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Promoting Pro-Environmental Behavior for Sustainable Water Resource Management: A Social Exchange Perspective

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Abstract

Water scarcity has become a pressing issue globally, with countries like Iran experiencing severe water stress. The reliance on groundwater sources for more than 80% of the annual water supply raises concerns about the rapid depletion of this vital resource. Water resources are an integral part of our shared heritage and represent one of humanity's fundamental natural assets. However, the challenge lies in the difficulty of restricting access to these resources, leading to competition, degradation, and potential destruction. This article employs a rigorous documentary research method combined with the social exchange theory to explore the factors that drive cooperative behaviors for effective water conservation. By emphasizing the importance of sustainable water usage, the study proposes a comprehensive set of strategies. These include educational initiatives to raise awareness about water scarcity and conservation, fostering ethical commitment to responsible water use, establishing effective communication channels among stakeholders, implementing systems of rewards and punishments to incentivize sustainable practices, and utilizing social sanctions to deter unsustainable behavior. The findings of this research provide valuable insights into promoting a cooperative and collaborative approach towards water conservation. By understanding the underlying factors that influence individuals and communities, policymakers and stakeholders can develop targeted interventions to encourage sustainable water management practices. This study contributes to the ongoing global efforts to address water scarcity and lays the groundwork for future research and policy development in the field of water resource management.

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1. Introduction

The environmental problems created by humans have led to economic and social conflicts with potentially destructive consequences for human health, well-being, and future generations. Although humans have a long history of environmental degradation, the effects are now being felt on a global scale due to population growth and technological advancements. It is widely accepted that we need to move towards greater sustainability. However, implementing the necessary changes is very challenging due to conflicting interests among the involved parties [1]. Common resources, whether natural or artificial, are shared among different stakeholders, and the competition for their use often leads to their depletion or even destruction [2]. Water is one such common resource in the world that transcends political boundaries, and its scarcity is one of the most important environmental issues that humanity faces in the 21st century [3]. Today, climate change, increasing demand for freshwater resources, declining water tables and river flows, and outdated infrastructure pose challenges to water management worldwide. The rising demand and intensifying conflicts over limited water resources have amplified the water management challenges in the 21st century more than ever before [4]. According to a report by the Water, Environment, and Health Institute, by 2030, there will be a 40% gap between water demand and available water. The world's population has tripled in the twentieth century, but water use has increased sixfold. By 2050, population growth in flood-prone areas, climate change, deforestation, loss of wetlands, and rising sea levels could increase the number of people vulnerable to floods to 2 billion. Currently, 1.8 billion people worldwide use contaminated drinking water, and more than 80% of wastewater is discharged into the environment without adequate treatment [5]. Iran faces significant water stress due to various factors, such as a large population, urbanization, industrialization, and excessive groundwater exploitation, leading to increased pressure on water resources [6]. The rapid socioeconomic development in the country, coupled with unsustainable water management practices, has resulted in a severe human-induced drought, primarily caused by extensive groundwater pumping. This situation poses a significant threat to the long-term sustainability of groundwater reserves. Additionally, climate change has disrupted the water cycle, exacerbating the challenges by causing droughts in some regions and floods in others. At present, Iran's annual water consumption is estimated to be approximately 96 billion cubic meters, exceeding the country's total renewable water resources (89 billion cubic meters) by around 8% or nearly 80% above the water scarcity threshold [7]. Studies indicate that approximately 77% of Iran's land area, encompassing 23 out of 30 water basins, experiences excessive depletion of groundwater resources, with human extraction surpassing the natural recharge rate by more than threefold. This unsustainable pattern of groundwater extraction has resulted in a significant decline in groundwater availability, evident from the proliferation of dried-up wells across the country [6]. Visible manifestations of Iran's water crisis include the shrinking of lakes, the drying up of rivers, and the overexploitation of subterranean aquifers. These manifestations intensify regional conflicts and exacerbate disparities in water access, leading to heightened competition for water resources. Consequently, these circumstances exert substantial socioeconomic and environmental impacts, negatively

affecting local economies and human well-being. Moreover, if the extraction from shared water resources, such as groundwater, exceeds sustainable thresholds, it renders them vulnerable to irreparable damage [8]. The persistence of the current situation will further exacerbate environmental degradation, making it increasingly challenging for the ecosystem to revert to its natural state unless extractors can limit their withdrawals to sustainable levels. The confluence of these problems with issues related to public health, politics, socioeconomic aspects, and sustainability significantly amplifies the demand for effective water management strategies [9]. Fundamental drivers contributing to the emergence and intensification of the water crisis in Iran encompass several interrelated factors. These include the high and escalating population growth rate, the rising per capita food demand driven by increasing incomes, particularly for water-intensive agricultural products, inadequate employment opportunities in alternative sectors to incentivize farmers and reduce the social costs associated with restrictive measures targeting agricultural activities, ill-conceived policies that prioritize food self-sufficiency as a cornerstone of national independence, weak governance and management of water resources with a predominant focus on augmenting water supply rather than enhancing water use efficiency, and the escalating average temperatures and declining average precipitation resulting from the impacts of climate change [7]. In the current circumstances, addressing the water crisis and implementing effective water management and conservation strategies are crucial and pressing issues in the country. The United States Environmental Protection Agency has identified two categories of actions to increase water efficiency: engineering measures designed to reduce water consumption regardless of consumer behavior, and behavioral actions that aim to change consumer habits, such as using dishwashers at maximum capacity, taking shorter showers, and turning off the tap while brushing teeth or shaving [10]. While traditional studies on water conservation have predominantly focused on top-down structural and institutional factors, such as physical infrastructure (water-saving technologies and facilities) and policy and legislation (measures and laws), as well as measurement and pricing mechanisms that determine water costs based on consumption volume, providing economic incentives for reducing consumption fewer efforts have been made towards bottom-up and soft measures [11]. These include creating motivations for individuals to conserve water and change specific patterns or behaviors that contribute to water conservation [5][12]. Behavioral change approaches address aspects of water demand that cannot be effectively addressed through engineering, technological, or legal interventions. On the other hand, water conservation is becoming a dominant and important strategy worldwide for long-term water planning and management [12]. Sustainable water consumption is a current topic on the agenda of governments worldwide, particularly given the increasing severity of water crises [13]. Behavioral change is an indispensable component in providing solutions to water demand[14]. The current water and climate emergencies require not only efficient water redistribution and reallocation institutions but also a better understanding of how water users collectively function in this new order [15]. The use of psychological and anthropological theories and patterns is one method to understand human behavior regarding water conservation. The goal of these patterns is to gain a proper understanding of the predictive structures of behavior so that behavior change can occur effectively. In the context of the water crisis, the social dilemma framework is described. Behavioral theories and evidence indicate that the social dilemma structure significantly influences behavior [16]. The issue of water conservation behavior as a social dilemma highlights the minimum two fundamental conflicts individuals face when making decisions in this area: (1) a social conflict between individual and collective interests, and (2) a temporal conflict between immediate and delayed consequences of their actions. Understanding how individuals resolve these conflicts can

provide valuable insights into the conditions under which people make decisions. Two considerations for water conservation behavior are identified: (1) non-cooperative considerations (such as a focus on immediate personal interests) associated with reducing water conservation behaviors, and (2) cooperative considerations (such as attention to the interests of others or justice concerns) associated with increasing water conservation behaviors. Numerous studies have addressed water scarcity using the 'tragedy of the commons' framework. It was demonstrated in [17] that the government could utilize planning mechanisms, pricing, and river ownership rights to establish a river restoration system. It was shown in [18] that not only the tragedy of the commons but also a misunderstanding of groundwater inventory, remaining water, and groundwater extraction and recharge rates could lead to excessive use and depletion of water resources. Based on [19], the strategy of limiting the spillover effects of water pumping decisions on pumping costs in another country has prevented the tragedy of the commons between Saudi Arabia and the United Arab Emirates for nearly 60 years. According to [20], shared resources are not only at risk of overuse but also excessive pollution. According to this theory, polluters lack incentives to control pollution, and profit-seekers are free to exploit common resources [21].

This article aims to provide a comprehensive analysis of the social dilemma surrounding water conservation, using psychological and anthropological theories. By understanding the underlying structures of behavior and how individuals navigate conflicting interests, we can foster effective behavior change. The focus is on the dichotomy between non-cooperative considerations (e.g., immediate personal interests) leading to reduced water conservation behaviors and cooperative considerations (e.g., interests of others, justice concerns) promoting increased water conservation behaviors. Drawing on empirical evidence, this article explores the tragedy of the commons framework, highlights the role of incentives, and offers valuable insights for preserving water resources based on psychological foundations.

2. Research Method

This article utilizes the method of documentary research. Documentary research involves the analysis of documents, where the researcher collects relevant research data from various sources and documents pertaining to actors, events, and phenomena. This method is employed for a multitude of reasons, with a key focus on gaining valuable insights into past activities and the transformative processes that have unfolded from the past to the present.

2.1. Social dilemmas

In everyday life, individuals often confront situations where their personal interests clash with the interests of a larger group or society to which they belong. What may appear as a rational choice from an individual standpoint can have adverse consequences for the collective well-being of the group or community. This conflict of interest is commonly referred to as a social dilemma. It arises when individuals have access to and compete for shared resources. [22] introduced the notion of the "Tragedy of the Commons" in his article, depicting a group of herdsmen with unrestricted access to a communal grazing land for their cattle. While it may benefit each herdsman to allow their animals to graze as much as possible, the costs are distributed among the entire group. Nevertheless, if each herdsman independently makes the rational decision to maximize their personal gain, the shared land quickly becomes depleted,

resulting in harm for all. According to [22], if individuals prioritize their self-interest and exploit the common resources, they will persist in doing so until the resource becomes scarce or depleted. Technical solutions alone cannot resolve this predicament since they may increase the resource quantity but fail to address individuals' underlying motivation for continuous exploitation. This tragic situation occurs when natural resources are freely accessible to all and shared among them [20]. According to [22], even a renewable resource is likely to be overexploited if used by a large number of individuals, leading to long-term damage [23]. Such tragedies are evident in the use of common resources in many parts of the world today. Underground aquifers serve as examples of common resources since, in most cases, all actors have direct access (legal or illegal) to groundwater. Consequently, underground aquifers typically follow the pattern of the tragedy of the commons. In a common-pool resource dilemma, group members decide how much of the shared resource to extract, and the amount consumed by each individual is not accessible to others. This interaction ceases once the common resource is completely depleted, meaning when individuals' consumption exceeds the replenishment rate over a specific period of time [24]. Hardin's depiction of the tragedy of the commons was not a new finding but rather rooted in assumptions and concepts related to Aristotle's perspectives. According to Aristotle, anything that is shared among many individuals receives the least attention. Aristotle observed that the common ownership of something affects the care and stewardship provided to it, which can either enhance resource sustainability or expose it to degradation and depletion [25]. Daws was the first to formally introduce the term "social dilemma" [26]. A social dilemma refers to a situation in which individual interests conflict with collective interests. This incompatibility can arise between individual short-term goals and the long-term societal goal, or between individual short-term goals and the goals of other individuals [15]. Two criteria have been identified to define a social dilemma: (1) when an individual's self-interest (selfishness/non-cooperation) outweighs their inclination towards cooperative actions for the collective interest, regardless of what others in the community do, and (2) if individuals act individually instead of cooperatively, they collectively receive lower benefits [16]. In other words, a social dilemma refers to a situation where a non-cooperative action is tempting for each individual because it yields superior outcomes (usually in the short term) for the individual themselves. However, if everyone follows this non-cooperative behavior, the overall situation will be worse compared to a cooperative scenario [27]. These conditions pose challenges as individual self-interests can be alluring, even if cooperation would lead to long-term benefits for everyone [26]. Social dilemmas are social interdependence situations where an individual's decision not only has consequences for themselves but also impacts other individuals involved in the social dilemma [28]. However, the outcome for each individual is not solely dependent on their own decision but also relies on the decisions of other individuals in the social dilemma [28]. Social dilemmas come in various forms, and this article specifically focuses on the social dilemma of common resource dilemmas. Common resource dilemmas revolve around the preservation of scarce resources [29]. Common resources are determined by two fundamental characteristics: (1) an individual's use of a unit of the common resource makes it inaccessible to others, and (2) excluding potential beneficiaries from the common resource incurs costs [16]. Common resource dilemmas arise when multiple individuals have open access to a limited resource, and each member of the group decides how much of the common resource to exploit [16]. In such circumstances, individuals have to choose between personal interests (unsustainable use of a natural resource like water) and societal or environmental interests (sustainable or reduced use of resources). Common resource dilemmas represent a matter of life and death for all living beings on Earth. For example, whenever you utilize limited natural resources (such as freshwater, oil, or gas) to

make your life easier, happier, or more comfortable, an event occurs. Some resources (e.g., grazing lands) regenerate relatively quickly, while others (e.g., trees) regenerate at a slower pace, and some resources are replenished at an extremely slow rate or not at all (e.g., oil and endangered species). When resources regenerate at a much slower rate than human extraction, the risk of resource depletion arises. Although in ancient times various forms of mutual assistance were prevalent in Iranian society, especially in traditional rural and tribal communities, the author believes that such mutual assistance has declined in the past two decades. This decline can be attributed to economic pressures, decreasing trust between the nation-state and individuals, increasing class disparities, the prominence of material-economic criteria in people's lives, and so on. Consequently, there has been a significant increase in prioritizing personal interests over collective and group interests, as observed in various forms of exploiting public resources for personal benefit, individuals outcompeting each other for available opportunities in society, and so forth. Therefore, self-centeredness, meaning the inclination to live within the realm of satisfying personal needs and achieving immediate interests and benefits, has become a prominent characteristic of Iranians [6]. Iranians tend to prioritize their own desires and seek self-preservation rather than considering collective, group, and public interests. This exact phenomenon has created numerous issues and challenges in the context of common resource dilemmas and environmental confrontations within the country. Tourists who indiscriminately light fires in forests for momentary pleasure without considering the long-term consequences of wildfires and environmental exploitation, urban residents who use private cars to commute to work without paying attention to the pollution of cities and the threat to public health, and farmers who utilize groundwater resources for increased crop yields without considering the risks of water scarcity for the current and future generations are examples of such dilemmas. This unregulated behavior arises because individuals benefiting from common resources tend to act in a self-centered manner and give less importance to the consequences of their actions on the collective well-being.

2.2. Social dilemma in water consumption

Coping with the increasing mismatch between water demand and supply is one of the most significant challenges facing society in the 21st century. As water resources dwindle while the need for water rises, individuals face conflicting pressures and find themselves at a crossroads between personal interests (excessive water consumption) and societal interests (collaboration for water conservation) and between immediate gratification and long-term consequences. Resolving the problem of water insecurity requires addressing how society navigates this social dilemma. Future research and policies on water insecurity require an optimal combination of individual and collective strategies to tackle this societal crossroad [29]. As water is part of a renewable, free, and seemingly endless public resource, people often perceive it as such. However, the volume of water does not determine the accessible water over time; rather, it is the renewability or replenishment rate of groundwater, rivers, and lakes that is crucial. Each surface and groundwater source worldwide provides approximately half of the necessary freshwater, but the recharge rate of groundwater is significantly low (about 1% per year) [30]. Conversely, unlike many resources, there is a constant demand for water. For instance, according to the World Health Organization, humans require a minimum of 20 liters of water per day for drinking, cooking, and sanitation to ensure adequate health (WHO, 2016). This demand also exists in other sectors, such as agriculture, industry, and urban areas. The Food and Agriculture Organization reports that the majority of freshwater in the world (69%) is consumed in

agriculture, including irrigation, livestock, and aquaculture (FAO, 2016). Water scarcity and the necessity for collective behavior to protect and incentivize individuals to minimize personal interests create the necessary conditions for addressing water consumption as a social dilemma [29]. From a social dilemma perspective, the depletion of shared natural resources, such as water, arises due to individuals' pursuit of short-term self-interests, disregarding the long-term implications for society and the environment [31]. While restricting water consumption is advantageous for the collective, individuals may have a tendency to excessively consume water. This situation is particularly concerning as it entails behaviors that ultimately yield adverse outcomes for both individuals and the resources themselves [29]. For example, consider a scenario in which an individual must decide whether to release water from a reservoir to compensate for future water scarcity or surface water access. Even if they believe that the current value of consumption is lower than the guaranteed future value, their motivation to retain water in the reservoir diminishes when they are aware that other users can immediately utilize the water. Tragedies of the commons occur because each individual has an incentive to extract water sooner than others, depleting the reserves rapidly [32]. Another illustration is observed during droughts when private well owners dig deeper wells, depleting the underground aquifers that they legally own [33]. The central question in social dilemmas pertains to how individuals can be encouraged to cooperate under social dilemma conditions. Addressing this question necessitates considering two types of social dilemma strategies: individual (behavioral) strategies and structural strategies. Individual strategies involve modifying individuals' cognition and motivation to promote cooperative behavior and responsible resource management. These strategies address factors that precede problematic behavior, such as behavioral commitment and education [34]. At least four socio-psychological factors may be associated with promoting water conservation in the context of resource dilemmas: (1) awareness of water scarcity, (2) a sense of responsibility towards collective well-being, (3) belief in the effectiveness of individual cooperation, and (4) belief that other members of society will also exhibit cooperative behavior [35]. Structural strategies aim to alter the motivational structure of social dilemmas by aligning individuals' motives with collective outcomes, thereby reducing the discord between individual incentives and collective consequences.

The most straightforward way to implement a structural strategy is often considered the simplest. Numerous studies have examined the impact of modifying the structural outcome on participants' behavior. The findings of these studies generally confirm that the cooperative behavior of participants is negatively associated with the cost of cooperation and positively related to the benefits of cooperation. Changing the structural outcome can be achieved by implementing selective sanctions or incentives, such as punishing non-cooperators and rewarding cooperators [34]. The structural strategy refers to interventions that modify the consequences of problematic behavior, such as feedback and rewards [35]. Resolving social dilemmas always requires a process of eliminating non-cooperative habits and establishing cooperative habits. The most significant psychological and environmental factors that facilitate cooperation include:

a. **Education:** Humans have a fundamental need to understand their environment to anticipate what will happen in times of uncertainty. Environmental uncertainty leads to excessive resource use because most users are optimistic about the future and underestimate the damage they inflict on the environment. Therefore, effective environmental resource management primarily depends on reliable information about the use and availability of resources such as water [1]. One prevalent strategy is to provide appropriate information about the water situation to individuals based on the

information scarcity model. According to this model, increased information leads to better behavior. Information-based educational strategies result in increased awareness and knowledge but often do not lead to actual behavioral change [36]. The value of educational activities lies in their ability to initiate change rather than merely informing individuals. Some messages are more effective than others. A study showed that empowerment messages (e.g., "You can do this") generally create stronger intentions to engage in positive pro-environmental behaviors compared to threatening messages (e.g., "You must do this") [37].

If individuals who choose non-cooperative behavior are unaware that their behavior is non-cooperative, they will not initiate cooperative behavior unless a change is made in the two-way structure. A prerequisite for facilitating self-motivated cooperation is having a clear understanding of what cooperation is and what it is not. To comprehend their behavior within the framework of cooperative or non-cooperative behavior, individuals, when solely focused on their immediate short-term gains, need at least some knowledge about the long-term and social consequences of what seems to be the most rational behavior [38]. Global environmental challenges are highly complex and uncertain, which undermines effective behavior change. In contrast, information related to local environmental degradation is more persuasive because the understanding of the link between actions and outcomes is easier [38]. One alternative way to encourage cooperation in water conservation is through the reinforcement of memes. Memes are cultural units, analogous to genes, that exist as small units within living organisms. They are patterned reservoirs that are copied, translated, normalized, and self-replicated. Each culture contains informational codes that are registered and stored in memes, flowing through social interaction and interplay within the collective mindset. This collective mindset is copied, shaping internalized modes of thinking [5]. If the norm that water is essential for life is prevalent, this internalized norm undergoes meme formation or modification. The copying of information occurs through various forms, such as new learning, experience, tacit knowledge, and so on. Suppose in educational settings, the issue of water scarcity, drought, and the need for water conservation becomes a priority. When a culture contains the information code of water scarcity, it is, in fact, containing a meme that states water is scarce and should be used with caution. In this case, a form of collectivism can be instilled, where everyone exercises caution in water usage. On the other hand, consider the experience of living in a land where water is abundant. When a culture contains an informational code of plentiful water, it is, in fact, containing an important meme that states there is no water shortage, and it can be easily utilized. In such a situation, a form of self-restraint is instilled, suggesting using water in accordance with individual priorities and various goals [5].

b. **Social Trust:** Trust is the fundamental motivator in social relationships and lies at the heart of collective efforts for environmental conservation. In social dilemmas, the individual's interest is to a large extent contingent on the behavior of others. If an individual chooses cooperative behavior while others choose non-cooperative behavior, they find themselves in a situation where they believe honesty is not rewarding. To avoid this situation and promote cooperative behavior, it is necessary for others to also choose cooperative behavior. In such cases, since everyone benefits equally, individuals do not feel dissatisfied even if they do not gain significant advantages through non-cooperative behaviors. Therefore, if individuals anticipate that others will also choose cooperative behavior, indicating trust in others, the likelihood of choosing cooperative behavior by the individual increases. In other words, in the absence of mutual trust, it is difficult to be hopeful for self-initiated cooperation [38].

1. **Ethical commitment:** In a large-scale social dilemma, when an individual chooses cooperative or non-cooperative behavior, it does not create a significant difference in public interests. For example, in a situation where millions of cars are emitting carbon dioxide, if one person refrains from driving their car, it will not have a substantial impact on the overall carbon emissions. Individuals with higher levels of ethical commitment may engage in cooperative behavior even if it is not particularly beneficial to society. Similarly, such individuals may choose cooperative behavior even without trusting others. Ethical commitment refers to the effort to align behavior with a norm that the individual believes is desirable. Therefore, if someone has an ethical commitment and believes they should choose cooperative behavior, they collaborate regardless of the behavior of others, even if their behavior may not appear beneficial to the entire community. In other words, ethical commitment is the willingness to conform to personal standards, regardless of any selfish or altruistic motives towards oneself or others. Hence, in communities with high ethical standards that reflect social norms, as long as individuals are aware of cooperative behavior, social dilemmas generally do not arise. Therefore, it is crucial to have an ethical commitment as a psychological factor in individuals and social norms in society to internalize it as their personal ethical commitment [38].
2. **Rewards and punishments:** Rewards and punishments play a significant role in guiding environmentally supportive behaviors. Both punishments and rewards can be used as incentives for cooperation. Both interventions can have intrinsic or extrinsic nature, and extrinsic forms of intervention, such as imposing fines on non-cooperative individuals, may increase cooperation more than intrinsic forms. It appears that monetary incentive schemes, such as subsidies, are effective in promoting water conservation in households. Additionally, it may be necessary to consider water pricing beyond drinking water and incorporate environmental costs. For example, the agricultural sector is the largest water user, but water is not priced even in water-stressed regions, and there are no financial mechanisms to compensate for environmental costs or create incentives for more efficient water use. However, it is important to note that economic incentives are not equally effective for everyone. For instance, a study on water conservation showed that households with a strong sense of community identity did not require financial incentives to consume less water, while those with a weak community identity needed financial incentives. This suggests that economic motivations work better when other basic needs are unmet [1].
3. **Scarcity:** Water scarcity affects over one-third of the global population. Access to clean water resources for productive, consumptive, and societal purposes is increasingly challenging due to growing competition among various sectors, including industry, agriculture, power generation, domestic use, and environmental needs. Individuals tend to utilize resources that they perceive to be severely scarce, leading to worsening conditions for those resources. For instance, research by [39] demonstrated that resource users increase their consumption when facing severe scarcity of a particular resource.
4. **Value Orientation:** Values are desirable end-states that vary in importance and serve as guiding principles in the lives of individuals or other social entities. This definition encompasses three key features of values. First, values involve beliefs about the desirability or undesirability of specific ultimate states. Second, values are relatively abstract constructs and thus extend beyond specific situations. Third, values function as guiding principles for evaluating individuals, events, and behaviors. Values are prioritized (i.e., their importance varies), which means that when competing values are activated in a given situation, choices are made based on the most salient value. Value

orientation reflects the importance individuals attach to their own and others' welfare in social dilemmas. Pro-self values (including egoistic and hedonistic values) and self-transcendence values (including biospheric and altruistic values) have distinct associations with beliefs, attitudes, norms, and environmental behaviors. Pro-self values have a positive relationship, while self-transcendence values have a negative relationship with these constructs. Generally, when biospheric and altruistic values are prioritized and given attention in a specific domain, such as water conservation, individuals are more inclined to act in accordance with these values [40].

5. **Religious Orientation:** Religious values shape individuals' identities and give purpose to their lives. Many cultural and religious frameworks now emphasize the sacred aspects of the natural world. The sacred elements in nature can lead humans to commit to environmental goals, especially when religious identities emphasize humans as caretakers of the Earth [29]. Religious orientations contribute to an increase in pro-social behaviors. For instance, in Zoroastrianism, the primary religion of Iranians before Islam, the four elements are represented as deities (Izads) and are respected through specific prayers (Yashts). Water is associated with the goddess Anahita (Nahid), while another deity (Apam Napat) is described as the guardian of rivers, springs, and seas. According to the Avesta, water must be kept pure and free from pollution, and this religious orientation can serve as a motivating factor for preserving water resources and keeping them clean for future generations [41].
6. **Group Size:** When group size decreases, cooperation tends to increase. Group size is also related to other factors, such as communication, environmental and social uncertainty, and group identity, which influence cooperation. Communication is likely to increase with a decrease in group size. If individuals can communicate with each other, they will have more opportunities for selecting strategies and coordination. Group members can decide how to behave to avoid depleting or reducing public resources, resulting in decreased environmental and social uncertainty [16][42]. The negative impact of group size on cooperation is mostly attributed to corresponding changes in the incentive structure. For example, personal collaboration benefits decrease in larger groups [34]. As social beings, humans have a deep sense of belonging to social groups and easily engage in social comparison with others in large groups. The intensity of their social identity affects their willingness to help their group or community, such as engaging in water conservation. Different ways exist to mobilize individuals' identity and affiliation needs to reinforce environmentally supportive behaviors. Firstly, individuals form stronger identities with primary groups like friends and family, making appeals to the interests of those groups (e.g., thinking about the future of their children) more convincing. Secondly, when individuals develop a social identity with a group, they are more likely to share costly environmental information with each other. Thirdly, when individuals acquire a social identity with a particular social group, they become more concerned about their intragroup reputation, which can strengthen environmentally supportive behaviors [1]. It is important to note that social identity can act as a double-edged sword regarding resources shared among multiple communities. In such cases, emphasizing and promoting a shared social identity, such as fostering inter-community trade or emphasizing a common threat like agricultural collapse, may be more effective.
7. **Social sanctions:** Social sanctions can be effective in maintaining beneficial norms through the use of social pressure and peer monitoring. Social approval or disapproval are important tools for controlling behavior in social life. Informal sanctions, such as peer pressure and social ostracism, serve as effective deterrents against non-cooperative behavior in social exchanges. Confronting the dissatisfaction of other members increases the level of cooperation. Sanctions

should be gradual, starting with mild consequences and increasing with repeated violations. Some believe that the implementation of gradual sanctions is preferable because consumers perceive legal water-saving measures as ineffective. For example, the suspension of farmers' membership in agricultural cooperatives and the denial of services to those who illegally dig deep wells or use water from these wells are examples of social sanctions imposed on farmers, which initially can limit the provision of services and eventually lead to their expulsion [42].

3. Discussion and Conclusion

Managing scarce resources like water poses a major challenge in most societies. The decision-making process of individuals or groups regarding whether to restrict the use of a common resource such as water varies. Individualism and collectivism are known orientations that describe the relationships of individuals or groups with others. Individualism is characterized by self-reliance (versus dependence on others), emphasizing personal autonomy, individual uniqueness, and prioritizing personal goals over group goals. In contrast, collectivists value group norms and collective coordination, considering personal goals as subordinate to group goals. The low inclination towards collectivist behaviors in individuals within a society is one of the most important issues affecting natural resource management. This issue is particularly sensitive in the case of a resource like water, which becomes increasingly limited in access every day, and the pursuit of individual interests by individuals leads to collective harm and, consequently, individual losses. Consumers in a collectivist culture have more other-oriented and eco-friendly consumption habits and are more concerned about environmental issues. On the other hand, individualistic attitudes are negatively related to concerns about climate change, willingness to engage in pro-environmental behaviors, and acceptance of related actions. Individuals with non-cooperative tendencies are more self-oriented and have less environmental awareness, while those with a collectivist culture demonstrate greater awareness of environmental issues [43]. Water management exhibits multifaceted and unique characteristics that necessitate collective action. Water is essential for life, supports societal livelihoods, and enables economic production and consumption. Therefore, water is considered a public resource that requires active and collective management, protection, and utilization. Water resources are inherently vital and possess such a public nature that they should not be exploited in a manner that prioritizes private interests over public welfare [33]. Currently, collective action is a significant factor in addressing the challenges of water management in the context of sustainable development. It is crucial for achieving a more sustainable, efficient, and equitable use of water, and its realization necessitates fostering a collective spirit among individuals in society. Participation is one of the eight main gaps in water governance in the country [20]. If individuals in different positions fail to overlook their individual interests in favor of collective interests and long-term perspectives on water consumption, water crises transform into intractable issues that affect the entire society and jeopardize desirable water management and governance. The conservation of natural resources relies not only on scientific knowledge and good governance but also on the collaboration of individuals with each other [44]. Instead of solely acting based on personal interests, individual actors responsible for preserving water resources should establish connections and collaborate with one another [42]. Another approach to addressing the tragedy of commons in shared resources is to limit access to water and transform it into a social asset [13]. Water should be regarded as a common resource, and sustainable use of water should be seen as a collective good that benefits everyone, necessitating a strong

commitment to its fair protection [33]. In conclusion, it is necessary to highlight that enhancing water security requires multilateral regulations and institutional measures that go beyond individual behavioral adjustments. The absence of appropriate institutional arrangements for water demand management may contribute to the challenges faced in contemporary water security, and addressing the complexities of shared resource tragedies necessitates a comprehensive framework that analyzes water security challenges from interconnected and intricate perspectives, which require integrated water resource management. Solely managing water demand may not provide a sufficient solution to water security challenges in practice. Naturally, water resource issues are intricate, intertwined with diverse stakeholders and ecosystems, and often arise from uncertain origins. Therefore, presenting a single solution may not address all ongoing water resource issues. Natural resource management is not merely an economic or environmental construct; it is a socio-environmental and economic framework. A country, in light of water use and development, should consider all potential consequences of unsustainable resource exploitation. Water security, especially, requires a government committed to sustainable development goals. Nowadays, challenges in water resource management exist due to governments' tendency to prioritize their short-term benefits over long-term collective interests. A government may undertake numerous large-scale development projects that impact water accessibility, and since governmental tenures are not long-lasting, short-sightedness by governments may pose a more significant challenge than individual opportunism. On the other hand, solving water-related problems may require public participation and stakeholder engagement, and governments or institutions alone cannot bear this important responsibility. In general, water security cannot be achieved solely through national-level institutional measures to modify water consumer behavior; rather, it requires comprehensive policymaking and legislation at various levels. Despite the ongoing initiatives for water resource management, the concept of shared resource tragedy continues to have a significant influence on policy formulation, resulting in limited transformation of traditional water resource management approaches. New radical approaches to water are needed to reverse the sobering trends regarding water and to sustain support for life, development, and biodiversity for future generations and the future of humanity through intelligent and coordinated responses to these crises.

Declarations

- **Ethical Approval** This paper has neither been published nor been under review for publication elsewhere.
- **Consent to Participate** The author has participated in the preparation and submission of this paper for publication in Water Resources Management.
- **Consent to Publish** The author would like to publish their paper in Water Resources Management.
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