

EVALUATING THE IMPACT OF THE MILLENNIUM DEVELOPMENT GOALS ON INTERNATIONAL LEGAL FRAMEWORKS FOR FRESHWATER MANAGEMENT

EVALUACIÓN DEL IMPACTO DE LOS OBJETIVOS DE DESARROLLO DEL MILENIO EN LOS MARCOS JURÍDICOS INTERNACIONALES PARA LA GESTIÓN DEL AGUA DULCE

Zirak Alkhateeb ^{*1a} 

¹ University-Duhok, Irak

azirak.ismael@visitor.duhokcihan.edu.krd * Assistant Lecturer

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Abstract

The purpose of this research is to analyse the influence that the Millennium Development Goals (MDG) had on the development and exploitation of international legal frameworks for the regulation of freshwater. The Research investigates three important questions: What are the potential knowledge gaps regarding the impacts of the MDG's on international law? Why are there so many challenges to enforcing those international agreements? How does Target 7c affect any given Member State through a legal lens? The research employs two types of qualitative data collection methods: Historical and Contextual Analysis and Overview of International Legal Instruments and Case Studies of Successes and Failures in India and Iraq. It finds that while the MDGs facilitated legal reform relating to water as a human right, and encouraged advancement in transboundary cooperation, the degree of advancement differed significantly by region based upon climate variability and poor governance. Ultimately, over the term of its existence, 7c had significant impacts with regard to the implementation of several important legal reforms; including recognising water as a human need to promote IWRM and transboundary cooperation.

Keywords: Millennium Development Goals, freshwater management, international legal frameworks, legal reforms, water pollution prevention

Resumen

El presente estudio tiene por objeto explicar el impacto de los Objetivos de Desarrollo Sostenible (ODM), en particular la meta 7c, en el desarrollo y la

aplicación de los regímenes jurídicos internacionales para la gestión del agua dulce. La investigación aborda cuestiones cruciales como una posible laguna de conocimiento sobre los efectos de los ODM en el derecho internacional, la insuficiencia de mecanismos de cumplimiento y la ausencia de un examen exhaustivo sobre cómo la meta 7c afecta jurídicamente a cualquier Estado miembro. El artículo emplea métodos cualitativos como el análisis histórico y contextual, así como una panorámica de los instrumentos jurídicos internacionales y estudios de caso de éxitos y fracasos en la India y en Irak. De acuerdo con los hallazgos, aunque los ODM sí permitieron reformas jurídicas en materia del agua como derecho humano y el fomento de la cooperación transfronteriza, los avances han sido desiguales entre las regiones debido al cambio climático y a una gobernanza débil. En última instancia, durante su vigencia, la meta 7c tuvo una gran influencia en reformas jurídicas clave, tales como el reconocimiento del agua como una necesidad humana, la promoción de la gestión integrada de los recursos hídricos (GIRH) y la cooperación transfronteriza.

Palabras clave: Objetivos de Desarrollo del Milenio, gestión del agua dulce, marcos jurídicos internacionales, reformas jurídicas, prevención de la contaminación del agua

SUMMARY

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I. INTRODUCTION

The Millennium Development Goals (MDGs), which were approved by the General Assembly of the United Nations in September 2000, have been followed since 2015 by the Sustainable Development Goals (SDGs). Therefore, the legal effect of Goal 7c (Target 7c) of the MDGs on the global legal framework for water will be examined in this study retrospectively from over ten years after the end of the MDG period. Impact here refers to the emergence of three analytically distinct effects:

- i. The establishment of new binding obligations under international law;
- ii. The influence of Goal 7c on the interpretation and implementation of pre-existing obligations;

- iii. The development of political and communicative momentum, through soft-law mechanisms, to shape future developments in the legal domain.

It will be argued that the main influence of Goal 7c can be found primarily in categories (ii) and (iii); it has generated soft-law and interpretive momentum while contributing minimally to the creation of new binding norms.

In 2002, 189 countries agreed to the MDGs (Millennium Development Goals). Eight MDGs were launched in 2002, and the campaign ran until 2015. The MDGs were anticipated to reduce extreme poverty, combat HIV/Aids, and provide universal primary education. MDG 7 was related to ensuring environmental sustainability. In particular, MDG 7c was intended to halve the global population who do not have sustainable access to safe water and improved sanitation. Since its adoption in 2006, a report by the Joint Monitoring Program tasked with assessing the progress of target 7c found that by 2015, 2.6 billion people had gained access to safe water, while 2.3 billion had improved sanitation. However, critics have questioned the success of MDG 7c claiming the JMP used tools that lacked analytical power. Besides, member states did not elaborate the justification of target (Wouters & Tarlock, 2021). Most initial targets, baselines, and indicator definitions were altered after their adoption in 2006. As such, the reported progress was potentially skewed to imply that progress was better than the actual situation.

1. Importance of freshwater management in sustainable development

Managing freshwater is essential in meeting current needs while ensuring future generations also access this essential commodity (Shayo et al., 2023). In public health, access to safe drinking water and basic sanitation is integral in the prevention on waterborne diseases (Lynch et al., 2023). In low income and developing countries, diarrheal diseases contribute to 1.5 million deaths annually, with 350, 000 of the affected being children under 5 years (Jung et al., 2023). The WHO attributes 58% of diarrheal diseases to unsafe water supply, poor hygiene, and improper sanitation (WHO, 2024).

Access to safe water is also integral in facilitating economic growth. Reliable water supply substantially impacts on daily productive activities such as industrial manufacturing (Sertyesilisik & Ceylan, 2023, p. 79–89). Water also serves as important in sustainable irrigation and food product, amid decline in rainfall due to climate change (Esen et al., 2020). As such, sustainable development and exploitation of water resources is considered a fundamental factor for basic economic infrastructure.

These findings indicate that in sustainable development, fresh water management is essential for human survival, socio-economic growth, and healthy ecosystems (Montoya et al., 2023). Importantly, amicable utilisation of water resources will reduce the global burden of disease, and improve the health, productivity, and well-being of natural ecosystems (Dolan et al., 2021). As population increases and demand for water reaches critical levels (He et al., 2021), there is a need to manage scarce freshwater resources for crop production, industry, and human health.

Proponents of sustainable practices in water management allude that unsustainable measures contribute to its scarcity and pollution (Zhang & Oki, 2023). As a result, undesired secondary effects are triggered including crop failure, disease, hunger, fishing and marine disruption, and failures in transportation and hydroelectric energy generation (Turyasingura et al., 2024). Therefore, sustainable water management in terms of utilities and resources not only ensures water security for present populations, but also for future generations.

2. Research problem

Over the last two decades, there has been substantial research on MDGs and their impact globally. Scholars largely agree that if the initial targets of the eight MDGs had been fully realised across the world, there could be a positive socioeconomic change. According to the UN, implementation of MDGs could have let to 500 million people being lifted out of abject poverty, and 300 million less go hungry. Besides, up to 30 million less children would die before age 5 (Mabuza, 2020). About 350 million persons experiencing barriers accessing safe drinking water could have reliable water supply and 650 million access better sanitation (Migiro, 2022). These findings show that full implementation of MDGs was to result in significant growth of social and economic opportunities.

While there is substantial literature devoted to the MDGs, Larionova et al. (2020) remarked that most analysis is limited to assessing the progress and implementation made toward achieving the development goals. Yet, there is a paucity of literature that has investigated intrinsic limitations and shortfalls to the MDG framework. There is need for integrated research to explore the regulatory and legal guidelines that emerged as a result of the MDGs. Moynihan and Magism (2020) indicated that efforts made by international regimes and courts to clarify access and sustainable use of marine and freshwater since the formulation of SDGs, remain unclear.

As applies to this study, existing literature lacks integrated analysis regarding Target 7c and its impact on legal issues across member states. As such, there is a potential knowledge gap and need to explore how MDGs influenced international freshwater management law. A study by Spijkers (2020) discovered that the creation of MDGs influenced countries to shift more towards human rights approach in endorsing entree to safe water and proper sanitation. While there are multiple legal issues related to water access, the researchers focused on local level implementation of MDGs in Germany and evaluated the problem using the human rights framework, thereby affecting the generalisability of their findings.

Weststrate et al. (2019) also examined international regulation of water in line with MDGs and SDGs. The researchers cautioned that despite the MDGs, there is absence of a worldwide treaty about human access to water. Instead, regulations about water and sanitation have largely been operated from the perspective of the state and individual countries (Wouters & Tarlock, 2021). At country level, water resources are mostly managed at subnational and community levels resulting in limited understanding of how MDGs have prompted UN member states to create international water laws and policies to align with the global MDG objectives pronounced under Target 7c.

The rationale for undertaking this study was informed by the concern that despite global efforts by UN member states to improve water accessibility and sanitation, the impacts on international legal frameworks remain unclear. Barouillet et al. (2024) noted that while many countries face water shortage and sanitation challenges, translating MDG framework to practical legal management and conservation is problematic. Efforts to raise awareness regarding urgent need for action have also remained largely inadequate in international law.

3. Purpose and scope of the article

The goal of this study is to express how the MDGs have affected the growth and usefulness of international legal systems that govern the management of freshwater. The scope includes an assessment of how the MDGs have changed the law, what worked and what hindered their implementation, and how they have affected global water government as a whole.

4. Research questions

RQ1: How has the MDGs shaped international legal systems for freshwater management and sanitation in line with Target 7c, and how have they promoted sustainable water governance worldwide?

RQ2: What challenges were experienced during the implementation of target 7c of the MDGs?

RQ3: What best practices should be adopted to address identified barriers in target 7c implementation within in international legal reforms?

5. Research gap and contribution

The knowledge gaps this study seeks to address is that previous research has extensively explored the MDGs' overall impact on different sectors, including water and sanitation, but there is little consideration of its impact on legal reforms in international freshwater management.

II. METHODOLOGY

The study adopts a qualitative research design, combining historical and contextual analysis, legal review, and comparative case studies to address the research questions. The analysis is grounded in soft-law theory and global-governance scholarship, which situates international commitments along a spectrum running from purely political undertakings to fully binding legal norms (Boyle & Chinkin, 2007). MDG 7c sits closer to the political end of this spectrum, while instruments such as the UN Watercourses Convention occupy a more determinate, binding position. Brunnée and Toope's (2010) interactional account of international law further informs the comparative design: legal norms acquire authority not only through formal adoption but through ongoing practices of interpretation, application, and shared expectation among the actors involved. This lens helps explain why MDG-related legal reforms produced divergent outcomes in India and Iraq, where differing domestic legal cultures and institutional practices shaped how international freshwater and sanitation norms were absorbed, contested, or operationalized. Within this theoretical framework, the UN Watercourses Convention and other international freshwater management accords are reviewed alongside MDG-related legal initiatives and country-level policies, with particular attention to the successful and failing case studies from India and Iraq. Drawing on published literature, the analysis compares these jurisdictions to identify best practices and lessons relevant to MDG 7c

implementation and international legal reform, drawing on legislative texts, policy documents, and international organization publications to trace the effects of MDG-related legal developments on freshwater governance and sanitation management.

III. BACKGROUND

The current section details the background to this study. Specific focus is on the genesis of MDGs and their goals. The general overview is discussed followed by specific focus on MDG 7c, which is the subject of this dissertation.

1. Genesis of millennium development goals and their objectives

The earliest events that initiated MDGs can be traced back to the UN's Millennium Summit held in the year 2000 (Mabuza, 2020, pp. 77–103). At the summit, global leaders from 189 member states agreed on collaborative efforts to address global challenges listed in eight MDGs within set timelines. MDG1 was formulated to fight hunger, extreme poverty, and improve quality of life (Ananomo & Emeka, 2020). MDG 2 entailed promoting and achieving universal primary education (Kushnir & Nunes, 2022).

MDG 3 advocated empowering women and working towards promoting gender equality. MDG 4 was pegged on reducing child mortality through disease prevention, vaccination, and care (Aziz et al., 2021). MDG 5 entailed improving maternal care while MDG 6 related to combating malaria, HIV/AIDS, and other illnesses. MDG 7 was dedicated to promoting sustainable practices to conserve the environment (De Jong, & Vijge, 2021). MDG 8 encouraged governments to collaborate and partner in realising global development agenda.

While these MDGs focused on addressing a plethora of global challenges, this dissertation is limited, in scope, to MDG 7 (Hickmann et al., 2022). MDG 7 had targets. Target 1 was proposed to adopt and incorporate sustainable development principles into member states' programs and policies. In the same spirit, member states were to promote a reduction in depletion or overexploitation of environmental resources. Target 2 was anticipated to encourage global regimes to reduce loss of biodiversity. Also, countries were to ensure substantial progress in mitigating decline of biodiversity loss by 2010 (Setty et al., 2020).

Target 3 of MDG 7 encouraged member countries to ensure the population without access to clean and safe drinking water is halved by 2015. The target also intended to halve the population without access to improved basic

sanitation (Hutton, 2022, pp. 151–175). Target 4 pronounced the need to significantly enhance the lifestyle of at least 100 million people. The focus was to target people residing in slums and rural areas and improve their living conditions by 2020 (Gaffan et al., 2023; UN-Habitat, 2022).

2. Specific targets related to freshwater (Millennium Development Goals target 7c)

As mentioned earlier, the specific focus of this study is limited to MDG 7c. In line with the UN declaration, objective 7c to ensure availability of safe drinking water and sanitation (7c) was suggested “to halve the proportion of people without sustainable access to safe drinking water and basic sanitation” (Girmey et al., 2023; UN-Habitat, 2022). Reports by JMP, the United Nations Children’s Fund (Unicef), and the World Health Organisation (WHO) are in consensus that this target was delivered globally in 2010 (Rakotomanana et al., 2020). However, there is divided opinion regarding the achievement of target 7c.

Some scholars and practitioners allege that most counties achieved half of the initial objectives. On the one hand, the goal for sanitation was achieved. On the other hand, most global governments did not realise the goal for access to safe drinking water (Pereira & Marques, 2022). At baseline, 24% of the world’s population lacked access to safe drinking water. Target level was to reduce to 12% of people without access to clean water (Sarkar & Bharat., 2021). The final achievement was 9%, which is more than half of the baseline disparity level of 24% (Sarkar & Bharat, 2021).

Achievement of the target was attributed to various factors. Some of these aspects related to access to water for large populations in China and India (Agarwal & Saha, 2021; Wang et al., 2021). However, the goal lagged due to challenges experienced by Sub-Saharan countries in making similar progress, as 663 million people lacked access to safe drinking water (Zimmerman et al., 2022). Yet, there were positive reports that about 91% of the global population had improved access to safe water by 2019 (Mabuza et al, 2020, pp. 77–103). Most of the water originated from increased rainwater harvesting, springs, protected wells, sinking or boreholes, and investment in piped water connections in rural and slum areas.

3. Initial challenges and global freshwater issues at the onset of Millennium Development Goals

Consulted literature reveals various hurdles experienced in meeting target MDG 7c globally. Potential challenges related to political instability, financial constraints, inadequate infrastructure, and varied commitment levels toward realising freshwater goals across countries (Ananomo & Emeka, 2020). First, a growing concern relates to water scarcity. Scholars observe that surging population, global warming, and climate change, in addition to unsustainable agricultural practices have worsened the water scarcity crisis (Larionova, 2020; Nhamo et al., 2021).

Second, unsustainable industrial practices also hindered attainment of access to fresh water in line with target 7c. Industrial effluents in most cities largely affected positive progress (Awan, 2020). Similarly, agricultural runoff and release of chemicals into water further derailed efforts towards freshwater access (Akteer et al., 2023, pp. 370–380). Improper waste management in global cities and slums also discouraged afford towards accessing clean water, substantially contributing to serious health risks (Marfe et al., 2020, pp. 159–192).

Third, there is constant lack of awareness about proper sanitation and hygiene. Public health reports indicate increase in waterborne diseases such as typhoid fever, dysentery, and salmonellosis (Mattos et al., 2021; Smaniotto et al., 2022, p 352). Fourth, some countries have weak governance structures and policies. Lack of articulate legal frameworks substantially affected efforts towards realizing adequate water resource management (Mombeuil & Diunugala, 2021).

Fifth, corporative efforts expected under MDG 8 among nations were affected by transboundary conflicts. With complicated cooperation, such geographical tensions slowed down commitment towards target 7c (Edum, 2023; Merem et al., 2020). Sixth, growing population, rapid urbanization, and rural urban migration strained existing water supply projects (Kousar et al., 2021). Most of the challenges were reported in developing countries with inadequate financial budgets to expand on their existing water supply programs.

Seventh, some scholars have reported gender disparity as another challenge hindering the success of target 7c. In most developing nations in South America and Sub-Saharan Africa, girls and women bear the challenge of water access and collection resulting from deforestation (Silva et al., 2020). Similar concerns have been reported in the Middle East where due to Global warming

causes women to experience increased water access problems due to wetland destruction and ecosystem degradation (Nunbogu et al., 2022). These practices further threatened efforts toward access to freshwater resources.

Lastly, most regions experience limited technological capabilities. These challenges relate to a lack of industrial-scale treatment initiatives and technology. Besides, in low-resource settings, inadequate water distribution networks impact equitable access and utilisation of safe drinking water.

IV. LEGAL REFORMS RESULTING FROM MILLENNIUM DEVELOPMENT GOAL 7C

Since the formulation of MDGs, studies have examined progress towards halving the number of people who lack sustainable access to safe drinking water and basic sanitation by 2015. Proponents assert that the world met the MDG target 7c since 90% of the global population has access to clean water compared to 76% in the 1990s (Solomon, 2023). However, critics assert that access to safe drinking water has been uneven across countries, mainly evident in the disparity between urban and rural regions and between the poor and the rich (Ndeunyema, 2020).

When considering access to basic sanitation, there is a growing consensus that existing progress was slow, making it difficult for international regimes to meet this goal globally by 2015. By 2015, more than 2.4 billion people were without access to improved sanitation facilities. Another 1 billion people were reported to practice open defecation. The rapid growth of urban populations further hindered efforts to achieve improved sanitation. Lack of funding also affected efforts to invest in and strengthen sewage and drainage systems in urban areas, which is key to better sanitation facilities. Legal frameworks and policies are key to addressing Target 7c, and exploring this topic will help understand their impact on international freshwater management (Pereira & Marques, 2022).

Analysis of literature shows varying research efforts on how MDGs influenced legal frameworks across UN member states. Besides, there are areas of contention and conflict regarding how countries formulated their policies and legal guidelines to align with Target 7c. Main themes emerging from the literature highlights various legal developments related to human rights, transboundary cooperation, reforming water governance, water quality management, sanitation policies, adaptation to climate change, and increased public participation in decision-making processes.

First, one of the widely discussed topics on MDG impact on international legal framework relates to water and sanitation as basic human rights. On 28th July 2010, the UN Resolution 64/292 adopted by General Assembly acknowledging the human right to water and sanitation. The Assembly further asserted that basic sanitation and access to clean drinking water are integral in the realisation of all human rights (UN, 2015; Spijkers, 2020). The resolution has formed the basis of major national reforms in most member states. In Latin America, Côrtes et al. (2021) reported that some countries like Peru have recognised right to water as a human right in the 2017 constitution. However, other countries such as Brazil and Colombia have experienced increasing water activism but have not succeeded like Peru. While countries like Argentina and Bolivia have water governing institutions, specialised laws, and jurisprudence recognising water as a basic human need, there are varied legal structures to enforce water as a socio-economic right (Spijkers, 2020).

Herrera (2019) investigated efforts to reconcile global MDG goals. The researchers noted that as applies to Target 7c, most developing countries manage water and sanitation at the subnational level. Yet, international legal opportunity structures rarely consider local governance hindering the success of water access as a human right. In developed countries, debates on water access as a basic right has been an incentive for social movements to advocate for reforms, while policymakers accept or reject such calls during legislation processes.

In European countries such as Romania and Slovakia, in addition to Asian nations like India, Pakistan, and Iran, there is growing focus on decentralisation of their water resources. As a result of these subnational approaches to water management, local management boards, utilities, and system operators face increased legal challenges to ensure access to freshwater and improved sanitation. Such increased responsibilities result in conflicts between users and practitioners, with the problem exacerbated by lack of laws to clarify on how national governments that finance, subsidise, and construct networks for water and sewer connection systems should assume responsibility over the operations of these local players to meet MDG goals (Pérez-Foguet, 2023).

Water suppliers and service providers have assessed how human rights can influence its implementation. However, most governments lack legal guidelines with elaborate national standards to translate human rights into progress monitoring and performance evaluation (O'Donnell, 2020). While human rights do not conflict with water pricing and user fees, there is no international law on how UN member states should ensure affordability in

private or public water and sanitation systems (Pérez-Foguet, 2023). To this end, MDG Target 7c has been unsuccessful in facilitating uniform structures in terms of utility costs (e.g., local taxes, household financing, and international support). It lacks clear guidelines to facilitate subsidies for impoverished populations with access to water and sanitation services (Neto & Camkin, 2020). Some scholars hold that human rights do not substantially impact water and sanitation system management.

Instead, human rights under UN General Assembly Resolution 64/292 has created political will, without substantial traction, in influencing international water management laws. While the UN resolution is promising, there is no clear practical impact on legal processes aimed at water and sanitation access (Mahoney & Mahoney, 2023). Besides, the right to water and sanitation may be a constitutional right in most governments following the adoption of MDGs, but there is not clear road map. To implement rights-based policies, human rights need to be translated into local terms since these services are offered at subnational levels and local operators, management boards, and utilities (Bosch & Gupta, 2023). These local systems should then be integrated with UN Resolution to understand causal pathways by which international human rights impact laws related to water and sanitation systems.

Second, scholars hold that the shortcomings of MDGs have a substantial impact on SDG The most significant part of the development of SDGs was the inclusion of 8 specific goals for managing water and providing access to sanitation (Bosch & Gupta, 2023). UN member states are now making commitments to safe water and sanitation because they dedicated Goal 6 to these issues. Although SDG 6 has been commonly referred to as "safe drinking water and sanitation," this name only describes the general name or title of the goal; it can actually be broken down into 8 distinct sub-goals covering basic access to drinking water, sanitation and hygiene, water quality and pollution, efficient use of water, integrated management of water resources, cooperation across national borders, protecting ecosystems, and building international capacity. Therefore, the overall scope of SDG 6 is significantly greater than that of MDG 7c, which would be better described as a partial precursor rather than a subset of SDG 6. Some additional important legal frameworks developed through this transition include the 2018 agreement on Transboundary Water Cooperation among Caspian Sea neighboring countries, specifically Azerbaijan, Iran, Kazakhstan, Russia and Turkmenistan (Ziganshina & de Schutter, 2022) and an increasing number of countries embracing the idea of water as a human right such as Slovenia, Peru, South Africa, Uruguay and Tunisia (Neto & Camkin, 2020).

These developments align with SDG 6, which ensures member states promote universal access to safe drinking water. For example, China enacted the Water Pollution Prevention and Control Law (amended in 2017), which imposed stricter penalties for water pollution in an effort to improve the management of its water quality (He et al., 2020). These findings show that MDGs created legal avenues that continue to contribute towards improved access to water quality and water-use efficiency among UN member states. MDGs also influenced how countries approach management of their integrated water resources while protecting water-related ecosystems in countries such as Kenya through its Water Act of 2016 (Mulwa et al., 2021). The Act also increases public participation in the utilization and management of water resources.

Third, the adoption of MDGs also increased water governance reforms. The 2014 UN Watercourses Convention provided a framework for reasonable and equitable use of shared international water resources. The framework intended to facilitate legal guidelines to reduce transboundary conflicts and improve cooperation among states. The convention achieved success in terms of creating a global framework for transboundary water cooperation, advocated equitable utilization of water, and encourages dispute resolution and information sharing. For example, Germany and the Netherlands ratified the UN convention, improving how they cooperate in the use of Rhine River water resources.

However, the Convention has been considered a failure because of low ratification with only 37 member states having adopted it by 2024. Countries in key river basin regions have also failed to attend relevant conventions, and there is lack of proper legal enforcement mechanisms. Key Nile Basin countries including Sudan, Ethiopia, South Sudan, and Egypt have failed to ratify the UN Watercourses Convention thereby hindering its effectiveness among Northern African countries. The construction of Ethiopia's Grand Ethiopian Renaissance Dam (GERD) on the Blue Nile has increased tensions with Egypt due to fears of reduced water flow and reduced allocation. Similar failures are evident in the Indus River Basin where conflicts remain between Pakistan and India due to India's hydroelectric projects. Moreover, Asian countries of Laos, China, Vietnam, Cambodia, and Thailand are concerned about China's upstream dams along the Mekong River. Increased sedimentation and reduced water flow affects downstream countries that rely on fisheries and agriculture. These examples are illustrations of the failures in worldwide compliance with the provisions of the UN Watercourse Convention to resolve transboundary water disputes. Experts argue that the UN convention

may have failed because it contains ambiguous language when describing many of its fundamental tenets. The Convention is viewed as "framework law" as a source of international law since even though its central tenets -- equitable and reasonable utilization, the obligation not to cause significant harm, and prior notice of proposed measures -- retain considerable authoritative ability to be interpreted where the Convention has not been ratified in a particular basin, but they derive more authority through custom, judicial acceptance rather than through the ratification record of the Convention.

Another instrument worth specific attention in this regard is the Convention on the Protection and Use of Transboundary Watercourses and International Lakes adopted in Helsinki on 17 March 1992 by the United Nations Economic Commission for Europe. Although originally limited to a regional area, the Helsinki Convention was modified to allow membership by all UN member states; The amendment took effect in 2013 allowing other countries to participate globally. It can reasonably be argued that a transition from a regional to global nature of the Helsinki Convention occurred during the same time frame as MDG Goal 7c was being implemented; however, an overstatement of causality would not be warranted.

The discussed reforms above show that since the enactment of MDGs, there has been a legal shift towards more globally integrated, sustainable, and rights-based approaches in freshwater management. However, there are growing concerns that the enforcement and implementation of these reforms is hindered by lack of robust legal frameworks. Most countries sharing water resources show laxity in embracing relevant legal ratifications to realize MDG 7c as pronounced in the UN Resolution.

1. Triumphs of Millennium Development Goals - inspired legal reforms

MDGs were marked by various successes, since their inception in 2000s, across different countries in sanitation and water management. First, despite lack of a uniform approach, MDGs influenced the legal recognition of water as a human right. Example of this success was evident in the Water Services Act and Free Basic Water Policy in South Africa. The Act guaranteed all citizens of a minimum quantity of water and served as model for other nations like Kenya, Uruguay, Colombia, Ghana, India, and the Philippines. Uganda considered water access as a gender sensitive topic and through Water Act was amendment in 2000s, it ensured women's representation in water user associations. Uganda's approach aligned with MDG 3 (gender equality) and MDG 7c, access to safe water.

Second, MDG 7c also influenced adoption of Integrated Water Resources Management (IWRM) by most member states. For example, Brazil IWRM through its National Water Resources Policy. The policy created river basin committees in Brazil, a move that increased community participation and devolution of water resources. IWRM principles were also factored into Kenya's Water Act of 2002. As a result, this Act established new institutions for water resource management such as Kenya Water Institute and Water Resources Authority.

Third, in some countries there was increased cooperation and engagement through Transboundary Water Cooperation. In Africa, countries such as Senegal, Mauritania, and Mali signed the Senegal River Basin Development Organization (OMVS) convention. The OMVS introduced a robust legal framework that promotes joint infrastructure development and equitable water sharing. As earlier noted, similar transboundary cooperation was realised in Central Asia among the Caspian Sea neighbors such as Russia, Iran, Azerbaijan, and Kazakhstan (Ziganshina & de Schutter, 2022).

Fourth, the MDG Target 7c contributed to improved legal framework related to sanitation laws. In India, policymakers formulated clear legal mandate supported by policies and laws, substantially improving sanitation coverage through its 2014 Swachh Bharat Mission. More countries integrated water and sanitation management into their National Legislations. Brazil also created Basic Sanitation Law in 2007 in response to MDG targets, with an aim of making sanitation services universal and easily accessible.

The following examples represent some of the shortcomings in global implementation of the principles of the UN Watercourse Convention which are intended to help resolve cross-border disputes regarding shared waters. Experts suggest that the UN convention may fail due to its use of unclear terms that define many of the conventions' primary elements. The Convention is considered "framework law," as a source of international law because although the key components of the Convention (equitable and reasonable utilisation, no causing significant harm, prior notification of planned actions) continue to retain a considerable amount of interpretive authority when the Convention is not ratified in a particular river system or basin, their authority is enhanced by way of customary practice, judicial acceptance, and/or the ratification record of the Convention.

Another treaty that is worthy of special consideration in relation to this issue is the Convention on the Protection and Use of Transboundary Watercourses and International Lakes adopted by the United Nations Economic Commission for Europe on 17 March 1992. Although initially designed to apply only

regionally, the Helsinki Convention was amended to include all UN member states; The amendment became effective in 2013 which allowed non-regional countries to join in on a global basis. It could be argued that there has been a transition from a regional to a global scope of the Helsinki Convention at approximately the same time period as that during which MDG Goal 7c was being implemented; however, an exaggeration of causal relationship is not supported.

2. Failings of Millennium Development Goals - inspired legal reforms

Despite growing evidence of MDGs having impacted legal frameworks of water and sanitation management in various countries, there are important shortcomings to take into consideration. First, most developing countries such as Ghana, Kenya, Bolivia, and India experience inadequate enforcement. Most water laws that have been developed in the last two decades lack robust enforcement guidelines and regulations. Bureaucracy, financial constraints, political interference, conflict of interest, and limited technological capacity have resulted in weak enforcement.

Second, some countries have fragmented legal water provisions that overlap and conflict. For example, there are instances of ineffective water management in countries like Indonesia there is overlapping mandate between local and national water authorities. The Indus Waters Treaty between Pakistan and India lacks uniform interpretation. While India claims the law allows it to construct dams on western rivers, Pakistan refutes these assertions as a violation of the treaty. Similarly, Ethiopia claims its laws allow it to use Nile Waters, but Egypt cites colonial-era agreements in its historical rights to the same water resources.

In Israel, the laws on ground water applies differently to Palestinians and Israeli settlers resulting in disparities in water usage and access rights. Mexico and United States also differ in interpretation of the 1944 Water Treaty, affecting allocation of Colorado River water allocation during the dry season. Similar conflicting interpretations are evident in the Tigris-Euphrates Basin between Iraq, Syria, and Turkey. While Syria and Iraq advocate their laws guarantee sufficient water flow, Turkish local laws support extensive construction of dams. Since these conflicts emerge due to varying international interpretations, historical claims, and national priorities, resolving them through dialogue to harmonise existing laws takes years, thereby slowing down the achievement of MDG goals.

Third, most MDG goals neglect groundwater use in its legal reforms. The guidelines primarily focus on the use of surface water. Such neglect fails to address concerns in countries such as Yemen, Qatar, and India, where groundwater depletion continues due to inadequate legal controls on water extraction and use.

Lastly, critics argue that most MDG goals did not adequately address the impact of climate change. For example, there are inadequate legal frameworks to address current problems in the Mekong River Basin, which is affected by reduction in water levels due to global warming (Barouillet et al., 2024). Besides, the impact of MDGs on international legal framework has been mixed, making it difficult to have sustainable water governance. Thus, enforcement and implementation of existing laws remains inadequate. Bosch and Gupta (2023) remarked that MDG related legal changes have been outpaced by practical concerns in water management and infrastructure development. A major hurdle is to formulate holistic water laws to address competing claims among countries (Wouters et al., 2021).

3. Best practices

In the light of the identified shortcomings, scholars and practitioners have share recommendations to achieve best practices. First, most scholars advocate a shift from siloed approach to holistic stakeholder participation (Adeel, 2021; Bosch & Gupta, 2023; Setty et al., 2020). Thus, more commitment should be focused on involving local communities in water management decisions. In Zambia, Tanzania, and Malawi, water laws direct creation of basin councils to represent all community stakeholders (Dinala et al., 2020).

Second, scholars also advocate rights-based approach to water access and management. Mahoney and Mahoney (2023) recommend including human rights principles into water laws as a best practice to achieve Target 7c. In Poland and Suriname, the constitutional amendment recognises water as a human right (Kowalski, 2020; Misiedjan, 2020). Scholars and practitioners advocate the introduction of the right to water into legal acts that regulate human rights under international law, as well as to legal acts at the national and regional scope (Baer, 2022; López-Ruiz et al., 2020; Reiniers, 2021).

Third, another best practice is related to embracing adaptive management of limited water resources. Amid the changing global climate, Herman et al. (2020) recommends integrating flexibility practices into international water laws to address emerging uncertainty. The 2007 Australian Water Act

encourages periodic adjustment and reviews of water rationing to combat the effects of climate change (Barker et al., 2021; Hajani et al., 2020).

Lastly, scholars also recommend the incorporation of penalties into water quality laws. In China, the polluter pays principle under the Water Pollution Prevention and Control Law introduced stringent fines for polluter (Wei & Luo, 2020). Legally stipulated punishment will raise awareness of ecosystem protection making conservation related practices more effective (Kang & Silveira, 2021).

4. Ongoing problems

There are ongoing challenges the need priority focusses in water and sanitation management. Insights from the literature identifies five key problems related to conflicts about water privatisation, transboundary disputes, rights of indigenous people, regulating water quality, and creating equilibrium between sustainable water use and economic development.

In Bolivia, Chile, Brazil, and Mexico, water privatisation laws remain a contentious topic (Ibarrarán, 2021, pp. 57–77). There is growing tension between human rights to water access and its privatisation. The privatisation law in Bolivia resulted in social unrest before it was repealed (Correa-Parra et al., 2020).

Researchers also raise concerns over transboundary conflicts among countries with shared water resources. The situation is exacerbated by lack of international legal water laws for resolving transboundary water conflicts. As earlier noted, there are constant conflicts between Ethiopia and an Egypt, India and Pakistan, and China versus its neighbors such as Vietnam, Laos, and the Philippines (Couves, 2020). These conflicts continue despite efforts to develop comprehensive legal framework to resolve the disputes.

Third, there are limited studies focused on addressing indigenous water rights. Existing water laws in most settler colonial nations fail to address the plight of traditional water rights for its first nations such as American Indians, Aboriginal, and Torres Strait Islanders (Bandala et al., 2022; Nikolakis & Grafton, 2021). Countries like Canada, Australia, and the United States struggle to fully incorporate natives' water rights into their water management framework prompting more efforts to address these concerns (Wilson et al., 2021).

Fourth, while MDGs have influenced formulation of various water laws among multiple countries, a major problem relates to enforcing existing

legislation. Specifically, there are hurdles in setting and enforcing uniform. Water quality standards.

The problem is prevalent in developing countries. For example, the Sub-Saharan region struggles to effectively monitor and implement water quality standards (Hlongwa et al., 2024; Ladan et al, 2024).

Lastly, most regions experience challenges achieving legal equilibrium between water conservation, sustainable practices, and economic development (Ndeunyema, 2020). Lack of a clear legal framework results in competing interests between environmental conservationists and economic development players such as industries and agricultural production (Tsani, 2020). Strengthening water laws with balance between multiple competing claims thereby addressing various conflicts of interest (Kumar & Thakur, 2024).

V. CASE STUDIES

The choice of India and Iraq was based upon the idea of assessing whether or not the implementation of MDG Target 7c impacted national water management law under two different levels of government and development context. In both nations there are serious issues with providing clean water and sanitation services to residents, thereby establishing a baseline for comparing each nation's success with regard to MDG 7c. Although both countries have many similar problems in these areas, they are very different from one another in terms of institutional capacity, political stability, and overall security. A comparative study of India (a country which has been relatively successful with implementing reforms aimed at achieving the MDG 7C) and Iraq (a country with the opposite characteristics) will enable an examination of what contributes to or detracts from the ability of governments to translate MDG commitments into effectively implemented water management policies.

1. India: a partial successful example

In line with MDG 7c, India initiated the National Rural Drinking Water Program (NRDWP) in 2009 as restructuring and continuation of the Accelerated Rural Water Supply Program (ARWSP) (Biswas et al., 2022). Being a centrally-sponsored scheme, it was launched to improve the coverage of safe and adequate drinking water to the rural populations across India (Sarkar & Bharat, 2021). Post 2015, NRDWP was implemented through restructuring and subsumed into Jal Jeevan Mission (JJM) (Sahoo et al., 2023). Under JJM, the primary goal was to provide Functional Household

Tap Connection (FHTC) to every rural household (Jadhav, 2022) for basic domestic needs such as drinking, washing, and cooking (Biswas et al., 2022).

During implementation, water is supplied with a minimum quality standard, with efforts to ensure convenient access in all situations and at all times. Sustainable supply is achieved through improved infrastructure, decentralised management, and active community participation (Singh & Arora, 2024). Upon implementation of this project, water supply and coverage in rural India has improved, with most communities and households having access to safe drinking water.

A) India's Performance

According to Beard and Mitlin (2021), the 2015 UN MDG Report showed that India made significant progress towards MDG 7c. Communities confirmed improved access to safe drinking water sources. The UN's 2015 MDG Report asserted that there was an increase in the proportion of the population using an improved drinking water source from 71% in 1990 to 94% in 2015. As a result of this improvements, India met the MDG target 7c (Saroj et al., 2020).

Despite improved access to safer water, Indian's progress on sanitation was slower. The proportion of individuals accessing improved sanitation rise from 17% in 1990 to 40% in 2015. The results show a shortcoming in relation to the MDG target of halving the population without access to improved sanitation facilities. While water access has improved, Saroj et al. (2020) noted that availability, scarcity, and quality remain a substantial challenge. A major concern is that many regions experience pollution of water bodies and groundwater depletion.

B) Contribution to MDG 7c

Formulation of the NRDWP has greatly contributed to MDG 7c in various ways such as extensive coverage, water quality, community participation, water quality, and covering underserved regions. In terms of coverage, NRDWP had covered 75% of rural Indian regions in 2012, supplying 40 liters of safe water *per capita* daily. In 2015, this coverage reached 95% thereby making significant contribution to MDG 7c.

Second, NRDWP contributed to improved water quality through surveillance and monitoring. Issues of quality monitoring instruments aimed to address concerns related to fluoride and arsenic contamination of ground water resources (Kumar et al., 2022, pp. 87–117). Third, NRDWP emphasised the sustainability practices to improve water management. Some of the main

strategies included ground water recharge structures and improved rainwater harvesting. The strategy aligns with the “sustainable access” concept under MDG 7c.

Fourth, Indian’s project also emphasised the importance of community engagement. Important areas of stakeholder engagement included aspects such as management, planning, and implementation of diverse water supply systems. Holistic approach to community participation intended to promote sustainable interventions through awareness creation. Fifth, NRDWP largely prioritised creating supply infrastructure in undeserved areas without adequate clean water supply. Reaching disadvantaged communities reduced existing disparities between affluent and resource constrained regions. By integrating water supply and sanitation, NRDWP further connected sewerage systems improving basic sanitation in line with broader goals under MDG 7c. These findings reveal that under NRDWP, India achieved major water and sanitation milestones in line with UN MDGs. Reports during the MDG analysis year showed India had achieved 95% in coverage of safer drinking water. The achievement surpassed MDG target of 80% coverage.

C) Challenges

Despite the progress, issues of water quality, sustainability of sources, and last-mile connectivity remained. The definition of “access” used in MDG reporting has not always aligned with the realities on the ground, such as the functionality of water sources or the actual quality of water provided.

D) Evaluation and impact

While the NRDWP made significant contributions, its important to note that evaluations have identified areas for improvement. A 2018 audit by the Comptroller and Auditor General of India found issues with planning, implementation, and monitoring of the program, highlighting the need for continued refinement of such initiatives.

However, the NRDWP played a crucial role in India’s progress towards MDG 7c, particularly in expanding access to improved drinking water sources in rural areas. Its contributions were significant, helping India surpass the MDG target for drinking water access. However, challenges remained, particularly in ensuring water quality and sustainability, which have been carried forward as focus areas in subsequent programs and in the context of SDG 6. Given the progress, India can be considered a largely successful case.

2. Iraq's case: unsuccessful

Before the adoption of MDG 7c goals in 2006, Iraq was already experiencing substantial water challenges due to a combination of factors. Main concerns related to increased water demand and climate change, outdated infrastructure, upstream dam construction in neighboring countries, and ongoing conflict (Al-Maqrif, 2020). A report by the Norwegian Refugee council shows that these issues made achieving water-related development goals, including MDG 7c, significantly challenging for Iraq (Islam & Wilson, 2023).

During the MDG period, Iraq's main national water program was delegated to the National Development Strategy (2005-2007). Subsequent national development plans further focused on enhancing water access and sanitation to address reconstruct efforts, sanctions, and conflict (Mason, 2022). Between 2010 and 2014, the country initiated the National Development Plan (NDP) aimed at address the dilapidated water infrastructure across the country (Elaiwi, 2020). Energy projects such as the Integrated National Energy Strategy (INES) were also restructured to assist in addressing water issues within the energy sector (Taniguchi et al., 2021).

Additional efforts included rehabilitation of Mosul Dam, Iraq's largest water reservoir, key to water supply and power generation (Weinthal & Sowers, 2020). Effective management of water resources was formulated under flood control and irrigation by the Ministry of Water Resources Strategic Plan (Borgomeo et al., 2020). In southern Iraq, there were plans to manage salt water intrusion through the Shatt al-Arab Barrage project (Ali & Thamiry, 2023). NDP further made efforts to restore Mesopotamian Marshes through the Marshland restoration project, that had been mismanaged under previous regime (Maulood & Hassan, 2021). A raft of other measures was initiated to improve water access an sanitation in cities through Iraq Drainage Project, waste water treatment plants, and Small-scale water treatment initiatives (Amrullah et al., 2023).

However, these multiple projects, implementation was hindered by security problems such as the rise of Islamic State of Iraq and Levant (ISIS) in 2013, political instability, and limited financial resources (Farhan, 2023). Therefore, Iraq faced mounting hurdles meeting MDG 7c targets related to improved access to freshwater and water and basic sanitation. Most of these projects extended into the SDG era, emphasising the long-term difficulties Iraq faces in achieving sustainable water resource management.

A) Contribution to MDG 7c

MDG 7c had various impacts on Iraq water and sanitation programs. First, expanding the distribution and treatment networks resulted in increased access to safe drinking water, especially in large cities like Baghdad. **The 2015** UN data report showed access to safe water increased from 80% in 1990 to 86% in 2015. Despite the progress, Iraq failed to meet the MDG target of halving the proportion its citizens without access to clean drinking water. According to Yousuf et al. (2018), this situation was complicated by the absence of effective legislative frameworks at the local level. Besides, the situation was exacerbated by disrepute and the incapability of the local water authorities (Yousuf et al., 2018).

Second, Iraq's program contributed to improvement in sewage treatment facilities and facilitated the expansion of sanitation networks. Access to sanitation significantly increased from 67% in 1990 to 85% in 2015, almost meeting the MDG 7c target (Lorenz & Erickson, 2017). Third, there was better management of water quality of rivers and reservoirs. However, financial hurdles, inadequate resources, and increased pollution slowed implementation (Al-Aloosy, 2024). Fourth, the NDP program aimed to reduce rural-urban disparities in access, but significant gaps remained by the end of the 2015 MDG deadline.

B) Challenges

While Iraq leaders showed commitment towards MDG goals, a number of issues affected the realisation of target 7c. First, conflict and instability such as the 2003 invasion and subsequent conflicts such as the Iraqi insurgency (2011-2013), and Iraq Civil War (2014-2017) significantly disrupted implementation of water and sanitation projects (Farooq & Aamir, 2024).

Second, climate change has resulted in reduced river flows, frequent droughts, and diminishing ground water resources have disrupted water availability. Lack of a clear legal framework hinder the national water program to fully incorporate climate adaptation measures (Yousuf et al., 2018). Existing policies have failed to encouraged the proper use of water in the agricultural sector. Iraq lacks future plans that emphasise optimal utilisation of these limited water resources and for the preservation of renewable surface water (Alkhafaji, 2018; Farooq & Aamir, 2024).

Transboundary conflicts remain resulting in reduced water flow from upstream countries (Turkey, Iran, Syria). For example, the Turkish

Southeastern Anatolia Project (GAP) threatens water Security Iraq negativity affecting hydroelectric production and agriculture. The GAP is estimated to reduce the flow of water into Iraq by 80% (Farhan, 2023). These challenges affect Iraq's efforts in meeting MDG 7c targets.

Fourth, Iraq experiences significant financial constraints affecting all implementation efforts. Fluctuating international oil prices, the country's main source of revenue, has stalled funding for water infrastructure. Internal conflicts also affect the country's commitment to invest or fund its national water resources. Funding is also limited by lack of effective international law informing the formulation of long-term strategies and planning of transboundary water resources (Yousuf et al., 2018).

Lastly, Iraq continues to experience limitations in political governance and institutional capacity. The Ministry of Finance Report shows lack of administrative and technical staff, instability, and lack of leadership support that affect sustainable processes to exploit and conserve water resources. There is also poor or complete coordination between different government agencies responsible for water management during the MDG period (Farhan, 2023).

C) Assessment

While Iraq's national water program may be noted to have shown genuine commitment towards MDG 7c, the progress was slow and marred with difficulties. Specifically, the rate of access to fresh water and sanitation was slower and less comprehensive compared to most developing countries. Political conflict, climate change, lack of legal framework, financial constraints, and transboundary problems, significantly impacted Iraq's progress in fully achieving its water-related development goals.

In urban centers, the program contributed to noticeable improvements in basic water access and sanitation, but the disparity existed in rural areas. Overall progress was less successful in meeting most goals set under MDG 7c such as sustainable practices, water quality, and equitable access across the country. Most unmet goals during the MDG 7c continued into the SGDs post 2015.

VI. CONCLUSION

Findings from institutional reports and literature shows that UN Millennium Development Goals, particularly MDG 7c, had a significant impact on international legal frameworks for freshwater management. There was substantial progress in most countries in terms of formulating policies to

enhance access to safe water and improved sanitation. However, progress was uneven among UN member states, across regions, and between urban and rural settings. Success cases like India demonstrate significant progress in meeting target 7c when suitable legal frameworks and institutions are put in place. Programs like the National Rural Drinking Water initiative were critical in helping India surpass the MDG target. Yet, unsuccessful cases like Iraq reveal the negative impact that climate change, conflict, climate, and transboundary issues have on hindering progress towards MDG 7c objectives, despite genuine efforts. Throughout its duration, MDG 7c greatly influenced important legal reforms such as recognising water as a human right, promoting integrated water resources management, and encouraging transboundary cooperation.

MDG era presents important lessons that emphasise the importance of holistic approaches to water management. Scholars advocate the need to consider local contexts and encourage community participation. Considering the potential failures of MDG implementation in some countries, there is need for stronger legal enforcement mechanisms and more coherent policy frameworks. Clear regulatory frameworks will address overlapping mandates, while prioritising attention to sustainable practices such as appropriate groundwater management and adaptive practices to changing climate. The MDG period further highlighted the challenges of balancing economic development with sustainable water use, besides barriers of addressing transboundary water conflicts in the absence of a clear international law.

Findings of this study inform various recommendations to enhance future frameworks. In future, countries should formulate progressive policies such as integrating rights-based approaches to water access and management. Governments should also incorporate adaptive management strategies key to addressing growing problem of global warming and climate change. Effective strategies should be designed on sustainable managed of ground and rain water, by developing robust mechanisms to improve water quality standards. International legal framework should be aligned to address transboundary disputes, indigenous people's rights to water resources, while balancing human rights access to water and its privatization. Like the EU countries, a comprehensive legal structure is needed to effectively regulate water quality, promote sustainable use, and reconcile competing interests between economic development and conservation. In future we will have to make sure legal frameworks are flexible and inclusive so they can provide for the complex and interconnected issues with which water resource managers deal. Overall, our position from this research is that while the legal effect of MDG target 7c was significant – i.e., the goals helped to establish the human right to water

and sanitation as a source of authority to guide interpretation, accelerate the global spread of regional agreements (i.e., the Helsinki Convention) and put integrated water resources management on the list of terms used in national legislation -- those effects were limited. The MDGs produced no new legally binding rules applicable everywhere under general international law; failed to alter the pace at which countries ratified the U.N. Watercourse Convention; and did little or nothing to resolve some of the toughest problems raised by implementation – including how to enforce decisions about use of shared water resources, how to settle disputes over the use of shared water resources across borders, how to govern the use of underground waters, and how to reconcile competing demands made upon water resources by human rights on one hand and markets on the other. Therefore, MDG 7C should be viewed as a catalytic soft-law event that created unfinished business which has been transferred to SDG 6.

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