

Gender Perspectives in Integrated Water Resource Management

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Abstract

Integrated Water Resources Management (IWRM) systematically addresses water challenges, emphasizing sustainability, equity and community participation. Despite its significance, gender perspectives in IWRM are often overlooked. Principle 3 of IWRM highlights women's roles in providing, managing and safeguarding water, emphasizing the need to integrate gender perspectives into IWRM. However, translating this principle into actionable strategies has been sluggish, with few countries implementing gender-responsive measures. This chapter highlights the significance of blending gender perspectives into Integrated Water Resources Management (IWRM) to improve efficiency, effectiveness, equity and equality - collectively referred to as the 4Es - in the pursuit of sustainable water management. Empowering women not only promotes gender equity but also fosters resilient water management solutions. Women's roles in domestic water use, agriculture, fisheries and aquaculture highlight the need for targeted interventions, such as infrastructure investments and education. Policies must prioritize women's access to affordable water resources and their participation in decision-making. Gender-responsive and transformative approaches are essential to addressing gender-specific challenges in IWRM, including access, affordability, climate impacts and technological barriers. These approaches promote uniform opportunities for men and women to contribute to and benefit from water-related initiatives, fostering sustainability and inclusivity. Tailored gender policies, sensitive institutions and gender-friendly technologies are pivotal for creating a facilitating environment for women's participation and leadership in water governance. By embracing gender perspectives, communities can unlock the full potential of water resources, advancing social equity, environmental sustainability and economic prosperity for all. This approach ensures a balanced and inclusive future for water management practices globally.

Keywords Gender, Gender equality, Gender Mainstreaming, IWRM, 4 'E'

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1. Introduction

Integrated Water Resources Management (IWRM) is a process that encourages the coordinated development and management of water, land and related resources to optimize economic and social benefits equitably, while ensuring the sustainability of essential ecosystems and the environment (Agarwal *et al.*, 2000). The IWRM approach is grounded in the Dublin-Rio Principles, four key principles established at the 1992 Dublin Conference on Water and later accepted at the Rio de Janeiro Summit on Sustainable Development. Principle 1 states that freshwater is a scanty and frail resource vital for sustaining life, development and the environment. Principle 2 underscores that water management and development should involve participation from users, planners and policymakers at every level. Principle 3 emphasizes the significant role of women in providing, managing and protecting water resources. Principle 4 acknowledges that water holds economic value across its various competing uses and should be treated as an economic good. Since the inception of the Dublin Principles, Integrated Water Resources Management (IWRM) has risen as a cornerstone in water resource governance. It is integral to national water policies, with “over 80% of countries globally incorporating IWRM principles into their water legislation and two-thirds have formulated national IWRM plans” (Allouche, 2016). IWRM Principle 3 explicitly underscores women’s pivotal role in water management, highlighting the need to address gender disparities and ensure women’s voices and contributions are integral to water governance. By integrating gender considerations, IWRM not only advances social equity but also leverages women’s unique insights and capacities to enhance the sustainability and effectiveness of water resource management. Despite the entrenched status of Integrated Water Resources Management (IWRM), the third Dublin Principle frequently receives insufficient attention (Ray, 2007). A 2013 report by the International Union for the Conservation of Nature (IUCN) revealed that merely 15% of countries had a gender policy within their water ministries, while only 35% had integrated gender considerations into their water-related policies and programs (Fauconnier *et al.*, 2018). To embrace and enact this principle, it is essential to develop proactive policies that address the specific needs of women. To fully adopt and implement this principle, it is imperative to enact affirmative policies catering to women’s unique needs. These policies should equip and empower women to engage actively at every level of water resource programs, including decision-making and implementation processes (United Nations, 1992). Building on the foundation of gender-inclusive policies, it is crucial to implement practical measures that ensure women’s effective participation in water management. This involves providing targeted education and training programs to enhance women’s technical skills and knowledge in water resource management. Creating platforms and forums where women can voice their concerns and ideas can foster greater inclusivity and collaboration. Ensuring equitable access to financial resources and decision-making bodies is also vital, as it empowers women to take on leadership roles and drive meaningful change

within their communities. By prioritizing these actions, we can create a more equitable and resilient water management system that benefits all members of society.

The international development agenda has increasingly emphasized governance as a crucial aspect for effectively addressing environmental challenges (Bessa and Facchina, 2014). Among these challenges, water management emerges as a key focus. In many industrialized countries, water supply systems are designed to deliver drinking-quality water to meet all possible human needs (Kotwicki and Al-Otaibi, 2011). The adoption of the United Nations 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs) in 2015 signified a notable transition towards a more sustainable and resilient global trajectory. Today, ensuring universal access to clean water and sanitation (SDG 6), promoting gender equality and empowering women and girls (SDG 5) are vital in advancing sustainable development efforts. Assessing water resources must incorporate a gender perspective to be truly meaningful. Understanding women's and men's distinct roles and needs in their interactions with water and the social and cultural contexts shaping these roles is essential. Considering these factors is crucial for enhancing the management and governance of global water resources to benefit everyone. Incorporating a gender perspective IWRM enhances the sustainability and efficiency of water resource management by addressing both genders' specific needs and roles in water use and conservation. The imperative to tackle gender disparity in water management is widely acknowledged worldwide (Gambe, 2019; Meinzen-Dick, 2017). Gender inequality in water management is evident across various sectors, from agriculture, fisheries, health and sanitation, decision-making, employment and education, underscoring the multifaceted challenges that require comprehensive solutions. Gender disparities in the water sector are poised to worsen with climate change (Bhattarai *et al.*, 2021). Given the pervasive nature of gender disparities in water management, adopting a holistic approach that addresses these inequities at multiple levels is crucial. Effective strategies must encompass policy reforms, community engagement and capacity-building initiatives that prioritize the needs and contributions of women. Integrating gender perspectives into water management policies can enhance resource allocation, improve sustainability and foster more resilient communities. Additionally, ensuring women's active participation in decision-making processes is essential for developing equitable and inclusive water management systems that can adapt to the challenges posed by climate change. Empowering women through education, training and employment opportunities in the water sector not only bridges the gender gap but also leverages their unique insights and experiences to create more innovative and effective water management solutions.

2. Gender Roles and Responsibility in Water Management

2.1. Domestic Water Use

Domestic water use and management are areas where gender roles are

particularly pronounced. In many cultures, women and girls are primarily tasked with fetching and managing household water. This responsibility includes ensuring water quality, cleanliness and proper storage. The gendered division of labor in water-related tasks has a significant impact on the daily lives of women and girls, affecting their health, education and economic opportunities. Collecting water can impose a significant time and labor burden on women and girls, particularly in regions where water sources are distant or unreliable. In many rural areas, women may spend several hours daily walking to and from water sources, reducing the time for other productive activities, such as education, income-generating work and leisure. This labor-intensive task can also lead to physical health issues, including musculoskeletal problems and fatigue. Women are crucial in maintaining household health and hygiene through water management. They are typically responsible for cooking, cleaning and caring for children, which require access to safe and sufficient water. Limited access to clean water can cause health problems, like waterborne diseases, with women and children being the most affected. Women's knowledge and practices regarding water sanitation and hygiene are vital in preventing disease outbreaks and ensuring community health. The time and effort required for water collection can have significant educational and economic impacts, particularly on girls. In many cases, girls are taken out of school to help with water-related tasks, which limit their educational attainment and future opportunities. Women's economic activities are also affected, as time spent on water collection reduces the time available for other income-generating activities. This perpetuates the cycle of poverty and limits the economic development of communities. Despite the challenges, women possess extensive knowledge and expertise in water management that can be leveraged for community benefit. Their firsthand experience with water use and needs makes them invaluable participants in water management decision-making processes. Encouraging women's leadership and participation in water committees and local governance structures can lead to more effective and sustainable water management practices that address the needs of all community members. Addressing gender disparities in domestic water use and management requires targeted policy interventions and programs. Governments and organizations should prioritize gender-sensitive approaches that recognize and address women and girls' unique challenges. This includes investing in infrastructure to reduce water collection's time and labor burden, promoting women's education and economic opportunities and ensuring women's active participation in water governance. By empowering women and integrating gender perspectives into water management policies, communities can achieve more equitable and sustainable outcomes.

Gender roles in domestic water use often manifest in various ways, deeply entrenched in cultural norms, socioeconomic factors and historical contexts. While these roles can vary significantly across different societies and communities, several common themes emerge regarding the division of labor and household water management responsibilities. Traditionally,

women have been assigned primary responsibility for domestic water use in many cultures worldwide. This role stems from historical practices where women were primarily responsible for household tasks, including cooking, cleaning and childcare. As water is essential for these activities, women have traditionally borne the burden of ensuring an adequate supply of clean water for their families. One significant outlook of women's role in domestic water use is the task of water collection. In regions with limited access to clean water, women often spend substantial amounts of time each day fetching water from distant sources, such as wells or rivers. This responsibility can be physically demanding and time-consuming, detracting from opportunities for education, employment, or leisure. In addition to water collection, women are typically responsible for managing water within the household. This includes storing water, rationing its use and ensuring proper hygiene and sanitation practices. Women often play a central role in decision-making regarding water use, determining how it is allocated for various household needs. Women are often assigned responsibilities related to water usage, including essential tasks such as cooking, cleaning and laundry, all of which necessitate significant amounts of water. They must ensure that water is used efficiently to meet these needs while balancing other household responsibilities. Conversely, men's roles in domestic water use have historically been less pronounced, often focusing on infrastructure maintenance, well digging, or irrigation in agricultural contexts. However, these roles are evolving, particularly as access to clean water becomes increasingly scarce due to climate change and population growth. In many communities, efforts are underway to challenge traditional gender roles and promote more equitable participation in water management. This encompasses initiatives designed to enhance access to clean water and sanitation facilities, alleviate the burden of water collection on women and engage men in household water-related tasks. Traditional gender roles concerning domestic water use are deeply ingrained in many societies, yet they can be changed. By recognizing and addressing the imbalances in water-related responsibilities, communities can promote more equitable and sustainable water management practices that benefit all.

2.2. Agricultural Water Use

Agriculture is a sector where water use and management are crucial and gender roles significantly influence these practices. In the field of agriculture, there exists a notable distinction between the roles and resource access of women and men, which significantly influences their respective experiences and challenges concerning water usage. Women play a crucial role in agricultural water management, especially within small-scale and subsistence farming contexts. They are often responsible for essential tasks such as planting, weeding and harvesting, all of which necessitate considerable water consumption. However, despite their significant contributions, women often face limited access to water resources and irrigation infrastructure compared to men due to cultural norms,

land ownership patterns and decision-making structures that favor men. This disparity can hinder women's agricultural productivity and reduce their resilience to water scarcity and climate variability. Water scarcity disproportionately affects women farmers, who may lack the resources and support systems to cope with reduced water availability. As primary caregivers, women also bear the burden of meeting household water needs, further straining their time and energy. Empowering women through training and access to water-efficient technologies can significantly enhance their agricultural productivity and water management capabilities. Programs that provide women with knowledge about efficient irrigation techniques, drought-resistant crops and sustainable water practices can lead to more resilient agricultural systems. Addressing gender disparities in agricultural water use and management requires comprehensive policy interventions that promote gender equity. Policies should focus on improving women's access to water resources, land ownership and participation in water governance structures. By incorporating gender perspectives into agricultural water management policies, governments and organizations can foster more inclusive and sustainable agricultural development.

Gender roles in agriculture significantly influence water use patterns, shaping everything from decision-making processes to labor allocation. Understanding these roles is vital for the development of effective and sustainable water management strategies. In numerous societies, established gender norms dictate specific responsibilities for men and women in agricultural settings, which significantly impacts water use in various contexts. Recognizing these dynamics is essential for fostering equitable and efficient resource management. Firstly, women often play a central role in water collection and management. They are frequently responsible for fetching water from distant sources, such as wells or rivers and transporting it back to their households or farms. This task consumes considerable time and energy, limiting women's participation in other agricultural activities. Consequently, their ability to influence water-related decisions, such as irrigation scheduling or crop selection, may be constrained. Moreover, women's involvement in agriculture extends beyond water collection, including tasks like irrigation and crop maintenance. In many regions, women are primarily responsible for small-scale farming activities, managing water resources at the field level. Their knowledge of local hydrological conditions and crop water requirements is invaluable for optimizing irrigation practices and minimizing water waste. However, low access to resources and decision-making power may hinder women's capacity to implement water-saving techniques effectively. Conversely, men often hold dominant positions in agricultural decision-making processes and resource allocation. They typically control access to land, machinery and financial resources, which are essential for implementing water-efficient technologies and practices. As primary decision-makers, men may prioritize crop production goals over water conservation objectives, especially in contexts where agricultural productivity is closely linked to household income and food security. Furthermore, gender

disparities in education and training further exacerbate inequalities in water use within agricultural settings. Women, especially in rural areas, often have less access to formal education and technical training opportunities compared to men. This limitation hinders the ability to adopt innovative water management techniques and to adapt to changing environmental conditions, thereby perpetuating inefficient water use practices. Addressing gender disparities in agriculture necessitates the promotion of women's participation and leadership in water governance and resource management. Empowering women through education, training and access to resources can significantly enhance their capacity to contribute to sustainable water use practices. Additionally, fostering gender-inclusive decision-making processes and policies will ensure that a diverse array of perspectives is considered in water management initiatives, ultimately leading to more equitable and efficient outcomes for agricultural communities and the environment.

2.3. Fisheries and Aquaculture Water Use

Fisheries and aquaculture are vital for food security, nutrition and livelihoods, particularly in coastal and inland communities, with distinct gender roles across the sectors. Women hold vital yet frequently underappreciated roles in post-harvest activities, including the processing, marketing and sale of fish. These activities are essential for enhancing the value of fish products and ensuring the economic sustainability of fishing communities. Their contributions are integral to the success and resilience of these communities. Despite their significant contributions, women frequently face challenges related to access to resources and decision-making, often having limited access to fishing grounds, boats, gear and aquaculture inputs compared to men. Furthermore, women are typically under-represented in formal decision-making bodies and fishery management organizations, leading to policies that may not adequately address their needs and contributions. The economic and social impacts of these gender disparities are profound, limiting women's economic opportunities and exacerbating poverty and vulnerability. Nevertheless, women possess valuable knowledge and expertise in fisheries and aquaculture that can enhance resource management and sustainability. Promoting women's leadership and participation in fishery management and aquaculture development is essential for creating more inclusive and resilient systems. Addressing these gender disparities requires targeted policies and interventions, such as enhancing women's access to resources, providing capacity-building and training programs, encouraging representation in management organizations, supporting women's networks and developing gender-sensitive policies. By implementing these measures, the fisheries and aquaculture sectors can become more equitable and sustainable, benefiting both men and women and enhancing overall community resilience and prosperity.

Gender roles in fisheries and aquaculture significantly influence water use practices, reflecting societal norms and historical patterns. Historically,

these sectors have been predominantly male-dominated, with men often engaged in fishing activities while women undertook roles in fish processing and marketing. However, as societal perceptions evolve and awareness of gender equality grows, the roles within these industries are also shifting. In many traditional fishing communities, men typically engage in fishing activities such as netting, trapping and angling, which directly impact water use. They operate boats, set up fishing gear and spend extended periods on the water, relying on it for their livelihoods. Their activities directly affect the aquatic environment, influencing fish populations and the overall ecosystem health. Moreover, men often hold leadership positions in fisheries management and decision-making bodies, influencing water resource allocation and conservation strategies. Conversely, women's roles in fisheries and aquaculture have traditionally been associated with secondary tasks, such as fish processing, sorting, cleaning and marketing. While these tasks may not directly involve water use, they are integral to the value chain of fishery products. Women's involvement in aquaculture, particularly in small-scale operations, also influences water use through activities like pond management, feeding and harvesting. In recent years, there has been a growing recognition of women's contributions to fisheries and aquaculture, leading to efforts to empower and involve them more actively in decision-making processes. As a result, there's a shift towards acknowledging women's roles beyond the traditional realms of processing and marketing. Women are increasingly participating in fishing activities, often in tandem with men and taking on leadership roles in community-based fisheries management initiatives. This diversification of gender roles in fisheries and aquaculture has implications for water use practices. With more women engaged in various aspects of these industries, there's a potential for different perspectives on water management and conservation. Women's involvement may lead to innovative approaches that prioritize sustainable water use, considering not only economic but also social and environmental dimensions. Furthermore, empowering women in fisheries and aquaculture can enhance resilience to environmental challenges such as climate change. Women often possess valuable traditional knowledge about local ecosystems and weather patterns, which can inform adaptive strategies for water resource management. By including women in decision-making processes, there's a greater likelihood of implementing holistic approaches to water use that safeguard the long-term viability of fisheries and aquaculture. Addressing gender disparities in fisheries and aquaculture is essential for achieving sustainable water use and promoting social justice within these sectors. Policies and initiatives aimed at gender equality can foster more inclusive and equitable practices, benefiting both communities and the environment. By recognizing and valuing the diverse roles that men and women play in fisheries and aquaculture, stakeholders can work towards a more balanced and sustainable relationship with water resources.

3. Gender-Specific Challenges in Water Management

3.1. Access to and Control over Water Resources

Recognizing the gender dynamics within water management is vital, as men and women frequently have distinct roles and differing needs related to the access and utilization of water resources (Zwartveen and Ahmed, 2012). This understanding is essential for developing equitable and effective water management strategies. Generally, it is observed that women tend to use and need more water than men for various purposes. However, despite the essential nature of water for all activities, only a minority of women globally enjoys complete access to and control over water resources (Sever, 2005). Access to water resource management is indispensable for ensuring fair and sustainable water distribution. However, entrenched gender-specific challenges impede women and girls' full participation and benefit in this critical domain. The underrepresentation of women in decision-making bodies governing water resources, deeply rooted in societal norms and cultural expectations, sidelines their unique perspectives and needs. Consequently, water management decisions may fail to account for women's diverse experiences and requirements, perpetuating gender discrimination in access to water resources. Moreover, the inequitable access to training and resources further exacerbates the marginalization of women in water management. Limited opportunities for women to acquire technical skills and knowledge essential for effective engagement in water management initiatives restrict their ability to contribute meaningfully to decision-making processes. Additionally, disparities in access to financial resources hinder women's capacity to invest in water infrastructure or implement sustainable water management solutions in their communities. These barriers hinder women's agency and perpetuate their exclusion from key roles in shaping water resource management strategies. Biased policies compound these challenges by reinforcing gender disparities in access to water and sanitation facilities. Policies that overlook gender disparities may inadvertently prioritize the needs and preferences of men, leaving women with inadequate access to clean water and sanitation facilities. As a result, women bear an unequal burden of water collection and sanitation tasks, impacting their health and overall well-being. Furthermore, the lack of gender-sensitive policies exacerbates existing gender disparities, perpetuating cycles of poverty and hindering community development efforts. Tackling these issues necessitates an all-encompassing strategy that prioritizes inclusivity, capacity building, equitable resource allocation, awareness raising and implementing gender-sensitive policies. Inclusive decision-making processes that ensure women's meaningful participation in water management initiatives are essential for amplifying their voices and perspectives. Capacity-building initiatives specifically designed to address the needs of women can equip them with the essential skills and knowledge required for the effective management of water resources. Equitable resource allocation mechanisms must be established to ensure women can access the financial and technical resources

needed to implement water management solutions. Furthermore, awareness campaigns to challenge entrenched socio-cultural norms and biases are essential for fostering a supportive environment for women's involvement in water resource management. Finally, developing and implementing gender-sensitive policies are critical for addressing systemic inequalities and promoting gender equality in water resource management. By prioritizing these strategies, communities can advance toward more equitable and sustainable water management practices that serve the interests of all individuals, irrespective of gender.

3.2. Participation in Decision-Making

Many challenges hinder gender participation in decision-making for water management, each deeply rooted in socio-cultural norms, institutional barriers, power dynamics and resource constraints. These obstacles collectively undermine women's meaningful involvement and representation in shaping water governance, perpetuating gender inequality in access to and management of water resources. Socio-cultural norms play a significant role in dictating male dominance in decision-making spheres related to water management. Traditional gender roles frequently assign women to domestic responsibilities, while men are typically viewed as the main decision-makers within community governance structures. As a result, women's voices are marginalized and their perspectives on water-related issues are often overlooked or undervalued. Limited access to education and training opportunities further exacerbates gender disparities in water resource management. Women and girls may face barriers in accessing technical skills and knowledge essential for effective participation in decision-making processes. Without adequate education and training, women are ill-equipped to contribute meaningfully to the development and implementation of water management policies and strategies, perpetuating their underrepresentation in water governance. Institutional barriers, such as male-dominated leadership structures and a lack of gender-sensitive policies, impede women's meaningful involvement in decision-making processes. Women often encounter resistance and discrimination in male-dominated environments, hindering their access to decision-making roles. Additionally, the absence of gender-sensitive policies fails to address the specific needs and priorities of women, perpetuating their underrepresentation and sidelining their diverse perspectives. Power dynamics within communities further marginalize women and constrain their influence in shaping water policies and practices. Patriarchal structures prioritize men's interests, relegating women to subordinate roles and limiting their participation in decision-making processes. As a result, women's voices are often silenced and their contributions to water governance are undervalued, exacerbating gender disparities in access to water resources. Resource constraints, including limited access to financial resources and infrastructure, present additional barriers to women's participation in decision-making for water management. Without adequate support and resources, women are unable to advocate for their needs and rights in water-related discussions and negotiations. This

further perpetuates their marginalization and undermines their ability to influence water governance processes. Addressing these obstacles requires a holistic approach that encompasses the implementation of gender-sensitive policies, provision of education and training opportunities, promotion of women's representation in decision-making bodies and the challenging of harmful socio-cultural norms. By fostering an inclusive and supportive environment for women's participation, communities can advance towards more equitable and sustainable water governance practices that benefit everyone, regardless of gender.

3.3. Gender and Climate Change Challenges in IWRM

Climate change presents considerable obstacles to water management, with women and marginalized communities bearing a disproportionate burden of its impacts. As primary caretakers and water managers in many societies, women face heightened risks from climate-induced changes such as water scarcity, flooding and waterborne diseases. These challenges are compounded by the intersection of gender and socio-economic factors, deepening existing vulnerabilities and creating new obstacles in accessing and managing water resources. One of the most pressing issues exacerbated by climate change is water scarcity, which amplifies the burden on women responsible for water collection and household management. As water sources dwindle or become contaminated due to changing precipitation patterns and rising temperatures, women often travel longer distances to fetch water, spending more time and energy on water-related tasks. This increased workload not only limits women's opportunities for education, income generation and participation in decision-making processes but also perpetuates gender disparities and hampers community development efforts. Moreover, climate-induced disruptions in water availability and agriculture exacerbate economic disparities, particularly affecting women in rural areas who rely on agriculture for their livelihoods. Decreased water availability and crop yields can lead to food insecurity, loss of income and increased poverty among women-headed households and marginalized communities. The lack of access to financial resources, climate-resilient infrastructure and water-saving technologies further exacerbates their vulnerability, impeding their ability to adapt to changing water conditions and build resilience. Additionally, women's limited access to resources and underrepresentation in decision-making processes exacerbate their marginalization and hinder their capacity to cope with climate change impacts. Male-dominated leadership structures and cultural norms often marginalize women's voices and perspectives in water management and climate adaptation strategies, resulting in policies and initiatives that fail to address their specific needs and vulnerabilities. To address these challenges, gender-responsive approaches are essential, prioritizing women's participation, equitable access to resources and the integration of gender considerations in water management and climate adaptation strategies. Promoting women's leadership and involvement in decision-making processes, ensuring equal access to education, training

and technology and challenging harmful gender norms and stereotypes are crucial steps towards building more inclusive and sustainable water systems. By recognizing and addressing the gender dimensions of climate change, communities can foster resilience and empower women to become agents of change in building more equitable and sustainable water management systems that benefit everyone, regardless of gender or socio-economic status. Through collaborative initiatives and inclusive policies, we can foster a future where water resources are managed with integrity and the effects of climate change are addressed effectively, ensuring the well-being of all stakeholders involved.

3.4. Gender and Technological Challenges

Gender and technological challenges significantly influence water management, affecting access, efficiency and sustainability in water-related activities. Women and marginalized communities often encounter barriers in accessing water-related technologies, stemming from limited financial resources, technical skills and cultural norms. This impediment hinders their capacity to adopt technologies facilitating water collection, purification and distribution. Moreover, technological solutions may not align with women's preferences and needs, leading to the adoption of systems ill-suited for their usage, particularly in rural areas where women bear the brunt of water collection responsibilities. The design of water-related technologies often reflects biases towards male users, overlooking ergonomic considerations crucial for women's comfort and effectiveness in usage. Additionally, the under-representation of women in technological development leads to solutions that often fail to address their needs, further reinforcing gender disparities in water management. The digital divide exacerbates these challenges, particularly in rural and low-income communities, where women lack access to essential digital tools for effective water resource management. Addressing these hurdles necessitates a gender-responsive approach, involving women in designing and developing water-related technologies to ensure inclusivity and user-friendliness. Targeted training programs must be implemented to enhance women's technical skills and empower them to utilize water-related technologies effectively. Furthermore, adopting gender-sensitive technologies tailored to address women's specific challenges is crucial, alongside investment in infrastructure and policies bridging the digital gap to ensure equitable access to technology for women and marginalized communities. Through addressing these gender and technological challenges in water management, communities can enhance access to clean water, improve efficiency in water distribution and promote sustainable utilization of water resources for the collective benefit of all.

4. Policy Frameworks and Recommendations

4.1. Gender Mainstreaming in Policies

The integrated management of water resources is essential for sustainable development, economic growth and social well-being. However, gender

disparities in access, control and decision-making related to water resources persist, limiting the effectiveness and equity of water management practices. To address these disparities, gender mainstreaming in IWRM is crucial. This policy outlines strategies to incorporate gender perspectives into all aspects of water resource management, ensuring that both women and men can equally contribute to and benefit from water-related initiatives. The objectives of this policy are multifaceted and aim to foster an inclusive approach to water resource management. Firstly, promoting gender equality is a core objective, ensuring that women and men have equal opportunities to participate in and benefit from water resource management. This is crucial because water management decisions affect all aspects of community life, from health and hygiene to economic activities and environmental sustainability. Enhancing women's participation is another key objective, aiming to increase women's representation and influence in decision-making processes related to water management. Historically, women have been underrepresented in these areas, which have led to a lack of consideration for their specific needs and perspectives. Improving resource allocation is also essential, ensuring that water resources and related services are distributed in a manner that meets the needs of both women and men. This involves understanding and addressing the different ways in which men and women use and prioritize water resources. Strengthening capacity building is another critical objective, involving the provision of training and resources to empower both women and men with the knowledge and skills necessary for effective water management. Finally, monitoring and evaluation are vital for establishing mechanisms to track the impacts of gender mainstreaming in IWRM, ensuring continuous improvement and accountability. To achieve these objectives, a series of policy actions are proposed. Establishing an institutional framework is the first step, which includes creating dedicated gender units within water management institutions to oversee the implementation of gender mainstreaming policies. These units would be responsible for developing gender action plans that outline specific goals, activities and indicators to promote gender equality in water management. Participation and decision-making processes must be reformed to ensure equal representation. This can be achieved by mandating the inclusion of women in water management committees, boards and decision-making bodies at all levels. Supporting women's leadership is also crucial, which can be facilitated through leadership training and mentorship programs designed to encourage and support women in taking on leadership roles in water management. Capacity building is another essential component, involving the organization of regular gender sensitivity and capacity-building workshops for water management staff and community members. These workshops would focus on the importance of gender equality in water resource management and provide practical training on how to implement gender-sensitive approaches. Promoting education and awareness is equally important, with campaigns to highlight the significance of gender equality in water resource management and to challenge traditional gender norms that may hinder women's participation. Resource allocation and

access must be addressed to ensure equitable distribution. This involves ensuring that water resources, infrastructure and services are distributed equitably, taking into account the specific needs of women and marginalized groups. Supporting women's projects by providing financial and technical support for water-related initiatives led by women can also promote gender equality. Monitoring and evaluation are critical for tracking progress. This requires developing and using gender-sensitive indicators to measure the impact of gender mainstreaming efforts in water management and conducting regular assessments and audits to evaluate the effectiveness of these policies and make necessary adjustments.

The implementation strategy for this policy involves several key components. Stakeholder engagement is vital, involving government agencies, non-governmental organizations, community groups and the private sector in collaborative efforts towards gender equality in water management. Policy integration is also essential, ensuring that gender perspectives are incorporated into national and local water policies, plans and programs, aligning with broader gender equality and sustainable development goals. Resource allocation must be sufficient to support the implementation of gender mainstreaming activities in water resource management, requiring both financial and human resources. Capacity development is another critical aspect, investing in the development of all stakeholders to emphasize the importance of gender equality and equip them with the tools to implement gender-sensitive approaches effectively. Gender mainstreaming in Integrated Water Resource Management (IWRM) is vital for achieving sustainable and equitable water management. By addressing gender disparities and promoting the active participation of both women and men in water-related decision-making processes, this policy aims to enhance the effectiveness of water management practices and ensure the equitable distribution of benefits derived from water resources. The successful implementation of this initiative requires continuous monitoring and adaptive management, which can significantly contribute to broader goals of social justice, economic development and environmental sustainability. This policy emphasizes the necessity of a holistic and inclusive approach to water management, recognizing the critical role of women's involvement and the integration of gender perspectives in the success and sustainability of water resource management initiatives. By fostering an environment that encourages equal participation and benefits for both women and men in water management, communities can develop more resilient, equitable and sustainable water systems that support overall well-being and development.

5. Conclusion

Integrated Water Resources Management (IWRM) is a comprehensive strategy that highlights the importance of coordinated development and management of water, land and associated resources to enhance economic and social benefits while ensuring environmental sustainability is not jeopardized.

Rooted in the Dublin-Rio Principles from 1992, IWRM incorporates four core principles: the finiteness and vulnerability of freshwater, the necessity of participatory management, the critical role of women in water management and the economic value of water. Despite widespread adoption, the third principle, highlighting women's roles, often receives inadequate attention. Effective IWRM necessitates integrating gender considerations, promoting social equity and leveraging women's unique insights and capacities. However, gender disparities persist, with only a small percentage of countries having gender-specific policies in their water ministries. Tackling these inequalities necessitates forward-thinking policies that enhance women's involvement in all aspects of water management, from policy-making to execution. Effective steps should involve focused education and training, establishing avenues for women's input and guaranteeing fair access to financial resources and decision-making entities. Women face pronounced challenges in domestic water use due to their traditional roles in fetching and managing household water, impacting their health, education and economic opportunities. These responsibilities can lead to significant time and labor burdens, health issues and reduced educational and economic prospects for women and girls. In agriculture, women often manage water for small-scale farming but face limited access to resources and decision-making structures, hindering productivity and resilience. Fisheries and aquaculture also see gender disparities, with women primarily involved in post-harvest activities yet facing limited access to resources and decision-making. Addressing these disparities involves promoting women's leadership, improving access to resources and implementing gender-sensitive policies. Gender-specific challenges in water management include inequitable access to water resources, underrepresentation in decision-making and impacts from climate change. Socio-cultural norms and institutional barriers often marginalize women's participation, while resource constraints and biased policies further entrench these disparities. Effective strategies to overcome these challenges include gender-sensitive policies, capacity-building programs, equitable resource allocation and awareness campaigns. Climate change exacerbates water management challenges, with women bearing a disproportionate burden due to their roles in household water management and agriculture. Empowering women through education, training and leadership opportunities is crucial for building resilience and ensuring sustainable water management. Technological challenges also impact gender equity in water management, with women often facing barriers in accessing water-related technologies due to financial constraints, limited technical skills and cultural norms. Designing gender-sensitive technologies and providing targeted training can help bridge these gaps. Gender mainstreaming in IWRM is essential for promoting sustainable and equitable water management. This involves incorporating gender perspectives into all aspects of water resource management, ensuring women's involvement in decision-making, improving resource allocation and building capacity. Strategies include establishing gender units within water institutions, reforming decision-making processes

to ensure equal representation, supporting women's leadership and promoting education and awareness. Monitoring and evaluation mechanisms are crucial for tracking progress and ensuring continuous improvement. The implementation strategy for gender mainstreaming in IWRM involves stakeholder engagement, policy integration, adequate resource allocation and capacity development. By fostering an inclusive environment where women and men can equally participate and benefit from water management, communities can achieve more resilient, equitable and sustainable water systems. This approach supports broader goals of social justice, economic development and environmental sustainability, recognizing the critical role of gender perspectives in successful water resource management initiatives.

The future direction of Integrated Water Resources Management (IWRM) should emphasize deeper integration of gender-responsive approaches, leveraging technology and fostering multi-stakeholder collaboration to enhance water resource sustainability and equity. By advancing policies that prioritize the active participation of women in water governance, we can ensure more inclusive decision-making processes. Incorporating advanced technologies such as remote sensing, GIS and AI-driven water management tools can enhance efficiency and address the unique water needs of diverse communities. Enhancing collaborations among governments, non-governmental organizations, private sectors and local communities will be essential for expanding effective models and encouraging innovation in water management strategies. Additionally, continuous education and capacity-building initiatives targeting women and men will help bridge knowledge gaps and promote sustainable practices. Through these strategies, IWRM can evolve to address the complexities of climate change, resource scarcity and socio-economic disparities, ultimately contributing to more resilient and sustainable water management systems globally.

6. References

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