. Here are some data collection techniques used in this study.



Figure 4. Research design.

1. Observation

Observations in this study were conducted by conducting direct observations in the field to determine the actual conditions of the Jatisari Village community, Buah Batu District, Bandung City, regarding household water use.

2. Focus Group Discussion (FGD)

Data collection using this method is carried out together with parties who are considered relevant to this topic [46]. FGD was conducted by involving various parties, namely the Cafe and Restaurant Association (AKAR), the Indonesian Shopping Center Management Association (APPBI), the Riung Priangan Hotel Association, BKM Cijerah, Diskominfo, the Environmental Service (DLH), the Housing and Settlement Service (DPKP), and Perumda Tirtawening in Bandung City. The selection of informants was based on the relevance of these institutions to their authorities and responsibilities related to water resources management. Each institution has complementary strategic roles in regulatory, operational, and advocacy aspects, enabling a comprehensive analysis. This approach also aims to explore cross-sector perspectives, including government, the private sector, and local communities, in order to identify challenges and opportunities to improve the efficiency of water supply and conservation in Bandung City.

3. Survey (Questionnaire)

The research questionnaire used was a closed direct questionnaire that was submitted to the respondents because it was to facilitate recording data related to the conditions experienced by the respondents and to facilitate the respondents to provide their answers as shown in Appendix A.1. and the result summary each question in Appendix A.2. The variables asked about the environmental communication obtained, cognitive dissonance, and changes in perception that trigger changes in behavior. The questionnaire accommodates environmental communication, cognitive dissonance, and perception to behavior change. The questionnaires were shared with each respondent in Jatisari Village, which was assisted by the village head.

The questionnaire was designed to measure environmental communication, cognitive dissonance, and perceptions of behavior change. Environmental communication shapes awareness and attitudes toward water conservation, which may create cognitive dissonance when individuals recognize gaps between their current behaviors and ideal conservation practices. This dissonance can influence their perceptions of behavior change, reflecting their self-assessed readiness to adopt water-saving behaviors. To avoid confusion, the term cognitive dissonance was not explicitly stated in the questionnaire. Instead, the questions were structured to indirectly capture discrepancies in respondents' attitudes and behaviors. This design allows us to analyze how environmental communication influences perceptions of behavior change through the mediating role of cognitive dissonance.

4. Thematic Review

Thematic analysis has been widely used as a qualitative data analysis method and involves understanding the collected data, identifying themes, and then interpreting the identified data [47]. Thematic analysis involves finding and identifying common threads that span across interviews or a series of interviews that provide a purely qualitative, detailed, and nuanced picture of the data, applying minimal description to the dataset, and interpreting various aspects of the research topic [48]. Thematic analysis has been widely used as a qualitative data analysis method and involves understanding the data collected, identifying themes, and then interpreting the identified data [36]. Reflexive thematic analysis was applied to the interview data through several stages. First, familiarizing by making preliminary notes. Second, coding, which involved systematically labeling relevant parts of the transcript, was approached deductively (using pre-established codes) and inductively (remaining open to new codes outside the original framework). Third, combining codes into subthemes: once codes have been created, they are then grouped into subthemes to capture broader patterns. Fourth, combining subthemes into themes and grouping them. Fifth, reviewing themes, where themes are reviewed and refined so that thematic maps can be created. Sixth, defining and naming themes, where themes are clearly defined and named at this stage to reflect their core meaning. Seventh, producing the report, i.e., the final analysis of the selected extracts (relating back to the research questions).

The sampling technique is probability sampling in Jatisari Village, which has a population of 2026 families. The data analysis technique used in this study uses the Statistical Program Science and Social (SPSS) 25 software program to conduct simple and multiple linear regression tests, validity tests using Bivariate Pearson, and reliability tests using Alpha Cronbach.

In addition, the data analysis in this study uses the Sobel test, which is used to determine how the relationship between the independent variable (X) and the dependent variable (Y) is mediated/influenced by the third variable (Z); in other words, if X and Y

have an indirect relationship [49], then it uses path analysis to examine and understand the relationship between variables. This Sobel test calculation has been used in a study conducted by Kartawinata [50] to evaluate the relevance of the mediation effect or indirect influence of a variable, which is the impact of entrepreneurial orientation and ESG on environmental performance with digital transformation as a mediator. The Sobel test was chosen because it supports modern research that ensures whether the mediator is involved or not [50].

This study also used ATLAS.ti 23.1 software, which offers features to centralize all the information needed to organize one's research and has mechanisms to allow data analysis to be carried out within the software itself, mediated by the researcher, who continues to play a central role in the analysis process as a critical thinker [51]. The feature utilized from this software is the network feature to visualize the analysis result into a map. The network feature is supported by the code and quote feature for indicating topics in each policy document.

4. Results and Discussion

4.1. The Influence of Environmental Communication on Community Behavior in Household Water Use in Jatisari Village, Buahbatu District, Bandung City

4.1.1. Validity and Reliability Results

A reliability test measures questionnaire data, and determine variable or construct indicators. A construct or variable is said to be reliable if it provides a Cronbach Alpha value $> r$. A validity test is used to measure whether a questionnaire is valid or not. The validity test is calculated by comparing the r_{count} (correlated item–total correlation) with the r_{table} . If the $r_{\text{count}} > r_{\text{table}}$ and the value is positive, then the item or question is declared valid. Reliability and validity tests were analyzed using the SPSS Version 25.0 program. The results of the reliability test show that the alpha coefficient is said to be reliable if the alpha coefficient is more than 0.7 and all variables are known to be reliable. This is in accordance with the Reliability Test Results in Table 3. The results of the validity test show that the variable is said to be valid if the r_{count} is greater than the r_{table} and all variables are known to be valid. This is in accordance with the Validity Test Results in Table 4. According to the calculation, the questionnaire is reliable and valid. Thus, we used all of the answers for the next analysis.

Table 3. Reliability test results.

Variable	Alpha Coefficient	Description
Environmental Communication (X)	0.900	Reliable
Cognitive Dissonance (Z)	0.813	Reliable
Perception of Behavioral Change (Y)	0.742	Reliable

Table 4. Validity test results.

Variable	Item Code	r_{count}	r_{table}	Description
Environmental Communication	X.1	0.820	0.107	Valid
	X.2	0.797	0.107	Valid
	X.3	0.774	0.107	Valid
	X.4	0.800	0.107	Valid
	X.5	0.795	0.107	Valid
	X.6	0.766	0.107	Valid
	X.7	0.782	0.107	Valid

Table 4. *Cont.*

Variable	Item Code	r _{count}	r _{table}	Description
Cognitive Dissonance	Z.1	0.708	0.107	Valid
	Z.2	0.749	0.107	Valid
	Z.3	0.710	0.107	Valid
	Z.4	0.750	0.107	Valid
	Z.5	0.633	0.107	Valid
	Z.6	0.650	0.107	Valid
	Z.7	0.607	0.107	Valid
Perception of Behavioral Change	Y.1	0.714	0.107	Valid
	Y.2	0.725	0.107	Valid
	Y.3	0.711	0.107	Valid
	Y.4	0.654	0.107	Valid
	Y.5	0.699	0.107	Valid
	Y.6	0.444	0.107	Valid

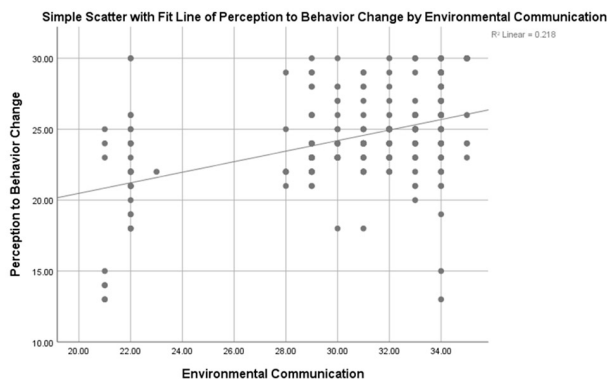
4.1.2. Linear Regression Test

As depicted in Table 5 and Figure 5, it can be interpreted that the environmental communication variable has a close relationship with the behavioral change variable, which is 0.466. This means that environmental communication has a real influence on behavioral change. Furthermore, the environmental communication variable has a close relationship with the cognitive dissonance variable of 0.478. This means that environmental communication is able to increase cognitive dissonance so that environmental communication, intended as environmental communication, is supported by cognitive dissonance as expected. Furthermore, the cognitive dissonance variable has a close relationship with the behavioral change variable, which is 0.573.

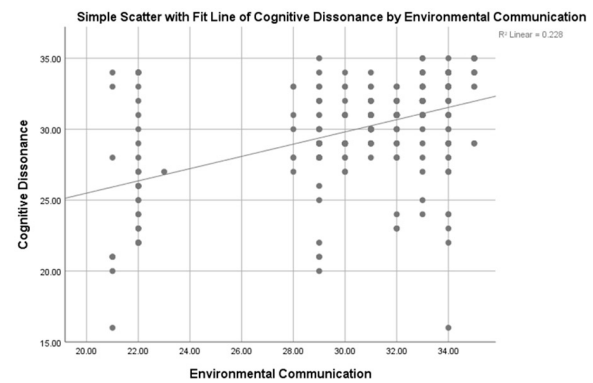
Table 5. Linear regression X and Y, X and Y, and Z and Y.

Equations	Unstandardized Coefficients	Standardized Coefficients	t	Sig.
Environmental communication (X) – Perception of Behavior change (Y)	0.372	0.466	10.923	0.000
Environmental communication (X) – Cognitive dissonance (Z)	0.432	0.478	9.914	0.000
Cognitive dissonance (Z) – Perception of Behavior change (Y)	0.505	0.573	12.739	0.000
Environmental communication (X) and Cognitive dissonance (Z) – Perception of Behavior change (Y)	0.199	0.250	5.050	0.000
	0.400	0.454	9.182	0.000

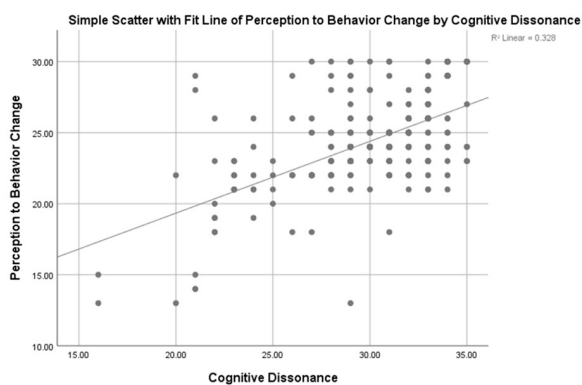
This calculation reveals a direct correlation between environmental communication and behavior change perception. Also, environmental communication correlates with cognitive dissonance. Then, perception of behavior change positively correlates with cognitive dissonance. Lastly, both environmental communication and cognitive dissonance are directly proportional to perception of behavior change.



(i) Environmental communication (X) - Perception for Behavior Change (Y)

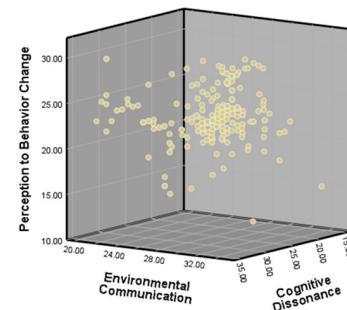


(ii) Environmental Communication (X) - Cognitive Dissonance (Z)



(iii) Cognitive Dissonance (Z) – Perception for Behavior Change (Y)

Simple Scatter with Fit Line of Perception to Behavior Change by Environmental Communication by Cognitive Dissonance



(iv) Environmental communication (X) and Cognitive Dissonance (Z) – Perception for Behavior Change (Y)

Figure 5. Linear regression visualizations.

4.1.3. Path Analysis

As can be seen in Table 6 and Figure 6, the direct influence of environmental communication on water-saving behavior is greater than the indirect influence through cognitive dissonance. This shows that people tend to change water-saving behavior more quickly without having to experience hesitation first. Although there is a difference between the two influences, the difference is relatively small, namely 0.033, and both remain in the category of ‘moderate’ influence.

Table 6. Results of direct, indirect, and total influence.

Influence	Path	Value	Total	Description
Direct	Environmental communication (X) – Perception of Behavior change (Y)	0.250	0.250	Moderate
Indirect	Environmental communication (X) – Cognitive dissonance (Z)	0.478	0.217	Moderate
	Cognitive dissonance (Z) – Perception of Behavior change (Y)	0.454		

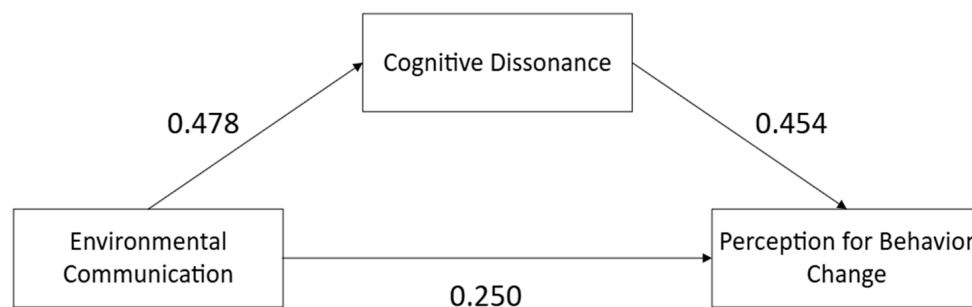


Figure 6. Path analysis.

4.1.4. Sobel Test

To determine the mediation effect of cognitive dissonance, the Sobel test is used. The criteria for using the Sobel test are to compare the t_{count} to the t_{table} . If the $t_{\text{count}} > t_{\text{table}}$, it can be concluded that there is an effect of mediation.

$$\begin{aligned}
 Sab &= \sqrt{b^2sa^2 + a^2sb^2 + sa^2sb^2} \\
 Sab(\text{Median Coefficient}) &= \sqrt{(0.2059^2 \cdot 0.0019^2) + (0.2284^2 \cdot 0.0019^2) + (0.0019^2 \cdot 0.0019^2)} \\
 Sab(\text{Median Coefficient}) &= 0.0288 \\
 t_{\text{count}} &= \frac{a \cdot b}{0.0288} \\
 t_{\text{count}} &= \frac{0.2169}{0.0288} \\
 t_{\text{count}} &= 7.5364
 \end{aligned} \tag{1}$$

The results of the Sobel test showed that the t_{count} was 7.5364. Meanwhile, the t_{table} was 1.9671 for a population of 334. With the results of these calculations, the t_{count} result was greater than the t_{table} , so it can be concluded that the mediation coefficient of 0.0288 is significant, meaning that there is a mediation effect from the intervening variable.

In path analysis, a direct effect that is greater than the indirect effect may indicate that the main relationship between the independent and dependent variables is dominated by the direct path, which is directly from environmental communication to perception. However, the significant results of the Sobel test indicate that although the direct effect is more dominant, the mediating variable still plays an important role in channeling some of the influence of the independent variable to the dependent variable. This supports the interpretation that the mediating variable, despite its relatively small contribution, still functions significantly in the relationship model. Meanwhile, the direct influence can be supported by aspects of communication such as credible information sources, quality and relevance, and frequency of message delivery. This probability is reinforced by the fact that the majority of communicators are government officials who have authority in water resources management, making it easier to gain public trust.

This study also looks at cognitive dissonance as a factor that can affect how people understand environmental messages. It suggests that good communication may affect how people deal with cognitive dissonance when they are receiving environmental messages. Understanding this mediating factor facilitates the exploration of how individuals process water use information and its potential influence on their perception of behavior change. This study did not directly look at the content of communication, but the results suggest that things like the reliability of the information source, the quality of the message, and how often it is delivered may affect how people understand environmental messages.

Therefore, it ought to be asserted that increasing the amount and quality of environmental communication that stakeholders send could make it have a bigger effect on cognitive dissonance and how people think they should change how they use water. More

intensive communication based on credible information can increase individual awareness of water use issues, encourage reflection on existing practices, and increase the likelihood of changes in perceptions.

4.2. Environmental Communication Efforts (Government and Non-Government) to Ensure the Sustainability of Water

In the FGD conducted, there were various stakeholders. Perumda Tirtawening is a PDAM whose main task is to organize the management of drinking water and/or clean water to customers and the distribution/sale of raw water within and outside the region in order to improve public health. The Bandung City Housing and Settlement Service (DPKP) has main duties and functions based on Mayoral Regulation Number 119 of 2021 regarding the Position, Organizational Structure, Duties and Functions, and Work Procedures of the Bandung City Housing and Settlement Service, which has the main task of carrying out part of the local government affairs in the fields of housing, settlements, infrastructure, facilities and utilities, land, and parks based on the principles of autonomy and assistance. DLH has the main task of carrying out government affairs in the environmental sector, including environmental management, environmental pollution control, conservation, climate change control, and compliance with environmental laws.

4.2.1. Stakeholders Involved

Figure 7 shows the results of interviews with informants represented by brown dots, namely, AKAR, APPBI, Riung Priangan Hotel Association, BKM Cijerah, Diskominfo, DLH, DPKP, and PDAM in Bandung City. The informants said that there are various parties involved in maintaining clean water and water conservation efforts in Bandung City, including collaboration across government agencies. In addition, non-governmental organizations such as WWF, the private sector, and academics from universities also support this program.

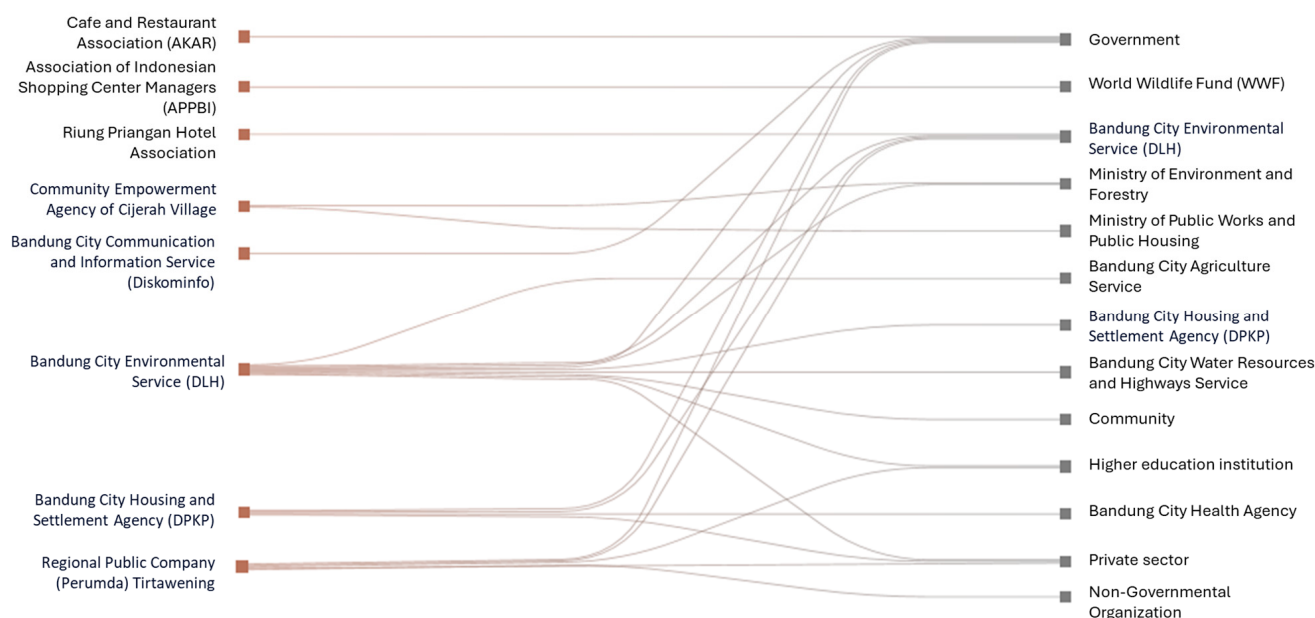


Figure 7. Stakeholders involved in the implementation of water-saving conservation techniques by the Bandung City Government and the non-Bandung City Government.

4.2.2. Environmental Communication in Clean Water Use in Bandung City

As shown in Figure 8, in government agencies such as DPKP, efforts are made to save by providing basic wastewater services and water management. Then, DLH carries

out general water conservation efforts, for example, the Climate Village Program. In addition, PDAM provides water and conserves water sources. Finally, in government agencies, namely Diskominfo, they provide water-saving education through government communication channels. In addition, non-governmental organizations carry out activities such as developing water-saving technology, water flow scheduling, water access assistance, and others.

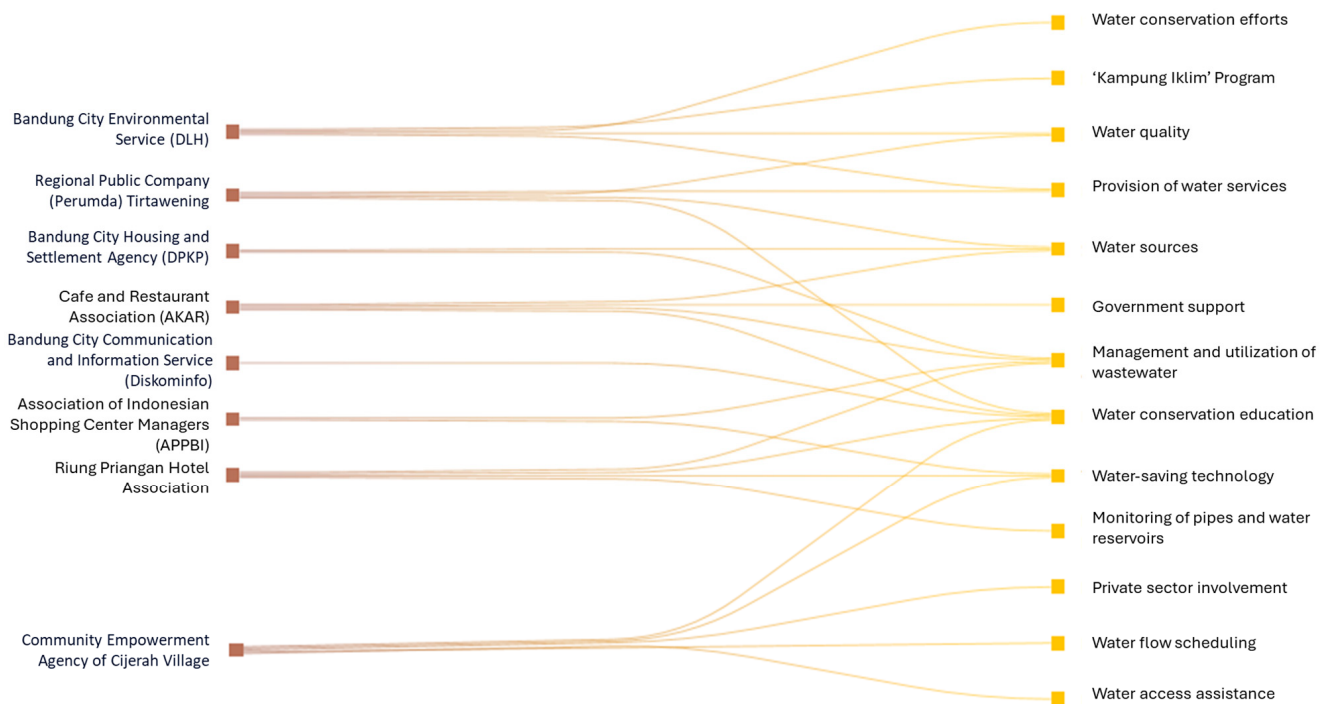


Figure 8. Implementation of water service programs by the Bandung City Government and non-Bandung City Government.

Based on the FGD with AKAR, it has been identified that the association is actively implementing environmental communication related to water saving as part of sustainability practices. One of the concrete steps taken is the installation of water-saving campaigns in strategic areas such as cafes and restaurants, particularly in handwashing stations, toilets, and other locations that encourage water usage. The campaign utilizes visual media in the form of posters, stickers, and infographics that emphasize the importance of saving water, accompanied by simple yet effective educational messages. In addition, the campaign was supported with in-house training for restaurant employees to support direct messaging to consumers, creating an environment that is more aware of the importance of water conservation.

This initiative shows that AKAR is able to take a significant role in environmental communication, filling a gap that has not been widely reached by the government. AKAR's water-saving campaign demonstrates the active participation of businesses in promoting environmentally friendly practices. The active role of the AKAR is an important argument in encouraging the government to strengthen synergies with the private sector in developing more comprehensive environmental communication so that it can reach a wider community and strengthen the impact of water conservation efforts in Bandung City.

Communication, through both rational and emotional channels, can influence individual behavior towards water conservation, with more permanent changes in attitudes often resulting from deeper elaboration of the message [52]. Environmental communication plays an important role in promoting collective awareness and action on environmental issues,

including water scarcity in various countries. For example, in Australia, a communication-based approach of grassroots activities involving small local groups proved effective in mobilizing broad public participation to address environmental challenges, demonstrating the importance of communication analysis in driving collective action [53]. In Kenya, communication technologies such as Global System for Mobile Communications (GSM) and LoRa were used to create an innovative water contamination monitoring system, utilizing short messages and local languages to ensure broad access to information for vulnerable groups, as well as improving communication resilience in rural areas [54]. Compared to Bandung, with the majority of communication conducted by the government, it would be beneficial to adopt digital transformation and strengthen community empowerment.

4.2.3. Barriers to Water-Saving Programs

Barriers to environmental communication in efforts to save water, as shown in Figure 9, are as follows:

- Implementation of policies that are not optimal, technical problems of water flow, different community backgrounds, wasteful use of water, lack of public awareness in saving water, obstacles from monitoring and evaluation of programs, obstacles due to land acquisition for conservation, and limited water supply.
- Water infrastructures and environmental drainage conditions that are unable to drain water runoff; then the wastewater management system does not comply with technical standards; sometimes the infrastructure and facilities for wastewater management do not comply with technical standards.

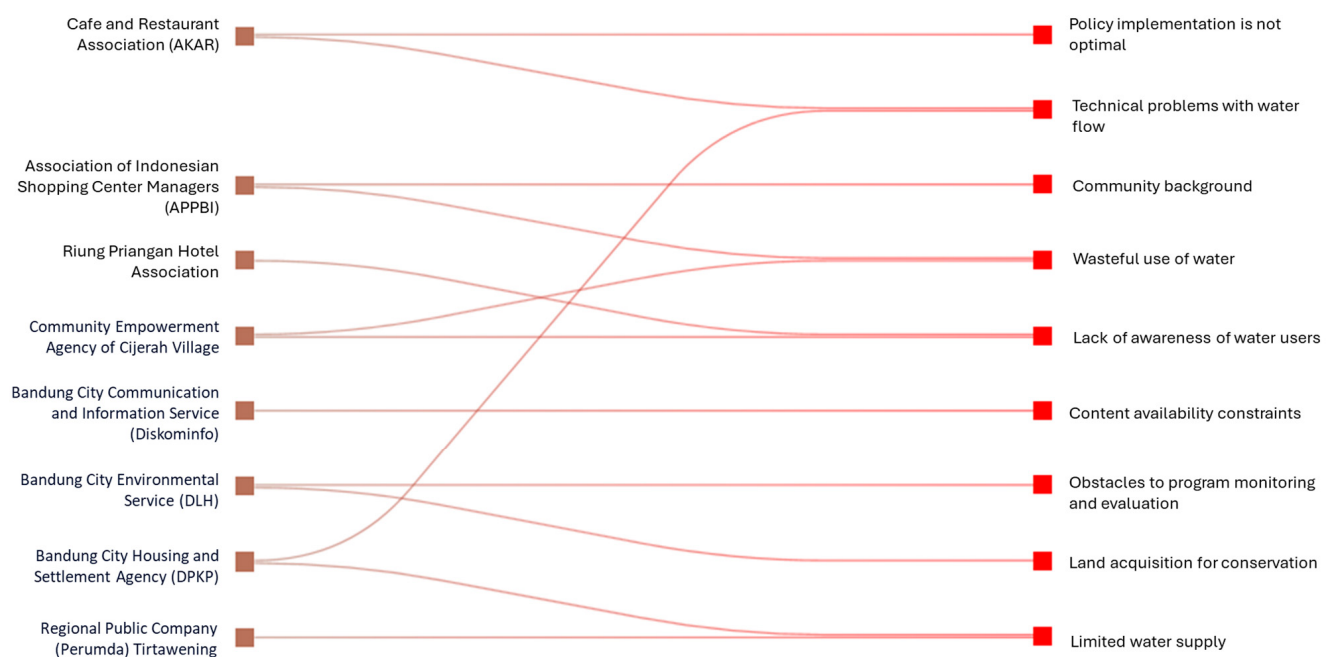


Figure 9. Barriers in environmental communication that is implemented by the Bandung City Government and the non-Bandung City Government.

4.3. Policy Review

In Indonesia, nationally, there are some policies that regulate water resources. Based on Presidential Regulation Number 37 of 2023 concerning National Water Resources Policy, it explains that national natural resources policies are formulated based on values such as economic and environment responsibility. This is a concern from the government and is

intended to be efficient in the use of water to anticipate water scarcity due to population growth and the variety of needs that continue to grow.

Specifically, a policy review was conducted to determine the position of policies in Bandung City that regulate water resources. The local government-level policies were analyzed by identifying the discussion into code, subtheme, and theme. It was then visualized into a network map.

Based on Bandung City Regional Regulation Number 5 of 2011 concerning Water Resources Management, it provides broad authority to the local government to carry out all government authorities in the field of water resources management and coordinate with institutional agencies that have a workload based on this Regional Regulation. It is not enough for an organization to determine and coordinate the implementation of policies, but an organization is needed with a portfolio to determine, implement, and supervise water resources management policies. Table 7 shows the list of local government policies that were analyzed in Figure 8.

Table 7. Policy list.

No.	Policy Name	Number	Topic	Date of Enactment
1.	Bandung City Regional Regulation	Number 15 of 2009	Tirtawening Regional Drinking Water Company, Bandung City	7 August 2009
2.	Bandung City Regional Regulation	Number 5 of 2011	Water Resources Management	11 May 2011
3.	Bandung City Regional Regulation	Number 6 of 2020	Tirtawening Regional Public Company, Bandung City	14 October 2020
4.	Regulation of the Mayor of Bandung City	Number 046 of 2018	Regulation of Drinking Water and Wastewater Services at the Tirtawening Regional Drinking Water Company, Bandung City	8 January 2018
5.	Regulation of the Mayor of Bandung City	Number 26 of 2022	Regulation of Drinking Water and Wastewater Services at the Tirtawening Regional Public Company, Bandung City	18 March 2022
6.	Decision of the Mayor of Bandung	Number 690 of 2022	Bandung City Drinking Water Supply System Master Plan 2021–2040	10 January 2022

The network visualization of Figure 10 consists of six policies attached in Table 7; there are two themes, namely:

1. Water service policies and organization

Water service policies and organizations are composed of several sub-themes, including:

- Disincentives and sanctions
These disincentives and sanctions include discussions on disincentives for excessive water use as well as the imposition of compensation and fines. Disincentives and sanctions based on the Regulation of the Mayor of Bandung City Number 26 of 2022 Article 42 state that the distribution of drinking water for commercial purposes carried out by customer groups other than those included in special groups is subject to fines.
- Policy integration
Policy integration includes discussions related to the integration of water policies into regional development policies, water utilization according to designated zones, and the determination of the SPAM master plan. Based on Bandung City Regional Regulation Number 5 of 2011 in Article 4, it states that water resource management policies can

be determined as separate policies or integrated into regional development policies. In the case of water resource management policies being integrated into regional development policies, the preparation of regional development policies must consider the condition of water resources. In addition, based on the Decree of the Mayor of Bandung Number 690 of 2022, it states that the implementation of the Bandung City SPAM is divided into a piping system and a non-piping system.

- Terms and standards

The provisions and standards include discussions on the objects of regulation, regulation of water source boundary areas, basic water requirement standards, and water service rates regulated by the mayor. Based on Bandung City Regional Regulation Number 5 of 2011 in Article 3, it is stated that the objects of regulation include the management of irrigation, rivers, and drinking water, and then in Article 13, it is stated that the regulation of water source boundary areas is carried out to secure and maintain the function of water sources and water resource infrastructure. Based on Bandung City Mayor Regulation Number 26 of 2022, Article 1 states that the Basic Drinking Water Requirement Standard is the need for water of 10 cubic meters/head of family/month or 60 L/person/day, or other volume units.

- PDAM Management

PDAM management includes discussions on financial support, PDAM collaboration with other stakeholders, PDAM as a water manager, the establishment of PDAM, and the change in the form of PDAM from a 'PD' to 'Perumda'. Based on the Bandung City Mayor Regulation Number 26 of 2022, Article 24 states that in implementing the management of drinking water and wastewater services, Perumda Tirtawening can collaborate with legal entities, business entities, cooperatives, individuals, and communities based on the provisions of laws and regulations. In addition, this change in company form has implications for broader opportunities to develop water businesses and services triggered by the stipulation of central government regulations, Government Regulation Number 54 of 2017 concerning Local Government-Owned Enterprises. This is important because the tariff for water consumption is also sensitive to company dynamics that can influence public water use.

2. Water services and conservation

Water services and conservation comprise several sub-themes, such as:

- Water conservation

Water conservation includes language about water conservation activities, water conservation involving the community, water conservation paying attention to local wisdom, water conservation prioritizing prevention activities, maintenance of infiltration and water catchment areas, water preservation, control of groundwater use, water savings, and the importance of water resource conservation. Based on Bandung City Regional Regulation Number 5 of 2011, Article 5 states that water resource conservation is intended to maintain the continuity of the existence, carrying capacity, and function of water resources. To achieve the goal of water resource conservation, water source protection and preservation activities, water preservation, water quality management, and water pollution control are carried out.

- Water service management

Water service management includes discussions on water resource management, water filling, water use facilities and infrastructure, water resource information systems, non-piping systems, and water piping systems. Based on Bandung City Regional Regulation Number 5 of 2011, Article 1 states that water resource management is an effort to plan, implement, monitor, and evaluate water resources, water resource utilization, and control of water damage; then Article 4 states that water resource

management is carried out in a comprehensive, integrated, and consistent manner through water resource conservation policies, water resource utilization, water damage control, and water resource information systems. In addition, based on Bandung City Mayor Regulation Number 046 of 2018 Article 3, drinking water services to the public are carried out through a pipe network by means of subscription connections, public taps, public hydrants, fire hydrants, and other facilities, and non-piping network services are served through drinking water tankers.

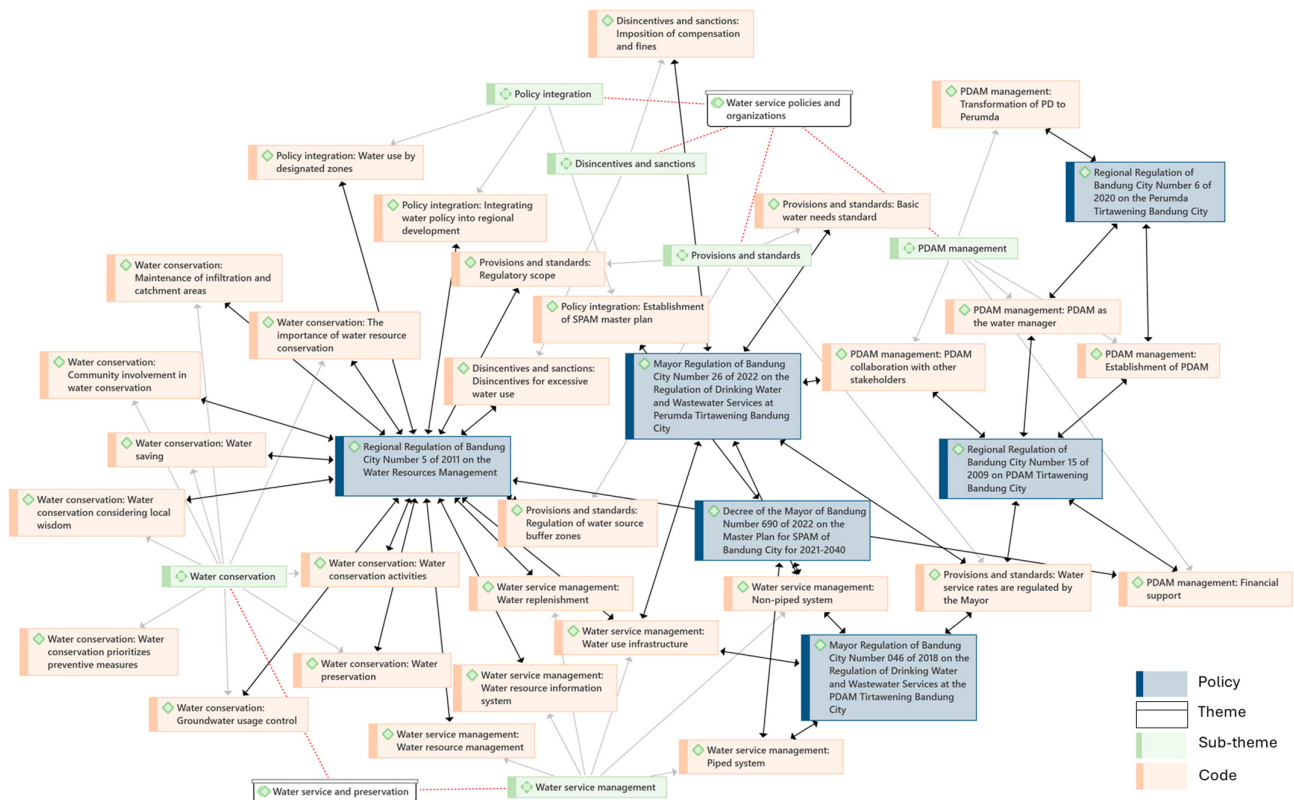


Figure 10. Themes, subthemes, and codes of the water policy in Bandung City.

Referring to the visualization results in Figure 8, the topics regulated by these policies form the basis for specific water management in Bandung City. The contents of the policies focus on water management in general from both institutional governance and service provision. In addition, there is also a discussion on the infrastructure and facilities provided to the community to ensure water services can be delivered.

On the other hand, these policies still do not explain in detail water-saving efforts. Existing policies have not been integrated with studies on consumption patterns and weather conditions that can increase the potential for water crises. Studies and surveys as a catalyst for the emergence of policies are still limited; thus, it is reasonable that the policies do not exist. Therefore, it can be concluded that Bandung does not yet have a water policy that focuses on preventing or handling water crises, called the policy gap.

In addition to the policy gap related to water crises, there is also no regulation that specifically regulates environmental communication related to water use. This highlights the results of quantitative calculations; this study emphasizes the importance of environmental communication in shaping people's perceptions of water use by mediating cognitive dissonance. In fact, structured communication based on credible information can be a more effective policy instrument in encouraging changes in perceptions and practices of more sustainable water use.

According to Maria Pedro-Monzonis, indices play an important role in the decision-making process and policy development [55]. In most developing countries (which suffer from severe scarcity, poverty, and hunger and require huge investments, for example, in agriculture and water infrastructure), the government acts as the decision-maker. To convince the authorities of the need for investments and policies, measurable values are needed [55].

5. Conclusions

Water scarcity is a phenomenon that is influenced by how people act in using water. Communication and education efforts have been intensified by various parties to reduce the possibility of this condition. Therefore, this study analyzes that the influence of environmental communication is significant on community behavior in household water use with cognitive dissonance as an intervening variable in Bandung City. The results of the path analysis show that the influence of environmental communication on behavioral change is greater through direct influence (0.250) than indirect influence (0.217). Meanwhile, results of the Sobel test show that the mediation coefficient of 0.0288 is significant ($t_{\text{count}} = 7.5364 > t_{\text{table}} = 1.9671$), so that the intervening variable has a significant mediating effect on both independent and dependent variables. From both analyses, it shows that cognitive dissonance is able to mediate, but its contribution is relatively smaller than the direct relationship between environmental communication and perception.

The quantitative analysis highlighted that the effectiveness of environmental communication is directly proportional to perceptions and behavior change. Also, the higher the effectiveness of environmental communication correlates with a higher level of cognitive dissonance. Greater levels of cognitive dissonance are associated with a greater perception of behavior change. Lastly, higher levels of environmental communication and cognitive dissonance correlate with higher perceptions of behavior change for water conservation.

Environmental communication in the Bandung City Government and non-Bandung City Government in an effort to maintain the sustainability of clean water has shown collaborative efforts involving various stakeholders. For instance, in the form of socialization of the Climate Village Program and others. The movement or efforts made by the majority are still carried out by the government. Meanwhile, community organizations and communities are more supportive of the implementation of these government programs. In addition, the communicators encourage us to use digital advancement and empower the community organization. Although much progress has been made, there are still a number of obstacles that need to be overcome, especially in coordination between government and non-government institutions and increasing public awareness.

In terms of water policies, according to an analysis of six local government policies, it was found that there are policy gaps that specifically regulate water conservation and water-saving. This is due to the absence of parameters or instruments, such as studies and surveys, that can convince the government to construct the policies on water conservation. One of the instruments for analyzing regional water conditions is WSI [42]. The WSI is a simple and practical method for assessing water scarcity, combining total water resources, water use efficiency, and the proportion of household water used to describe different levels of water scarcity using various thresholds based on basic human daily water use per person [56]. In recent years, researchers have developed various water scarcity measurement tools aimed at measuring water scarcity in a region or country and supporting decision-making and policymaking to address water scarcity [42].

Even so, the point remains that there is a gap; in Bandung City itself, until now, there has never been a measurement of water scarcity using a standardized index. Although the authorized government agencies have conducted various surveys and research for this

matter, there is still no measurable assessment of the level of water availability in Bandung City. The absence of these data can be one of the causes of the absence of policies related to provisions on maximum water use limits, mapping of water crisis zones, and water distribution in Bandung City. Without convincing parameters, the urgency of water-saving policies is difficult to articulate, potentially exacerbating the challenges of water resource sustainability in the future. The study and survey are not only performed once and for all; they are a routine activity for monitoring and assessment for the government and water businesses to manage the resource.

If governments conduct WSI, they will comprehend their position. WSI or similar calculation tools in the city of Bandung are needed as an instrument to map the level of water availability as well as an early warning system for potential water shortages. With this index, the government can formulate more appropriate policies, such as regulating water distribution and setting maximum limits for water consumption.

Beyond the lack of a water crisis policy, environmental communication for water use also faces policy inadequacy and a lack of specific legislative oversight. The result shows how environmental communication forms public perceptions by triggering cognitive dissonance reactions. It is possible for public policy to change how people think about water and help them implement sustainable water practices when structured communication is used with correct information.

The contribution of this research is that environmental communication is able to influence a person's perception to encourage behavior change; it turns out that there is also a contribution from cognitive dissonance. Thus, the content of the message received is not immediately accepted or rejected, but there is also a cognitive dissonance process first. By considering the existence of this cognitive dissonance stage, it can predict how effective an environmental communication implementation will be.

6. Limitations and Future Research Directions

This study does not cover the role of other actors who contribute to the delivery of water-saving information in Bandung City. In addition, this study only covers the Bandung City level so that further research can be carried out on a wider scope at the regional or national level. On the other hand, in further research, a comparative study can be carried out by taking a comparison of two or more regions to find out how they overcome the problem of water availability.

Moreover, this study did not directly examine the comparative effectiveness of communications that offer inducements versus those that present neutral information. Future research could explore how different types of communication, particularly those emphasizing inducements, influence the promotion of water conservation behaviors. This would enhance our understanding of the most effective communication strategies for behavior change and could contribute to more targeted and effective policy recommendations in water conservation efforts.

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Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

APBBI	<i>Asosiasi Pengelola Pusat Belanja Indonesia</i> / Association of Indonesian Shopping Center Managers
AKAR	<i>Asosiasi Kafe dan Restoran</i> / Cafe and Restaurant Association
BKM	<i>Badan Keswadayaan Masyarakat</i> / Community Empowerment Agency
Diskominfo	<i>Dinas Komunikasi dan Informatika</i> / Communication and Information Service
DLH	<i>Dinas Lingkungan Hidup</i> / Environmental Service
DPKP	<i>Dinas Perumahan dan Kawasan Permukiman</i> / Housing and Settlement Agency
PD	<i>Perusahaan Daerah</i> / Regional Company
PDAM	<i>Perusahaan Daerah Air Minum</i> / Local Water Company
Perumda	<i>Perusahaan Umum Daerah</i> / Regional Public Company
SPAM	<i>Sistem Penyediaan Air Minum</i> / Drinking Water Supply System
WSI	Water Scarcity Index
WWF	Worldwide Fund

Appendix A

Appendix A.1. Questionnaire

A. Environmental Communication

		Strongly Disagree (SD)	Disagree (D)	Neutral (N)	Agree (A)	Strongly Agree (SA)
		(1)	(2)	(3)	(4)	(5)
1	You or your family members know how to save water					
2	You and your family members are interested in obtaining information about saving water.					
3	In your opinion, providing the right campaign will be able to change the water-saving behavior of you and your family members.					
4	You and your family members realize the need to save water because the water supply may be limited in the future.					
5	In using water, you and your family members consider the availability of water at home.					
6	You or your family members often receive water-saving information campaigns.					
7	You or your family members have understood the information from the campaign.					

B. Cognitive Dissonance

		Strongly Disagree (SD)	Disagree (D)	Neutral (N)	Agree (A)	Strongly Agree (SA)
		(1)	(2)	(3)	(4)	(5)
1	You and your family members realize the importance of saving water as a social norm that must exist in the community.					
2	You and your family members are highly motivated to save water.					
3	You and your family members conserve water because it saves household expenses.					
4	You and your family members can save water if you are inspired by seeing friends or neighbors who have water-saving habits.					
5	You and your family members can save water if you are inspired by seeing slogans about saving water.					
6	You and your family members will be motivated to save water if they are given awards or prizes.					
7	According to you, if you and your family members are motivated, you and your family members will be able to change your water-saving behavior.					

C. Perception to Behavior Change

		Strongly Disagree (SD)	Disagree (D)	Neutral (N)	Agree (A)	Strongly Agree (SA)
		(1)	(2)	(3)	(4)	(5)
1	You and your family members can recognize good and bad habits in household water use.					
2	You and your family members turn off the water tap when not in use.					
3	You or your family members have an understanding of technologies that can help save water.					
4	You or your family members have the ability to create new ways to save household water (for example, utilizing rainwater for other purposes).					
5	You and your family members have the skills to work together in saving household water.					
6	You or your family members have the skills to make minor repairs to household water appliances, such as repairing a leaking faucet or a toilet that is having problems.					

Appendix A.2. Respondents' Answers

Respondents' Answers										
	SA	%	A	%	N	%	D	%	SD	%
Environmental Communication										
1	168	50%	128	38%	38	11%	0	0%	0	0%
2	167	50%	130	39%	37	11%	0	0%	0	0%
3	171	51%	134	40%	29	9%	0	0%	0	0%
4	166	50%	133	40%	35	10%	0	0%	0	0%
5	167	50%	134	40%	33	10%	0	0%	0	0%

Respondents' Answers										
	SA	%	A	%	N	%	D	%	SD	%
Environmental Communication										
6	147	44%	150	45%	37	11%	0	0%	0	0%
7	149	45%	147	44%	38	11%	0	0%	0	0%
Average		49%		41%		11%		0%		0%
Cognitive Dissonance										
1	150	45%	151	45%	33	10%	0	0%	0	0%
2	141	42%	148	44%	43	13%	2	1%	0	0%
3	158	47%	140	42%	34	10%	2	1%	0	0%
4	140	42%	142	43%	50	15%	2	1%	0	0%
5	133	40%	167	50%	32	10%	2	1%	0	0%
6	138	41%	151	45%	43	13%	2	1%	0	0%
7	146	44%	141	42%	43	13%	4	1%	0	0%
Average		43%		44%		12%		1%		0%
Perception to Behavior Change										
1	104	31%	146	44%	57	17%	27	8%	0	0%
2	105	31%	158	47%	65	19%	6	2%	0	0%
3	104	31%	142	43%	83	25%	5	1%	0	0%
4	108	32%	166	50%	57	17%	3	1%	0	0%
5	38	11%	195	58%	95	28%	6	2%	0	0%
6	155	46%	168	50%	6	2%	5	1%	0	0%
Average		31%		49%		18%		3%		0%

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