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Sustainable Water Conservation Means Happiness: A Qualitative Approach in Rural Neighborhood Confronting Climate Change and Economic Struggles

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Abstract

This study examined the factors influencing household decisions to engage in sustainable water conservation in a rural neighborhood confronting climate change and economic struggles. The socioecological model (SEM) was employed to identify multilevel factors and relationships affecting sustainable water conservation behaviors. Participants included residents from a barangay (village) in the Philippines, consisting of approximately 100 households. Six female adults, aged 34 to 72, took part in the study. Two participants worked as vendors, while four were unemployed. Some also reported health issues such as urinary tract infections (UTI) and anemia. The study identified multiple interrelated factors that influence sustainable water conservation practices among rural households. Findings suggest that residents perceive sustainable water conservation as a mean to secure access to clean water amid climate and economic challenges. However, policy-level barriers were also revealed, such as the deprioritization water purity and indirect discrimination water disconnection. These findings should be interpreted in light of several limitations inherent to the study. Nevertheless, the results point to the potential for implementing sustainable water conservation initiatives in regions experiencing severe weather conditions and financial hardship.

Keywords

Sustainable Water Conservation, Indirect Discrimination Water Disconnection, Qualitative Research, Socio-Ecological Model, Philippines, Facebook App, Rural Area, Barangay, Purok, and Climate Change, Economic Struggles

1. Introduction

Humanity's progress is inextricably linked to the availability of water, which is vital for our biological functions and the sustainability of ecosystems [1]-[3]. Water scarcity has led to the emergence and spread of numerous health issues [4] [5]. Populations in geographically marginalized regions are particularly vulnerable to waterborne diseases due to limited access to clean water [6]-[22]. In developing nations with constrained water resources, water conservation is regarded as a key strategy for mitigating health impacts associated with water scarcity [20] [23].

According to Pereira *et al.* (2012) water conservation is typically linked to the management of water resources in conditions of scarcity [24]. Water conservation encompasses all policies, administrative strategies, and user practices designed to protect water resources and mitigate their degradation, including quality deterioration [24]. Sustainable on the other hand assumes the maximum number of options should be retained over the long term [25]. This study defines sustainable water conservation (SWC) as the provision of sufficient water resources throughout generations, achieved through water-saving practices and design, hence promoting public health.

Water conservation, particularly regions with restricted water supplies, poses significant challenges and health problems [1] [26] [27]. For instance, households saving water in water restricted area are at risk of food insecurity. Qualitative research in rural Cameroon conducted by Nounkeu and Dharod examined the management of limited water supplies in households [27]. To manage limited water resources, the household indicated altering cooking plans [27]. For instance, rather than preparing tomato stew with rice, households choose sautéed pasta due to the water requirements for rice and the necessity of washing tomatoes [27]. Another study by Achore *et al.* (2020) found some households resort to drinking high-sugar beverages to conserve water [28]. Moreover, according to Nounkeu and Dharod, several women often reported abstaining from drinking and experiencing thirst before bedtime to conserve drinking water for other household members [27]. Additionally, Achore points out in order to save water, some households prevent children from taking their bath and some households conserve water by skipping flushing the toilet [28]. These studies reveal knowledge and skills (e.g., alternating food), peers (e.g., caring for other household members), physical environment (e.g., size of households), and norms (e.g., unhygienic activities) are the contributing factors households managed to conserve water in these geographical regions. The studies enhance our comprehension of household water management in regions with limited water supply. Research is insufficient in its focus on understanding households' decisions to engage in sustainable water conservation in rural neighborhoods confronting climate change and economic struggles. Moreover, research on the impact of sustainable water conservation in developing countries with restricted water resources is inadequately explored [15]. Additional understanding is needed, as literature and data indicate that access to water has transitioned from distant fetching to availability within household premises in

marginalized regions [29].

2. Method

2.1. Qualitative Design

Qualitative research is defined as the exploration of the essence of phenomena, including their quality, diverse manifestations, contextual occurrences, and interpretative perspectives, while excluding their scope, frequency, and placement within an objectively determined causal framework [30]. A primary benefit of qualitative research is its ability to clarify processes and patterns of human behavior that may be difficult to measure quantitatively [31] [32]. Experiences, attitudes, and actions are intricate phenomena that can be difficult to assess accurately [31] [32]. A qualitative approach allows participants to express their thoughts, emotions, and experiences on a particular moment or event of interest [32]. This study employs qualitative research, enabling an in-depth examination that a quantitative technique cannot achieve.

This study examined the factors influencing household decisions to engage in sustainable water conservation in rural neighborhood confronting climate change and economic struggles. Consequently, the socioecological model (SEM) was employed to identify multilevel factors and relationships affecting sustainable water conservation behaviors. The utilization of SEM in research is extensively employed across multiple dimensions of health promotion [33]-[35]. The model directs the inquiries that will assist households in discussing the phenomenon. The researcher employed the socioecological model to guide the questions and assess the range of factors relevant to sustainable water conservation behavior.

2.2. Village Characteristics/Data Collection

The more accurately the sample reflects the priority study population, the greater the likelihood that the researcher will capture the diverse factors [32]. Considering this, the researcher utilized the purposive sampling. The Philippines was chosen as the study site due to its annual susceptibility to climate disasters and poverty. Participants included residents from a barangay (village) in the Philippines, consisting of approximately 100 households. To engaged in sustainable water conservation, the participants receive access to a hose, a water meter reading, and a fixed amount of 50 pesos (equivalent to one dollar USD) for up to 15 cubic meters of water per month. If participants did not meet their obligations, they were penalized, and the quintador (the individual who reads the monthly water meter usage) from the Barangay office would disconnect their water immediately without any notice if they could not pay the water bill when it was due.

The researcher utilized the Facebook (FB) Messenger to identify and recruit participants and determine their locations. A Facebook friend was tasked with recruiting participants and paired up with another person to help achieve this goal. Their initial efforts to recruit participants or identify a relevant program in their community were challenging. After two weeks, they discovered water conserva-

tion activities in rural area through word of mouth. To collect the data, the researcher conducted semi-structured face-to-face interviews using the Facetime method and recorded the interviews.

The participant criteria included adult who had been engaged in a water conservation program for at least one year and resided in the same neighborhood. The volunteered participants had five to six years of experience in sustainable water conservation. To validate their engagement, participants provided the researcher their monthly water bills, which included their names on the receipts. Six female adults, aged 34 to 72, took part in the study. Two participants worked as vendors, while four were unemployed. Some also reported health issues such as urinary tract infections (UTI) and anemia. Data saturation was attained after the sixth participant and no new insights emerge from the data gathering.

2.3. Analysis

I employed a guided method to content analysis, as delineated by Graneheim and Lundman (2004) and Hsieh and Shannon (2005), in alignment with the socioecological model [36] [37]. I read the transcripts multiple times to immerse myself in the data and gain a sense of the whole. I coded and analyzed the meaning units, which were embedded within the transcripts. I also highlighted all texts, which on the first impression, appear to represent factors influencing sustainable water conservation. The subsequent phase of the research involved coding all emphasized passages utilizing predetermined codes derived from the conceptual framework (**Table 1**). I gave new codes to any texts that could not be categorized with the initial coding scheme and then reviewed and revised these codes during the entire coding process. I grouped the emergent codes into categories and further classified into themes in accordance with the conceptual framework: individual, interpersonal, environment, community, and policy level factors. I translated relevant participant quotations and used them to illustrate themes. I adopted various measures to ensure that the publication of these responses does not violate the code of confidentiality. For instance, I used unique recording numbers to protect the identity of the participants. Finally, I conducted linkages among emergent categories and themes through axial coding (**Table 2**).

2.4. Strategies to Deal with Validity Threats

I utilized multiple strategies to identify challenges to validity relevant to qualitative research. The methodology implemented to mitigate risks to descriptive and interpretative validity encompassed utilizing verbatim transcripts of interviews, presenting participant quotations in full, employing open-ended questions, conducting peer debriefing, gathering and analyzing data, and offering a comprehensive description of the setting, participants, and themes.

I reestablished contact and reiterated queries to the participants due to insufficient internet signals. I obtained written informed consent from the participants after they were informed of the study's aim, objectives, and procedures. Participation in this study was voluntary, allowing participants to skip interview questions

Table 1. Code, categories, and themes for sustainable water conservation in rural neighborhood confronting climate change and economic struggles.

	Code	Categories	Theme
Individual Level	Joy for safety drinking water Gratitude of lower monthly bill Household efficient water use Household faucet duties Reduce flow of faucet Healing sickness	Access to clean water (A) Water conservation happiness (B) Less household (C) Adult women experienced in faucet management (D) Knowledge, culture, and skills to reduce wasting (E) Health benefits(F)	Enabling individual factors (Level 2: A1 - A3), (Level 3: A22, A 33), (Level 4: A111, A222), (Level 5: A 3333-A4444) Hindering individual factors (Level 3: A11), (Level 4: A111), (Level 5: A1111-A4444)
Interpersonal Level	Neighborhood concern Reduced bill Saving personality	Neighbors benefit (A1) Affordable water bill (A2) Conscientious personality (A3)	Enabling interpersonal factors (Level 1: A - F), (Level 3: A22, A33), (Level 4: A111 - A222), (Level 5: A3333 - A4444) Hindering interpersonal factors (Level 3: A11), (Level 4: A111), (Level 5: A1111 - A4444)
Environmental Level	Consistent heavy rain Consequence of climate change Water home connection	Stormwater runoff (A11) Climate change awareness (A22) Modernizing water access reduces health burdens (A33)	Enabling environment factors (Level 1: A - F)), (Level 2: A1 - A3), (Level 4: A111 - A222), (Level 5: A3333 - A4444) Hindering environment factors (Level 4: A111), (Level 5: A1111 - A4444)
Community Level	Inability to afford Water connection implementation	Financial difficulty (A111) Barangay advocacy (A222)	Enabling community factors (Level 1: A - F), (Level 2: A1 - A3), (Level 3: A22, A33), (Level 5: A3333 - A4444) Hindering community factors (Level 3: A11), (Level 5: A1111 - A4444)
Policy Level	Insufficient personnel to maintain water flow Waterless during rainy days Instant disconnection New adequate village tank	Water infrastructure mismanagement (A1111) Deprioritize water purity (A2222) Indirect discrimination water disconnection (A3333) Village water storage size (A4444	Enabling policy factors (Level 1: A - F), (Level 2: A1 - A3), (Level 3: A22 - A33), (Level 4: A111, A222) Hindering policy factors (Level 3: A11), (Level 4: A111)

Table 2. Causal relationships of sustainable water conservation between SEM levels for rural neighborhood confronting climate change and economic struggles.

SEM Level	Factors Enabling	Factors Hindering
Individual	Access to Clean Water, Water Conservation Happiness, Less Household, Adult Women Experienced in Faucet Management, Less Household, Knowledge, Culture, and Skills to Reduce Wasting, Health Benefits, Neighbors Benefit, Affordable Water Bill, Conscientious Personality, Climate Change Awareness, Modernizing Water Access Reduces Health Burdens, Financial Difficulty, Barangay Official Advocacy, Indirect Discrimination Water Disconnection, Village Water Storage Size	Stormwater Runoff, Financial Difficulty, Water Infrastructure Mismanagement, Deprioritize Water Purity, Indirect Discrimination Water Disconnection, Village Water Storage Size

Continued

Interpersonal	Access to Clean Water, Water Conservation Happiness, Less Household, Adult Women Experienced in Faucet Management, Less Household, Knowledge, Culture, and Skills to Reduce Wasting, Health Benefits, Neighbors Benefit, Affordable Water Bill, Conscientious Personality, Climate Change Awareness, Modernizing Water Access Reduces Health Burdens, Financial Difficulty, Barangay Official Advocacy, Indirect Discrimination Water Disconnection, Village Water Storage Size	Stormwater Runoff, Financial Difficulty, Water Infrastructure Mismanagement, Deprioritize Water Purity, Indirect Discrimination Water Disconnection, Village Water Storage Size
Environmental	Access to Clean Water, Water Conservation Happiness, Less Household, Adult Women Experienced in Faucet Management, Knowledge, Culture, and Skills to Reduce Wasting, Health Benefits, Climate Change Awareness, Modernizing Water Access Reduces Health Burdens, Neighbors Benefit, Affordable Water Bill, Conscientious Personality, Financial Difficulty, Barangay Official Advocacy, Indirect Discrimination Water Disconnection, Village Water Storage Size	Stormwater Runoff, Financial Difficulty, Water Infrastructure Mismanagement, Deprioritize Water Purity, Indirect Discrimination Water Disconnection, Village Water Storage Size
Community	Access to Clean Water, Water Conservation Happiness, Less Household, Adult Women Experienced in Faucet Management, Knowledge, Culture, and Skills to Reduce Wasting, Health Benefits, Neighbors Benefit, Affordable Water Bill, Conscientious Personality, Climate Change Awareness, Modernizing Water Access Reduces Health Burdens, Financial Difficulty, Barangay Official Advocacy, Village Water Storage Size	Stormwater Runoff, Financial Difficulty, Water Infrastructure Mismanagement, Deprioritize Water Purity, Indirect Discrimination Water Disconnection, Village Water Storage Size
Policy	Access to Clean Water, Water Conservation Happiness, Less Household, Adult Women Experienced in Faucet Management, Knowledge, Culture, Skills to Reduce Wasting, Health Benefits, Neighbors Benefit, Affordable Water Bill, Conscientious Personality, Climate Change Awareness, Modernizing Water Access Reduces Health Burdens, Financial Difficulty, Barangay Official Advocacy, Indirect Discrimination Water Disconnection, Village Water Storage Size	Stormwater Runoff, Financial Difficulty, Water Infrastructure Mismanagement, Deprioritize Water Purity, Indirect Discrimination Water Disconnection, Village Water Storage Size

Table 3. Causal relationships in SEM: Water conservation happiness and Sustainable water conservation.

SEM level	Cause (water conservation happiness influence)	Effect (water conservation outcome)	Causal Direction
Individual	Feeling happy to have access to clean water	Enables households to pay attention to the faucet to ensure they are conserving water	Motivated by access to clean water; use less water to ensure access to clean water
Interpersonal	Feeling very happy the water bill is affordable	Enables sustainable water conservation behavior	Motivated by affordable water bill; individuals are more likely to model conservation behavior
Environmental	Positive attitude for access to running water at home	Enables sustainable water conservation behavior	Motivated by faucet in the home; more likely to support eco-friendly upgrades
Community	The barangay leader talk positive about saving water	Enables sustainable water conservation behavior	Motivated by the barangay influence; more likely to engage in sustainable water conservation projects
Policy	Saving water as seen as access to clean water	Enables sustainable water conservation behavior	Encourages to reduced use as long as they have access to clean water.

or withdraw at any moment. They were not obligated to disclose any personal information throughout the interviews. During the FaceTime call, I requested consent to record our interview.

3. Results

3.1. Individual Factors

3.1.1. Access to Clean Water

The participants perceived that access to clean water influences their decision to engage in sustainable water saving. They possess an optimistic attitude regarding clean water and the health gains of sustainable water conservation. They feel that to access saving water in their houses promotes clean water. The participants answer clarify this observation below.

I am happy because we are provided with clean water that does not cause health problem to our body. (Rec 33) *I am very happy the water is a big help because it is very clean.* (Rec 40) *I am very happy because we are not sick because my water is clean. The Barangay cleans it. They clean it … when it rains, it gets clean, they clean it.* (Rec 41)

3.1.2. Water Conservation Happiness

I am happy that saving water I only pay a little every month. (Rec 46)

3.1.3. Less Household

The size of the household may significantly influence participants' ability to maintain their water bills below 50 pesos PHP. Water consumption becomes more manageable when there are fewer individuals residing in the household.

For me, I pay less because there are only four of us. I do not wash clothes every day. I wash clothes ones a week. We shower everyday that's all we use. I pay less for water. We only use a little water. (Rec 42) *There are only two of us, we really save water, we don't waste water because we are only two.* (Rec 46)

3.1.4. Adult Women Experienced in Faucet Management

The participants, all adult women, are responsible for various household duties and water usage duties, including cooking, cleaning, washing clothes, and managing water bills. They also oversee the faucets. Gender and age may influence participants' decisions to conserve water.

I take care of the water faucet in the bathroom and in the kitchen, I close the faucet so we can conserve. (Rec 43) *I wash clothes twice a week. I watch the faucet all the time, so the water doesn't keep flowing. I only cook in the morning to save water.* (Rec 46)

3.1.5. Knowledge, Culture, And Skills to Reduce Wasting

Furthermore, the participants possess the knowledge, culture, and skills to conserve water and adept to the activities. They expressed no dissatisfaction with their activities and are content with them. Some of the activities they do to ensure they do not pass 50 pesos are illustrated below.

Run the water slowly, slowly run the faucet. (Rec 40) *We only use it for washing clothes and cooking* (Rec 41). *Shut off the faucet right away after using.* (Rec 42) *I cook ones a day in the morning, I shower ones a day it is cold you cannot take a shower it is cold* (Rec 45) *I drink three cups of water for my UTI, like that, but I am not like others they just let their faucet run water that's wasting.* (Rec 46).

3.1.6. Health benefit

The beliefs in health benefits influence the participants decision to conserve water. They hold a high regard the importance of access to clean water's benefits on their health. They perceive conserving water heals the sickness.

Conserving gives us good health in our body. (Rec. 33) *Water is medicine for sickness. The water here the center checks our water to make sure it's clean.* (Rec 41) *It is good for the body especially if you are sick, it makes you better. I have pain UTI you know I drink enough water to urinate more so it will go away.* (Rec 46)

3.2. Interpersonal Factors

3.2.1. Neighbors Benefit

Neighbors' benefit influences households to save water. Several households indicated that the entire community would face water deprivation due to a lack of conservation efforts. Concern for the neighbor's well-being appears to be significant in this neighborhood.

If you save water, it benefits my neighbors. If you don't save, you will be the only one benefiting because you will be the only one to finish the water (Rec 33) *Our neighbors will be affected, if you don't pay attention to the water and save. If you use too much especially when the kids when they go to school, they take showers in the morning they use a lot of water students take showers in the more and waste. If they waste the water, the Barangay tank will run out.* (Rec 46)

3.2.2. Affordable Water Bill

Affordable water bill is a norm in this neighborhood. They are pleased that utilizing water efficiently enables them to decrease their monthly water expenses. On the other hand, if the bill exceeds their capacity to pay, household water will be disconnected.

My bill will be become small too. (Rec 33) *If you save, you pay less.* (Rec 40) Conserving water, I only pay a little bit. I only pay a small amount (Rec 41) *We don't waste because our bill will get big then there is this meter then when the day comes to pay then if we have a big bill we will get disconnected because we cannot afford to pay.* (Rec 43)

3.2.3. Conscientious Personality

It is my personality. Also, so that I pay less for my water, it is my personality that I save. (Rec 42)

3.3. Environmental Factors

3.3.1. Stormwater Run Off

The village faces severe and constant weather conditions, including excessive rain-

fall and typhoons, which hinder sustainable water conservation efforts. Each time it rains, the Barangay tank requires cleaning due stormwater runoff. This situation threatens the sustainable water conservation program, leaving households temporarily without access to water or leaving households in difficult positions.

When there is typhoon, the water is dirty. (Rec 40) *The water is under ground when it rains, they have to clean it.* (Rec 41). *It rains here all the time.* (Rec 46)

3.3.2. Climate Change Awareness

Climate change influences participants' decisions to conserve water. It seems that in this neighborhood, people are aware of the effects of climate change on freshwater and are actively reducing water consumption.

People talk about that we should consume less water because of climate change. (Rec 42)

3.3.3. Modernizing Water Access Reduces Health Burdens

Access to a faucet at home influences the behavior to save water. Some participants believe that the program is a big help. Individuals engaging in sustainable water conservation have easy access to water and no longer need to walk or find transportation to collect water at the river.

All of us we all now have access to water. We now have faucets. My water is complete I have one for the restroom, for the sink, for the outside. (Rec 41) *If you don't have connection to the water, you may have to walk or get a ride to get water.* (Rec 42) *What I want to say regards to water, I won't have a hard time carrying and fetching from far away.* (Rec 43)

3.4. Community Level

3.4.1. Financial Difficulty

Financial difficulty is another factor influencing the participants to conserve or that hinders to participate in the sustainable water conservation. Households struggle to pay more than two dollars per month. When their monthly water cost exceeds their monthly obligation, many households struggle to make the payments.

My water was disconnected only one time when my hose leaked and caused my bill to go up to about 1000 *pesos.* (Rec 41) *You really have to save water, it's very difficult to find money here.* (Rec 42) *I must maintain* 50 *pesos or even* 60 *pesos so I know I can pay for it, but* 500 *pesos I cannot afford.* (Rec 43) *We must save because we do not have the money.* (Rec 43) *If I go over* 50 *pesos and I can't afford to pay, I will get penalize of extra* 100 *pesos.* (Rec 46)

3.4.2. Barangay Official Advocacy

The Barangay official's advocacy for the implementation of sustainable water conservation significantly influences households' decisions regarding water usage. The neighborhood participant feels empowered and trust the barangay official's commitment to water conservation, feeling compelled to engage in the official's project.

The barangay said it is important to save water. (Rec 33) *I am very happy with our barangay the water has reached us* (Rec 40) *The water comes from the Barangay they are the ones who initiated and paid for everything, so we have water.* (Rec 42)

3.5. Policy

3.5.1. Water Infrastructure Mismanagement

Water infrastructure mismanagement reduces the quality of water and flow which disrupt to sustainable water conservation. Households request that the Barangay officials or the government clean the water well and employ additional personnel to address issues related to water access especially after the rain. Their requests to the officials are outlined below.

What I want them to do is to add more personnel sometimes our water is on and off sometimes one day or two days the water is on and off. It takes them long time to fix when there is problem with the water on and off. If one day, there is no water it is so hard. This is what I want them to do. Sometimes the tank has problem with the water flow, and it doesn't come to us. (Rec 42) *We need them to manage it well so that the water can flow continuously.* (Rec 43) *Sometimes there is a leak in the main hose, and we can't get water.* (Rec 46)

3.5.2. Deprioritize Water Purity

If there is heavy rain the water submerged, so we cannot drink the dirty water. We pay attention. It should be given attention to the government to clean it so people can drink it because we have to buy mineral water every time it rains. (Rec 33)

3.5.3. Village Water Storage Size

Now our village tank is bigger they change it to ensure the water is adequate for the size of the village. (Rec 33)

3.5.4. Indirect Discrimination Water Disconnection

Indirect discrimination water disconnection can be a barrier to sustainable water conservation program. Lack of payment arrangement and penalties to re-connect to water for individuals with economic obstacles disadvantages the neighborhood. The participant expressed how the government disregard their financial situation and their struggle to make payments.

They should not penalize us. There are times when we really can't pay. (Rec 41) *This is what they need not to disconnect our water right away.* (Rec 43)

What I think the government should do is to give us more time to pay if we don't have the money. Don't cut our water off right away. Give us time. (Rec 46)

4. Discussion

The study identified multiple interrelated factors that influence sustainable water conservation practices among rural households. It extends the evidence base by illustrating the multidimensionality and interaction of the factors that encourage households to conserve water. The influences intertwined and influenced each

other across different levels of the SEM (Figure 1). The facilitators were identified across the five levels: individual (access to clean water, water conservation happiness, less household, adult women experienced in faucet management, knowledge, culture, and skills to reduce wasting, and health benefits), interpersonal (neighbors' benefit, affordable water bill, and conscientious personality), environment (stormwater runoff, climate change awareness, and modernizing water access reduces health burdens), community (financial difficulty and barangay official advocacy), and policy (water infrastructure mismanagement, deprioritize water purity, indirect discrimination water disconnection, and village water storage size).

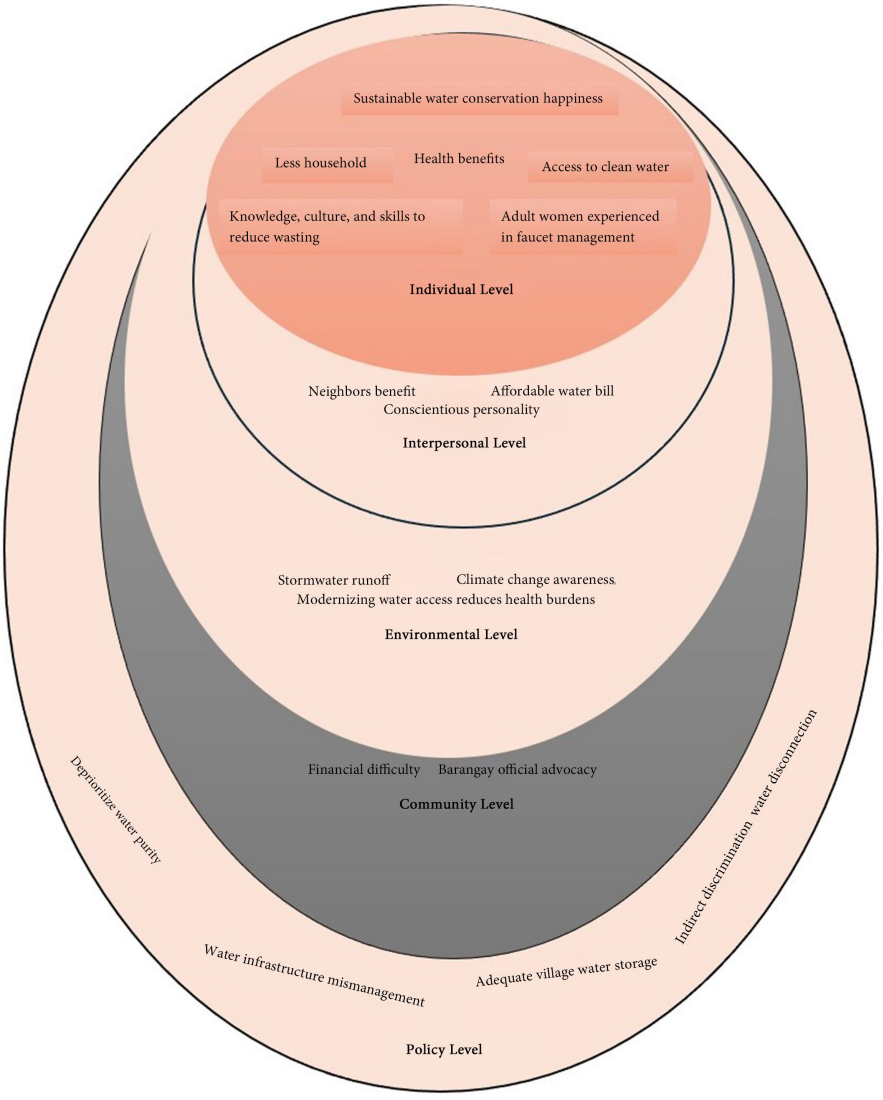

Figure 1. Conceptual framework adapted from the SEM to identify the household influences to engage in sustainable water conservation. Adapted from McLeroy *et al.* (1988) [43].

The present study demonstrates causal relationships between SEM levels. For example, access to clean water, less household, and health benefits in the individ-

ual level can positively influence the interpersonal and policy levels. The affordable water bill in the interpersonal level can positively influence the individual level and prevent the negative outcome of the indirect discrimination water disconnection. However, financial difficulty enables and hinders both behaviors in the individual and policy levels. While barangay advocacy in the community level can positively influence all levels, deprioritize water purity in the policy level create challenges to the sustainable water conservation in all levels. Similarly, while village water storage size positively influences all levels, the impact of the rain causes the village water storage size to become inadequate at all levels. The hypothetical relationships in **Table 1** and **Table 2** are depicted based on the findings from this study.

The participants hold a favorable attitude towards sustainable water conservation despite consequences of the economic struggles. They articulated the significance of water in healing diseases and emphasized the necessity of conserving water and avoiding waste. Behaviors aimed at conserving water, such as preparing meals once or twice a day and skipping baths to minimize water consumption, are prevalent in regions with limited water availability [28]. Additionally, it is common to regard the welfare of individuals facing water-related challenges, as shown by previous research [27]. The socioeconomic status of this community necessitates water conservation, as indicated by other studies [38]-[42]. The financial component is a crucial factor in the decision to save water to reduce water bill in this population [40]. Households explained how some cannot afford to pay more than two dollars each month, necessitating the need to conserve water. However, the participants expressed happiness and gratitude towards their official for access to clean water in their neighborhood.

Findings suggest that residents perceive sustainable water conservation as a mean to secure access to clean water amid climate and economic challenges. Despite the challenges posed by consistent heavy rain and strict policy, households maintain a positive outlook towards the program. They are determined to meet their monthly obligations to ensure clean water access in their homes. However, the results also suggest that severe weather conditions undermine the goals of the program. Participants reveal weather-related issues hinder their ability to access clean water at home.

4.1. Limitations

These findings should be interpreted in light of several limitations inherent to the study. First, due to resource constraints, the sample was drawn from a single remote neighborhood. Second, the volunteered participants were all women, which may limit transferability of the findings to broader populations. Another limitation is that some participants may have encountered challenges in articulating their thoughts, as this was their initial experience being interviewed about their water experiences. For instance, a few exhibited significant reluctance in discussing the topic, which introduces the possibility of interview bias. Additionally, the

utilization of the FaceTime application posed challenges. Most of the interviews were conducted outside the store due to the availability of internet connectivity and mobile phones. Background noise, including chickens, occasional loud music, and passing cars, sometimes resulted in disconnections. However, I endeavored to acquire comprehensive data by reestablishing contact and reiterating the same inquiries, which the participants did not object. In addition, some respondents were recontacted to verify their responses. During the analysis, the researcher listened to the recording multiple times due to the insufficiency of the transcription (some words were missing, or some words were not translated correctly).

4.2. Conclusions and Programmatic Implications

The present findings show the behavior to engage in sustainable water conservation among rural households with restricted water resources is the result of ecological influences (all five levels of socio-ecological models). For instance, water conservation happiness (individual level) and its impact on sustainable water conservation at the five SEM levels. At the individual level, feeling happy to access clean water enables households to pay attention to the faucet. People are motivated by access to clean water and may use less water to prevent collecting water from the river or harvesting rainwater. At the interpersonal level, feeling very happy the water bill is affordable enables water conservation behavior. People are motivated by affordable water bills and more likely to model conservation behavior. At the environmental level, access to running water at home causes joy, enabling positive water conservation behavior. People are motivated by having a faucet at home and more likely to support eco-friendly upgrades. At the community level, the barangay leader talks positively about saving water, which enables water conservation. The people are motivated by the barangay influence and the households in the neighborhood are more likely to engage in sustainable water conservation projects. At the policy level, saving water as seen as access to clean water enables positive water conservation behavior. People are encouraged to use water less as long as they receive clean water. This hypothetical relationship links the individual level to all SEM levels see **Table 3**.

Access to clean water in the home is vital for households' daily use. However, policy-level barriers were also revealed, such as the deprioritize water purity and indirect discrimination water disconnection. As stated by the participants,

"*If there is heavy rain the water submerged, so we cannot drink the dirty water. We pay attention. It should be given attention to the government to clean it so people can drink it because we have to buy mineral water every time it rains.*" (Rec 33)

"What I think the government should do is to give us more time to pay if we don't have the money. Don't cut our water off right away. Give us time." (Rec 46).

Policy must account for the highly disadvantaged socioeconomic situation requiring philanthropic assistance and/or payment arrangement to provide access to clean water. Nevertheless, the results point to the potential for implementing

sustainable water conservation initiatives in regions experiencing severe climate change and economic struggles. The result of the findings can be utilized to design studies on sustainable water conservation in vulnerable region as climate change continues to threaten water resources. Further research is needed to understand the influences of age and gender, psychological effects, and water conservation infrastructure maintenance.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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