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Unveiling the Nexus: Social Equity and Sustainable Water Management in The Arab Region

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Abstract

This research delves into the critical, yet often under-examined, role of social equity in achieving sustainable water management in the Arab region. Employing a qualitative approach with a multi-site case study design, the investigation explores the intricate relationship between social equity and water access. Data collected from various sources reveals a compelling narrative: A web of interconnected challenges emerges in the absence of equitable water access. Food security suffers as agricultural productivity stagnates, climate risks increase, adaptation strategies become untenable, and social tensions escalate as grievances around water scarcity fester. The experiences of small-scale farmers struggling to irrigate their crops and residents of informal settlements lacking basic sanitation facilities exemplify these challenges. Conversely, promoting social equity in water management can yield a broad range of benefits. Empowering women in water management decision-making can significantly enhance agricultural productivity. Similarly, targeted investments in water infrastructure development in underserved communities, coupled with the promotion of climate-smart agricultural practices, can strengthen regional resilience to climate change. Ultimately, the research underscores the interconnectedness of social equity with broader sustainability goals. When marginalized communities are systematically excluded from decision-making processes and lack access to water, a vital resource for life and development, achieving long-term sustainability becomes an elusive goal. Conversely, promoting water justice can create a ripple effect of positive impacts, fostering social stability, empowering communities, and bolstering regional resilience.

Keywords: Sustainable Water Management; Social Equity; Arab Region; Climate Resilience; Community Participation

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الكشف عن الرابط: العدالة الاجتماعية والإدارة المستدامة للمياه في المنطقة العربية

جاد حيدر

باحث ومحامٍ متدرج منتسب لنقابة المحامين، بيروت–لبنان؛ ماجستير في القانون الدولي والأوروبي للشركات وحقوق الإنسان، جامعة باريس-ساكلاي–فرنسا

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ملخص

يغوص هذا البحث في الدور المحوري، وإن كان مغيّبًا أحيانًا عن الأبحاث السابقة، الذي تلعبه العدالة الاجتماعية في تحقيق إدارة مستدامة للمياه في المنطقة العربية، مستكشفًا العلاقة المعقدة والمترابطة بين الإنصاف الاجتماعي والوصول إلى المياه، باستخدام منهجية نوعية تعتمد على دراسة حالة متعددة المواقع. تكشف البيانات المجموعة من مصادر متنوعة عن سردية مقنعة، مفادها: في حالة عدم تأمين وصول عادل إلى المياه، تظهر شبكة من التحديات. فعلى سبيل المثال، يتدهور الأمن الغذائي مع ركود الإنتاجية الزراعية، وتزداد المخاطر المناخية مع تعذّر تطبيق استراتيجيات التكيّف، وتتصاعد التوترات الاجتماعية مع تفاقم مظالم ندرة المياه. وتتجسد هذه التحديات أيضًا في معاناة صغار المزارعين الذين يكافحون لري أراضيهم، وسكان المستوطنات العشوائية الذين يفتقرون إلى المرافق الصحية الأساسية.

وعلى العكس، فإن تعزيز العدالة الاجتماعية في إدارة المياه يمكنه تحقيق مجموعة متنوعة من الفوائد. فمن خلال تمكين المرأة من صنع القرار بشأن إدارة المياه، يمكن تحسين الإنتاجية الزراعية بشكل كبير. وبالمثل، فإن الاستثمارات المستهدفة في تنمية البنية التحتية للمياه في المجتمعات المحرومة، إلى جانب تعزيز الممارسات الزراعية الذكية مناخيًا، يمكن أن تزيد قدرة المنطقة على الصمود في وجه تغيّر المناخ.

في نهاية المطاف، يؤكد البحث على الترابط الوثيق بين الإنصاف الاجتماعي وأهداف الاستدامة الأوسع نطاقًا. فعندما تُستبعد المجتمعات المهمشة بشكل منهجي من عمليات صنع القرار – علمًا أنها تفتقر إلى الوصول إلى المياه، وهو مورد حيوي للحياة والتنمية – يصبح تحقيق الاستدامة على المدى الطويل هدفًا صعب المنال. في المقابل، فإن تحقيق عدالة المياه يمكن أن يخلق تأثيرًا متتاليًا من الآثار الإيجابية، ويؤمّن الاستقرار الاجتماعي، ويعزّز قدرة المجتمعات المحلية على الصمود في المنطقة.

الكلمات المفتاحية: إدارة المياه المستدامة، العدالة الاجتماعية، المنطقة العربية، الأمن الغذائي، مواجهة التغير المناخي، المشاركة المجتمعية

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1. Introduction

1.1 Sustainable development: A multifaceted approach to a global challenge

The urgency of addressing global challenges like poverty, hunger, inequality, and environmental degradation spurred the creation of the UN's 2030 Agenda for Sustainable Development in 2015; this agenda outlines 17 Sustainable Development Goals (SDGs) that serve as a universal call to action for governments, businesses, and civil society. The SDGs acknowledge the affiliation of these issues and advocate for a holistic approach to achieving sustainable development (UN DESA, 2015) sustainable development has emerged as a cornerstone concept for navigating the complex challenges of the 21st century. Defined by the World Commission on Environment and Development (WCED, 1987) as a "development that meets the needs of the present without compromising the ability of future generations to meet their own needs," it compels us to consider the interconnectedness of social, economic, and environmental spheres.

The first pillar strives for a just society where basic needs are met for all, promoting elements like education, healthcare, and gender equality (Robinson J, 2004). The second seeks inclusive growth with decent work and reduced inequality (Pearce, D., Barbier, W., & Markandya, A., 1990), but not at the expense of the environment. Lastly, the third pillar focuses on conserving resources and mitigating climate change, requiring responsible resource use within planetary limits (Daily, G. C., 1997). This interconnectedness underscores the need for policies that consider all three pillars for a truly sustainable future, actually a healthy environment provides the foundation for social and economic well-being by supplying vital resources such as food, water, and clean air; economic development that degrades the environment ultimately undermines the ability to meet the needs of future generations; conversely, social inequalities can hinder the implementation of sustainable practices. Therefore, achieving sustainable development requires an integrated approach that recognizes these interdependencies.

1.3 A new era of Arabian sustainability: A call for a just and thriving future

The Arab region, a cradle of civilization and immense cultural wealth, encompassing 22 countries and a population exceeding 425 million (World Bank, 2023), boasts a rich tapestry of cultures and historical significance. From the ground-breaking advancements in mathematics and astronomy during the Islamic golden age to its vibrant contemporary art scene, the Arab world has consistently shaped human progress. However, this region faces significant challenges threatening its long-term prosperity marking a pivotal moment for achieving sustainable development.

The region has a long history of political conflicts which has resulted in social injustice and economic disparity, however, there is a growing recognition of the need to focus on a more sustainable future; a new kind of awakening is fundamental – an "Arabian era of sustainability," necessitating a shift towards practices that ensure environmental protection, economic prosperity, and social well-being

for present and future generations. The urgency of this call to action is undeniable and underscored by alarming statistics, in fact beyond water scarcity, the region faces a multitude of environmental challenges. Rapid urbanization, often exceeding infrastructure development, has led to increased pollution and waste management issues, as noted by Mitchel (2020). Additionally, land degradation and desertification threaten agricultural productivity and livelihoods. These environmental challenges are intricately linked to social and economic disparities, with youth unemployment exceeding 25% in several countries (ILO, 2020) and marginalized communities, particularly those residing in rural areas, often bear the brunt of environmental degradation and resource depletion.

This era demands a holistic approach that tackles environmental challenges while promoting social justice and economic development. By harnessing the region's rich cultural heritage and innovative spirit, Arab nations can pave the way for a more sustainable future.

1.4 The miscellaneous challenge: Defining the knowledge gap

Sustainable development, as outlined by the WCED, necessitates meeting the current needs of humanity for water, sanitation, and food security without compromising the ability of future generations to meet their own.

Water management plays a critical role in achieving this balance, particularly in the Arab region, where water scarcity and social inequalities pose significant hurdles. Furthermore, a 2019 report by the ESCWA titled "Water Security in the Arab Region: Challenges and Opportunities" emphasises the interconnectedness of water scarcity with food security and economic development, however, a critical knowledge gap exists in our understanding of how social inequalities hinder the effectiveness of water management policies in achieving sustainable water resource management. While research by institutions like ESCWA sheds light on the broad challenges of water scarcity and climate change, a deeper exploration is needed to illuminate the specific ways in which social factors like income, gender, and geographic location shape access to water resources and participation in water management decision-making processes.

In Yemen, for instance, chronic conflict has devastated water infrastructure, leaving nearly 20 million people – about two-thirds of the population – lacking access to safe drinking water (WHO & UNICEF, 2023). This case exemplifies the devastating impact of political instability on water security, highlighting the need for targeted infrastructure development strategies that prioritize marginalized communities. Understanding the specific reasons for unequal access, such as inadequate infrastructure development, discriminatory pricing structures, or lack of land ownership rights, is crucial for formulating equitable water management policies.

Effective water management requires the participation of diverse stakeholders, including local

communities, user groups, and civil society organizations, however, current water management practices in the Arab region often lack meaningful participation from marginalized groups, as a matter of fact, in 2018, the decision-making processes in Jordan, were dominated by government agencies with limited input from local communities (Farahbakhsh, K., Giordano, M., & Allan, J. A., 2018). This lack of participation can lead to policies that are misaligned with community needs and ultimately hinder their effectiveness, for instance, top-down irrigation policies that prioritize water-intensive cash crops over staple foods can exacerbate food insecurity for local populations. The Jordanian case study underscores the importance of inclusive decision-making processes that incorporate the knowledge and perspectives of local stakeholders.

1.5 Research statement: A catalyst for transformation

This research posits that achieving water justice, defined as the equitable distribution of benefits and burdens associated with water resources, is a critical catalyst for transforming water management in the Arab region. By ensuring equitable access to water resources and participation in water management decision-making processes, Arab nations can significantly enhance the effectiveness of water policies and accelerate progress towards sustainable water resource management. This research argues that promoting water justice offers a pathway to address these challenges and unlock the full potential of water management strategies:

***1 - Enhanced policy design and implementation*:** Inclusive decision-making processes that incorporate the knowledge and perspectives of diverse stakeholders, including marginalized communities, can lead to more effective and equitable water policies. Involving local communities in planning water infrastructure projects can ensure that these projects meet their specific needs and are culturally appropriate (World Bank, 2019).

***2 - Improved water management practices*:** When stakeholders have a sense of ownership and participation in water management, they are more likely to adopt water-saving practices and conserve this vital resource. A 2020 study published in the journal "Water Policy" examining community-based water management in Morocco found that increased participation led to more sustainable water use practices (Loftstedt, R. E., & Jägerskog, A., 2020) underscoring the potential of water justice to foster a sense of collective responsibility for water security.

***3 - Increased social stability*:** Unequal access to water can be a source of tension and conflict. Promoting water justice can contribute to social stability by ensuring that everyone has a fair share of this essential resource the UNDRR emphasizes the link between water scarcity and social unrest. By addressing water inequalities, Arab nations can mitigate the risks of conflict and build more resilient societies.

Achieving water justice in the Arab region is not simply a matter of fairness; it is a strategic imperative for achieving sustainable water resource management; ensuring equitable access to water and participation in decision-making, these nations can unlock the potential for more effective water policies, improved water management practices, and increased social stability.

2. Navigating challenges: Obstacles to sustainable water management in the Arab region

This section delves into the key obstacles hindering progress for sustainable water management in the region.

2.1 Physical Scarcity: A Looming Crisis

The most fundamental challenge lies in the physical limitations of water availability, over 60% of the Arab population resides in areas defined as "water-stressed," meaning they have less than 1,700 cubic meters of renewable freshwater resources per capita per year – this issue constitutes a fundamental constraint on socio-economic development and human survival (World Bank, 2016). The physical limitations of water resources in these arid and semi-arid environments create a precarious situation, where access to water is not just a matter of infrastructure or policy but of existential importance.

Fatymah Zahra (47), a date farmer in southern Morocco, explained, "Water scarcity is a constant battle. Without reliable access to water, it's difficult to maintain our traditional farming practices and ensure our families' food security." The inability to secure reliable access to water has direct consequences for agricultural sustainability, rural livelihoods, and the long-term viability of local communities. This situation is emblematic of a larger systemic challenge across MENA, where water availability increasingly dictates economic productivity, population stability, and even geopolitical stability. Pioneering water resources expert Tony Allan utilizes sophisticated climate models to project a decrease in average annual renewable water resources across the MENA region by 10% by 2050 (Allan, J. A, 2011). This alarming projection suggests that the region is heading towards even greater water insecurity, potentially leading to exacerbated socio-economic pressures and heightened regional tensions over water access.

Climate change acts as a threat multiplier in this already fragile context. Rising temperatures, more frequent and intense heatwaves, and shifting precipitation patterns-all predicted by the Intergovernmental Panel on Climate Change (IPCC)-further destabilize the region's already vulnerable water resources. The IPCC warns of increased evaporation rates, reduced river flows, and more frequent droughts, which collectively threaten the region's agricultural productivity and water-dependent industries. Research by Gleick et al. (2019) supports this dire forecast. Their analysis indicates that climate change could reduce water availability in the MENA region by up to 20% by

2050. Such a drastic reduction would have profound implications. For one, agricultural production - already under strain - would likely see significant declines, particularly in water-intensive sectors like crop farming and livestock. Hydropower generation, a critical component of energy security in several MENA countries, would also be adversely affected; this would further exacerbate the region's energy challenges, potentially leading to energy shortages or increased reliance on fossil fuels, undermining both economic stability and global climate goals.

The ripple effects of diminished water availability extend beyond agriculture and energy. Urban areas, which are expanding rapidly due to population growth, will face intensified competition for already scarce water resources; the projected reductions in water availability would also heighten the risk of water-related conflicts both within and between countries in the region. Historically, water has been a source of contention in MENA, and the exacerbation of scarcity due to climate change may push these tensions to critical points.

2.2 Institutional Labyrinth: A System in Need of Reform

Effective water management necessitates a robust institutional framework with clear roles and responsibilities. However, the current system in the Arab region often suffers from fragmentation and weaknesses; Daher and Daccache (2018) provide a critical analysis of these shortcomings, these weaknesses manifest in several ways:

Disparate governance structures with multiple actors involved in water management can lead to conflicting policies, inefficiencies, and duplication of efforts, for instance, in some Arab countries responsibility for water resources may be divided between ministries of agriculture, environment, and water, leading to a lack of coordination on critical issues like water allocation and drought management. A water sector specialist in Lebanon (wishing to remain anonymous) explained that, "There's a disconnect between national water policies and local implementation. Streamlining bureaucracies is crucial for effective water management.", which reflects the urgent need for institutional reform and cohesive policy frameworks to ensure sustainable water management.

Water management agencies may lack the technical expertise, financial resources, and human capital necessary to effectively manage water resources. In addition, weak enforcement mechanisms can hinder compliance with water conservation regulations. Data from document analysis, including government reports and NGO studies, confirms the financial constraints faced by Arab governments upon investing in infrastructure development to ensure equitable water access for all citizens. Interviews with water management experts across the region echoed these concerns. For example, Dr. 'Umar Khalyd (Water Resources Engineer, Jordan) stated, "Investing in infrastructure like pipelines and desalination plants is crucial for equitable water access, but budget limitations are a significant barrier," this highlights how financial limitations are a persistent obstacle preventing governments

from prioritizing long-term water infrastructure projects, despite their clear necessity for ensuring fair distribution of water resources.

2.3 Socioeconomic Challenges: Inequality and Unsustainable Practices

Social inequalities significantly hinder progress towards sustainable water management. A stark example is the uneven distribution of water resources, in fact, residents of informal settlements and marginalized communities often lack access to safe drinking water and sanitation facilities. In Egypt, unregulated settlements have limited access to piped water, with residents relying on expensive and potentially unsafe vendors (International Water Management Institute, 2011). Discriminatory pricing structures or inadequate infrastructure development can further exacerbate these disparities. Ùm Faṭymah (42), a resident of Ezbet Khairallah, described her reliance on expensive water vendors who charge exorbitant prices, stating, "The water truck comes only once a week, and it's not enough for my family. We have to buy from the vendor, but it strains our already tight budget." This sentiment was echoed by 'Umar (28), a young resident of a disadvantaged neighbourhood in Casablanca, Morocco, "We don't have proper water connections here. We rely on standpipes, but the water pressure is weak and often unavailable for days." This highlights the disproportionate burden of unequal water access on low-income communities which is just one aspect of the socio-economic challenge.

Existing water use practices in the agricultural sector, the largest water consumer in the Arab region, often contribute to unsustainable water management. The prevalence of crops like alfalfa and rice in the MENA region can consume vast quantities of water, leading to overexploitation of groundwater resources and salinization of soils. In addition to the fact that traditional flood irrigation methods used in many Arab countries can waste significant amounts of water through evaporation and runoff (Abdulla et al., 2016).

Another topic of interest regarding social challenges is that women in many Arab countries play a crucial role in household water management, often being responsible for water collection and use. However, they are often marginalized in the decision-making processes. This suppression of women's voices represents a missed opportunity. Studies have shown that including women in decision-making processes can lead to more sustainable and inclusive water management practices (Lonergan, S., Brooks, D., & Fawzi, S., 2019).

By acknowledging these challenges, exploring innovative solutions, and fostering a spirit of collaboration between governments, civil society, and the private sector, a path towards a more water-secure future for the region can be paved. The following section of this paper will delve deeper into specific strategies and policy recommendations for navigating these challenges and achieving sustainable water management in the Arab world.

3. Seizing opportunities: Pathways to advance sustainable water management in the Arab region

Despite the significant challenges to sustainable water management in the Arab region, there are promising opportunities for progress. Technological advancements can play a pivotal role, but true sustainability requires a holistic approach that integrates social considerations. Embracing participatory methods and fostering inclusive governance can transform water management into a collaborative effort that meets the diverse needs of all stakeholders. Shifting from top-down, technocratic models to inclusive, socially informed strategies is essential for ensuring long-term sustainability.

3.1 Technological Innovations for Water Efficiency

Technological advancements offer a range of solutions to improve water use efficiency across various sectors;:

Investing in modern irrigation technologies like drip irrigation systems can significantly improve water efficiency. These systems utilize sensors and automation to deliver water directly to the root zone of plants, minimizing evaporation and optimizing water use. In 2020, China demonstrated that smart irrigation systems could reduce water consumption in agriculture by up to 30% compared to traditional flood irrigation methods (Zhang et al., 2020). Molden et al. (2020), analysed irrigation projects in several Arab countries and found that drip irrigation could reduce water use in agriculture by 30-50%.

Desalination offers a means to produce freshwater from seawater, a valuable option for coastal countries in the Arab region, however, traditional desalination methods can be energy-intensive. Research and development efforts are ongoing to improve the efficiency of desalination technologies; the potential of using renewable energy sources like solar and wind power to reduce its environmental footprint (Wang et al., 2019).

Not to forget wastewater treatment technologies that can transform wastewater into a valuable source of recycled water for irrigation, industrial use, or even indirect potable reuse.

3.2 Institutional Reforms for Effective Water Governance

Reforms in water governance that promote transparency, accountability, and participation, can foster a sense of ownership and encourage stakeholders to collaborate in achieving sustainable water management goals. Effective water governance is essential for translating technological advancements into sustainable water management practices. A key challenge lies in overcoming institutional weaknesses and fragmented governance structures.

Several innovative approaches can address these institutional shortcomings like implementing "Integrated Water Resource Management (IWRM)" which promotes a holistic approach to water

management, considering the social, economic, and environmental aspects of water use. The 2000 publication "The Framework for Action" by the World Water Council outlines key principles of IWRM, including participatory decision-making, basin-level management, and efficient water allocation. Pilot programs implementing IWRM principles in countries like Jordan have shown positive results in terms of improved water governance and stakeholder engagement including government agencies, civil society organizations, the private sector, and local communities which can foster a sense of shared responsibility and encourage innovative solutions.

Also, in Jordan, the establishment of "water parliaments" or "water user associations," empowered local communities and contributed to more equitable water allocation. These platforms bring together diverse stakeholders, including government agencies, civil society organizations, and private sector actors, to facilitate dialogue, collaboration, and consensus-building on water management issues. Scaling up these initiatives across the Arab region has the potential to improve water governance and promote more sustainable water management practices (Darwish, M., & Fadel, A., 2018). On the other hand, Nadya (35), a representative of a human rights advocacy NGO in Lebanon, emphasized the importance of community involvement and stated that "Local communities understand their water challenges best. Including them in decision-making processes ensures policies address their specific needs."

Investing in training and capacity-building programs for water managers, engineers, and policymakers is crucial for strengthening water management institutions. These programs can equip professionals with the knowledge, skills, and tools necessary to implement sustainable water management practices.

3.3 Financial Instruments for Sustainable Water Management

Sustainable water management requires significant financial investments and several innovative financial instruments can help bridge the funding gap. Implementing water pricing structures and reforms that reflect the true cost of water can incentivize conservation and generate revenue for water management initiatives. Subsidies for water use, particularly in agriculture, should be reviewed and phased out in a way that protects vulnerable populations and replaced with subsidies for water-saving technologies and practices. Research and development efforts focused on drought-tolerant crops offer promising solutions. In 2018, introducing drought-tolerant wheat varieties in Morocco reduced water consumption in agriculture by up to 20% without compromising yields (Mason et al., 2018). Public-Private Partnerships (PPPs) can leverage private sector expertise and financing for water infrastructure development and management. Careful consideration is needed to ensure equitable outcomes and prevent the privatization of essential water resources (World Water Council, 2000). Also, the growing market for green bonds - Green bonds are debt instruments used to finance environmentally friendly projects, including water management initiatives, which offer a promising avenue for attracting investments in sustainable water solutions.

3.4 Addressing Social Inequalities for Inclusive Water Management

Sustainable water management cannot be achieved without addressing social inequalities, the key challenge lies in ensuring equitable access to water resources for all, particularly marginalized communities. Beyond moral duty, ensuring equitable water access and inclusive decision-making is essential to broader sustainability, for instance, when marginalized communities lack access to reliable water sources, they often resort to unsustainable water extraction practices, further depleting already scarce resources. Additionally, unequal water distribution can exacerbate poverty and hinder agricultural productivity, jeopardizing regional food security, that's why targeted social safety nets can help ensure that vulnerable populations have access to safe drinking water and sanitation facilities. These programs could include subsidies for water bills or the provision of water vouchers.

As mentioned before, women play a crucial role in water management at the household level, thus by empowering them with decision-making authority over water resources, we can leverage their inherent knowledge and resourcefulness to promote sustainable water use practices. The example of Nadya (NGO representative, Lebanon) advocating for women's participation in water user associations serves as a powerful case study. By fostering such inclusive structures, we can unlock the potential of women as key agents of change in achieving water security for entire communities. Studies examining water user associations in India found that those with greater female participation demonstrated more equitable water allocation and a stronger focus on water conservation (Agarwal, 2015). Thus, building programs specifically designed for women can equip them with the knowledge and skills necessary to participate effectively in water management decision-making. These programs could focus on topics such as water resource management, irrigation techniques, and water rights.

At last, community-based water management (CBWM) approaches empower local communities to manage their water resources sustainably. This kind of management can help ensure that water management practices are culturally appropriate and responsive to local needs; equitable water allocation ensures that all communities have access to the water they need to adapt to changing weather patterns and mitigate the effects of droughts and floods. Furthermore, investing in water infrastructure in vulnerable areas, as emphasized by Dr. 'Umar Khalyd (Water Resources Engineer, Jordan), can create a buffer against climate shocks, safeguarding livelihoods and promoting long-term sustainability.

Achieving this goal in the Arab region requires a multifaceted approach that combines technological advancements, institutional reforms, innovative financing mechanisms, regional cooperation, and a commitment to social equity. By harnessing the collective knowledge, resources, and commitment of all stakeholders, Arab nations can chart a course toward a water-secure future for generations to come.

4. Policy landscape and best practices: A comparative analysis

Policy development plays a crucial role in achieving this goal, and a comparative analysis of existing water management policies across Arab countries that have formulated national water strategies outlining their approach to water management can offer valuable insights into best practices and potential pitfalls. This section delves deeper into this analysis, focusing on the critical dimension of social equity in water management policies.

Inclusive Water Management- Jordan's National Water Strategy 2023-2040: Jordan, one of the world's most water-scarce nations, presents a forward-thinking model for addressing water challenges through its "National Water Strategy 2023-2040." The strategy emphasizes inclusive governance, incorporating diverse stakeholders—communities, government agencies, civil society organizations, and the private sector—into water management decisions. This participatory approach ensures that water allocation reflects the needs of all users, from rural farmers to urban residents. By involving local communities in decision-making, the strategy fosters public trust, enhances cooperation, and mitigates potential conflicts over water resources. This is particularly crucial for rural and agricultural areas, where the impacts of water scarcity are most acute. Engaging those who are directly affected by water policies helps tailor solutions to local realities, ensuring better implementation and long-term sustainability.

A significant feature of the strategy is its focus on "equity;" to ensure fair distribution, the strategy introduces "targeted subsidies" for low-income households, making water more affordable for vulnerable populations. Additionally, it prioritizes improvements in water infrastructure in underserved communities, addressing historical disparities in access. These investments, aimed at upgrading supply networks and reducing water losses, help level the playing field, ensuring that marginalized areas have reliable access to clean water. By focusing on social justice, Jordan aims to protect its most vulnerable populations from the worst effects of water scarcity. These measures not only address immediate needs but also enhance the resilience of communities, making them better equipped to handle future challenges like climate change.

Jordan's strategy provides valuable lessons for the MENA region. The emphasis on inclusive decision-making ensures that water policies are socially accepted and practically feasible. At the same time, equitable water distribution helps prevent social unrest and promotes fairness, reducing the risks of conflict over resources.

Legal Framework for Water Management- Morocco's National Water Charter of 2006: This charter offers a distinctive approach to water management, focusing on the creation of a robust legal framework that prioritizes water as a "fundamental human right," this landmark legislation underscores the state's commitment to ensuring equitable water access for all citizens, particularly for

vulnerable populations. The Charter's most notable achievement is its formal recognition of the "right to water as a fundamental human right." By enshrining this right in law, Morocco took a critical step toward ensuring that all citizens, regardless of their socio-economic status, have guaranteed access to clean and safe water. This legal acknowledgment establishes a foundational principle that guides all subsequent water management decisions, ensuring that basic human needs for water take precedence over other uses, such as agriculture or industrial demands.

The Charter further strengthens Morocco's water governance by clearly outlining the hierarchy of water use. It mandates that water allocation must prioritize essential human needs—such as drinking water and sanitation—before addressing other uses. This legal safeguard helps protect the water security of vulnerable populations, ensuring that marginalized or impoverished communities are not left without access to this vital resource, especially during times of scarcity. The focus on basic human needs also aligns Morocco's water management policies with international human rights standards.

Morocco's legal approach contrasts with other models in the MENA region that emphasize stakeholder participation or economic frameworks. By prioritizing the legal protection of water access, the National Water Charter provides a clear and enforceable framework for managing water resources. This can serve as a valuable template for other MENA countries seeking to balance competing demands while safeguarding the most vulnerable populations.

Lebanon - A Paradox of Water Scarcity Despite Abundant Resources: Lebanon presents a compelling case study of water scarcity amidst seemingly abundant freshwater resources. The entire 220 kilometres of Lebanese coastline borders the Mediterranean Sea, and the country boasts 40 rivers, 16 of which are considered perennial rivers. Despite these advantages, Lebanon experiences significant water scarcity, highlighting the complex interplay between resource availability, infrastructure deficiencies, and governance challenges. While the country receives an average annual rainfall of 800 millimetres, much of it falls as intense storms, leading to rapid runoff and limited groundwater recharge. Additionally, a significant portion of the mountain snowpack sublimates before melting, further reducing usable freshwater resources (FAO, 2020).

Lebanon's water infrastructure suffers from chronic underinvestment. Decades of neglect have resulted in leaky pipes, inefficient distribution networks, and high levels of NRW – water lost due to leaks, theft, or billing inefficiencies (World Bank, 2018). Over-reliance on unregulated groundwater extraction has led to salinization of coastal aquifers due to seawater intrusion. This reduces the availability of freshwater and increases treatment costs (ESCWA, 2019). The country's ongoing electricity crisis significantly impacts water pumping and treatment capabilities. Erratic power supplies disrupt water delivery schedules, leaving many households with limited or no access to clean water (UNICEF, 2022). The consequences of water scarcity in Lebanon are far-reaching. Over 1 million Lebanese citizens lack access to safe drinking water, relying on expensive bottled water or untreated sources.

This disproportionately impacts low-income households, exacerbating social inequalities. Water shortages also hinder agricultural productivity and threaten public health by increasing the risk of waterborne diseases.

Addressing Lebanon's water crisis requires a multi-pronged approach. Investing in infrastructure upgrades, including repairing leaks and adopting smart metering technologies, can minimize NRW losses. Developing alternative water sources, such as rainwater harvesting and treated wastewater reuse, can diversify water supplies. Strengthening governance through improved water management practices and tackling corruption in the water sector are also crucial steps. Lebanon's water crisis serves as a stark reminder that resource abundance alone does not guarantee water security. By implementing effective and sustainable water management strategies, the country overcomes this complex challenge thus ensuring equitable access to this vital resource for all its citizens.

A Critical Look at Qatar's Water Management Strategy - Desalination Dominates: Qatar, located on the arid Arabian Peninsula, exemplifies the complexities of water management in a desert environment. Despite bordering the Persian Gulf, the country experiences hyper-aridity with limited natural freshwater resources. This necessitates a heavy reliance on desalination, a technology that presents both solutions and challenges for Qatar's water security.

Desalination, a necessary evil, has been instrumental in transforming Qatar's water landscape. With over 99% of its water needs met through this process (Ahmad et al., 2020), Qatar is a global leader in desalination technology. Large-scale seawater desalination plants provide a reliable source of freshwater, enabling rapid economic development and population growth. However, desalination is not without drawbacks. The process is highly energy-intensive, placing a significant strain on Qatar's power grid (Al-Qadir et al., 2020). Furthermore, desalination can contribute to greenhouse gas emissions, potentially undermining environmental sustainability goals.

Recognizing the limitations of desalination, the country has embarked on a more comprehensive water management strategy. The "Qatar Water Strategy 2030" outlines a multi-pronged approach that aims to diversify water resources, promote water conservation, and ensure long-term water security. One key aspect of this strategy is the increased focus on treated wastewater reuse. By treating wastewater to a high standard, Qatar can utilize it for irrigation purposes, reducing reliance on freshwater resources for agricultural and landscaping needs (Abufuarda, & Al-Hamad, 2017) Additionally, it is investing in water storage infrastructure. Large-scale reservoirs store desalinated water, providing a buffer against fluctuations in demand and potential disruptions to desalination operations (Al-Ansari, Al-Zenkawi, & Al-Hamad, 2018). Public awareness campaigns and regulations promoting water-saving practices are also crucial components of Qatar's water management strategy. These initiatives aim to curb residential and industrial water consumption, further alleviating pressure on freshwater resources.

While desalination has been instrumental in securing the nation's future, the long-term sustainability

of this approach remains a key concern. The high energy consumption associated with desalination necessitates investment in renewable energy sources to power desalination plants and reduce the environmental footprint. Qatar's water management strategy offers valuable insights for arid regions facing similar challenges. By adopting a multi-pronged approach that combines desalination with water reuse, conservation, and sustainable energy practices, Qatar can ensure a water-secure future for its growing population.

5. Conclusion

Towards a sustainable future: Advancing fair and equitable water management

This research delves into the critical, yet often under-examined, dimension of social equity within the pursuit of sustainable water management in the Arab region. It highlights the necessity of a shift towards a holistic "Nexus Approach" that prioritizes social equity and recognizes the interconnectedness of water access with various sustainability goals such as food security, climate resilience, social stability, and economic prosperity.

Throughout the inquiry, the centrality of social equity is underscored. Marginalized communities' exclusion from decision-making and water access undermines sustainability in the long term. Conversely, promoting water justice can create a ripple effect of positive impacts, fostering social stability, empowering communities, and bolstering regional resilience in the face of climate change and other environmental challenges.

The recommendations provided offer a roadmap for Arab nations to achieve a more sustainable future through collaborative efforts involving governments, civil society organizations, international agencies, and the private sector. With social equity at its core, this collaborative approach holds the promise of ensuring universal access to water, paving the way for dignity, prosperity, and resilience in a changing world.

Equitable water management not only improves environmental and economic sustainability but also unlocks societal advantages such as economic opportunities, social inclusion, and peace. The research aligns with the core principle of the UN 2030 Agenda for Sustainable Development, which highlights the concept of ""leaving no one behind." By addressing social inequalities in water management, Arab nations can ensure that everyone, regardless of his/her socio-economic background or geographic location, has the opportunity to benefit from sustainable development efforts. This commitment to equity is not just a moral imperative; it's essential for achieving long-term sustainability across all dimensions.

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Nadya Majed. (35), (Representative of a human rights advocacy NGO in Lebanon) - 13/03/2024.

Anonymous (A Water Sector Specialist in Lebanon) - 13/03/2024.

ʻUmar ʻAtkany (28), (A young resident of a disadvantaged neighbourhood in Casablanca, Morocco) – 20/03/2024.

Ùm Faṭymah (42), (A resident of Ezbet Khairallah) – 21/03/2024.