The Journal of Business Leadership, Vol. 31, No. 1 Spring 2024

GLOBAL PERSPECTIVES ON WATER MANAGEMENT: AN OVERVIEW OF ACTION STEPS FROM THE UNITED NATIONS TO LOCAL COMMUNITIES

Elizabeth McVicker, Metropolitan State University of Denver

ABSTRACT

Water scarcity is a worldwide reality; people across the globe now experience the impacts of an excess of water demand over available supply every day. Pressure on water is rising, and action is urgent (UN HLP, 2018, UN SDG Summit 2023, 2023). The United Nations (UN) and the United Nations Educational Scientific & Cultural Organization (UNESCO) have been focused on water scarcity since 1977, when they created an Action Plan on "Community Water Supply," declaring that everyone has the right to access drinking water to meet their basic needs (UN, 2018). Since then, the UN has declared the decade of 2018-2028 as a "Decade for Action" on "Water for Sustainable Development (UN, 2018)." The recommendations from this international body of 193 member countries call for all stakeholders to be involved in creating responses to the challenges of water scarcity—not only governments and international organizations but universities, private organizations, farmers, and all citizens. Concomitantly, the World Economic Forum is working to foment public-private partnerships around the world to close the gap between water demand and water supply. This article presents an overview of some of the "action steps" being taken by these organizations, as well as some examples from universities to local organizations with ties to agriculture and water use.

INTRODUCTION

Four billion people—almost one-half of the world's population—experience severe water scarcity for at least one month each year (UNICEF, Water Scarcity, 2023). Over two billion people live in countries where water supply is inadequate (UNICEF, Water Scarcity, 2023). Half of the world's population could live in areas facing water scarcity by 2025 (UNICEF, Water Scarcity, 2023). While municipal, industry, and recreational demands tackle challenges of water scarcity, agriculture is the leading consumer of water worldwide, accounting for 70 percent of global water withdrawal (UNFAO, 2023). Food and water form the core of the United Nation's (UN) 2030 Agenda for Sustainable Development (UN SDGS, 2023). The UN articulated 17 Sustainable Development Goals (SDGs) that focus on ending poverty, improving health and education, and spurring economic growth (UN SDGS, 2023). Goal Number Six aims to "ensure availability and sustainable management of water…for all (UN SDGS, 2023)."

The action steps that the UN has taken to bring this goal to reality include its policies and strategies in the following programs: the UN Food and Agriculture Organization (FAO), the UN Global Framework on Water Scarcity in Agriculture (WASAG), and UNESCO's World Water Assessment Program (WWAP). These programs and the policies adopted by the United Nations General Assembly as well as the UN High-Level Panel on Water Outcomes have opened doors to

universities, private sector organizations involved in agriculture and water development, students, and national and local governments to turn the vision of water-related SDGs of the 2030 Agenda into reality through global, national and local partnerships.

The World Economic Forum (WEF) has embraced the call to action to achieve the UN's SDGs focused on water by creating partnerships with over 1,000 entities to "unlock innovative solutions for a sustainable future" and protect the global water cycle (WEF, 2023). The WEF champions the collaboration of public-private partnerships (PPPs) to close the gap between water demand and supply worldwide (WEF, 2023).

Efforts and accomplishments of three water study programs at universities in Colorado, Nebraska, and Italy, along with programs focused on water management in key agricultural sectors in these areas and around the world—including both local government and private companies—illustrate accomplishments that align with the UN's "International Decade for Action—Water for Sustainable Development" as well as with the WEF's focus on PPPs. In Denver, Colorado, the One World One Water Center for Water Studies at the Metropolitan State University of Denver (OWOW) has provided opportunities for students to study in Italy as well as in the oldest irrigated parts of Colorado (OWOW, 2023). OWOW has partnered with the Colorado Department of Agriculture to help foment studies on soil health and water management, as well as reaching across the Atlantic to form partnerships with the Università per Stranieri di Perugia in Perugia, Italy, and with one of the largest irrigation companies in Italy the Canal Emiliano Romagnolo (CER) that has rolled out programs for local Italian farmers to find solutions to the water scarcity that has hit Italy severely in the past few years (CER, 2023). These collaborations foster opportunities at the UN, at UNESCO, and with irrigation companies and local farming research efforts in both Italy and Colorado (USP, 2023; OWOW, 2023). Concomitantly, the University of Nebraska, located in a state where one in four jobs is related to agriculture, embraces its role as not only a local and national source of water research but an international one as well (DWFI, 2023). At the heart of these accomplishments is an optimism based on the energetic leaps into new water management practices from students, researchers, farmers, and policy leaders at the local, national, and international levels.

All of these efforts aimed at improved water management on a local and global scale resonate with "water ethics" that emphasize human dignity, collaboration, the common good, and stewardship. This article provides an overview of these goals and some examples of achievements that have responded to the UN's call to action to meet the world's water scarcity challenges.

GLOBAL ACTIONS: UNITED NATIONS AND WORLD ECONOMIC FORUM'S RESPONSES TO WATER SCARCITY, FOOD, AND AGRICULTURE

The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, sets out 17 Sustainable Development Goals (SDGs) and issues an urgent call for action by all countries to come together in a global partnership to end poverty, reduce inequality, spur economic growth, confront climate change, and preserve our oceans, waterways, and forests (UN SDGs, 2023). Goal Number Six of the 17 SDGs focuses on water and aims to "ensure availability and sustainable management of water (UN SDG, 2023)." SDG6, the 'Water SDG,' calls for

progress around water supply, sanitation, water quality, water efficiency, scarcity, integrated water resources management, water, and the environment, increased international cooperation, and involvement of communities in the management of water and sanitation. Water is the common currency that links nearly every SDG (UN HLP, 2018).

Although SDG 6 is the most recent and most urgent call for action on water scarcity around the world, the UN has been concerned with water-related issues around the world for many years. In 1977, the Mar del Plata conference in Argentina agreed to endorse a plan called the "Community Water Supply," which declared that all people everywhere on earth have the right to "access drinking water in the quantities and quality equal to their basic needs (UN SDG, 2023)." After almost forty years, in December 2016, the UN General Assembly unanimously adopted the resolution declaring the decade of 2018-2028 as the "International Decade for Action—Water for Sustainable Development to support the water-related targets tied to SDG 6 (UN SDG, 2023). The UN now has focused its resources on turning its goals articulated in SDG 6--"ensuring the availability and sustainable management of water resources"--into reality by fostering global, national, and local partnerships (UN SDG, 2023, UN SDG Summit 2023, 2023).

UN Secretary General's Action Plan, the UN High-Level Panel on Water Outcomes, the 2023 SDG Summit

In 2018, the UN Secretary-General, António Guterre, and the President of the World Bank Group, Jim Yong Kim, issued a declaration and an outline for an "Action Plan" that emphasizes the SDG 6 goals. The Plan begins with the declaration that water is "critical for sustainable development, the eradication of poverty and hunger and is indispensable for human development, health, and well-being (UN Secretary-General, 2018)." The Secretary-General and World Bank Group President's declaration and plan build on the agreements reached during the 2030 Agenda for Sustainable Development, the Sendai Framework for Disaster Risk Reduction 2015-2030, and the 2015 Paris Agreement (UN Secretary-General, 2018). They also note the role of the World Economic Forum (WEF) and how the WEF has contributed to the "action steps" needed worldwide to respond to the water crisis.

The activities listed in the "Action Plan" are broad in their scope, with the specifics of achievements and undertakings dependent on "Member State activities" and scientific and academic engagement with a focus on communication, sharing of technology and water data, and continued coordination of "policy support, capacity building and improved access to reliable water data to effectively model and plan for the future (UN Secretary of State, 2018)."

Alongside the "Action Plan" issued by the UN Secretary-General and the World Bank Group President, the "High-Level Panel on Water" (HLPW), a group of 11 Heads of State and Government, with one Special Advisor, released a document summarizing the key initiatives aimed at realizing the goals of SDG 6. The document is entitled "Making every drop count: UN High-Level Panel on Water Outcome Document," released on March 14, 2018 (UN HLP, 2018)."

Again, the Panel's recommendations are broad and call on "all stakeholders to be involved in crafting responses to these challenges, and to build on the work already underway (UN HLP, 2018)." The Plan looks to Member States and governments to facilitate cooperation "across national boundaries" but also galvanizes individual citizens, private organizations as well as international non-governmental organizations to "meet these challenges (UN HLP, 2018)." The HLPW observes that if nothing is done to meet the challenges of water scarcity, the world faces a 40% shortfall in water availability by 2030 (UN HLP, 2018). The "foundations for action" outlined by the Panel are as follow:

1) "Understand Water," which means all stakeholders must commit to making evidence-based decisions about water and cooperate to strengthen water data, such as through the HLPW World Water Data Initiative;
2) "Value Water," which means "to sustainably, efficiently, and inclusively allocate and manage water resources and deliver and price water services accordingly";
3) "Manage Water" which means to "implement integrated approaches to water management at local, national, and transboundary levels, strengthen water governance, and ensure gender equality and social inclusion." (UN HLP, 2018).

The Panel's recommendations not only encourage promoting partnerships and encouraging innovations in water management but also in increasing financial support. The UN's SDG6 also highlights the role of agriculture, which uses almost 70% of the globe's water, as well as how water scarcity threatens the ability of the world's communities to feed its people. Several UN organizations and committees have undertaken significant work on the nexus between water, agriculture, and food. The UN, the World Bank, and the World Economic Forum push forward with pragmatic achievements in forging partnerships to harness financial resources and foster collaboration among government agencies, corporations, and NGOs (UN FAO, WASAG, WEF, 2023). The UN Secretary-General, António Guterre, convened a 2023 Summit in New York in September 2023 to "provide a renewed impetus and accelerated actions for reaching the SDGs (UN 2023 SDG Summit, 2023)." The summit highlighted the increased crises that the world faces and the critical need for a unified response from all stakeholders.

United Nations Food and Agricultural Organization (UNFAO) and United Nations' Global Framework on Water Scarcity in Agriculture (UNWASAG)

Agriculture uses almost 70% of the world's freshwater withdrawals (Global Agriculture, 2023). The United Nations Food and Agricultural Organization (UNFAO) is a specialty agency of the UN that leads international efforts to defeat hunger. The goal of FAO is to help people around the globe find food security and access to high-quality food. The 195 members work collaboratively on the goals of the FAO—193 countries and the European Union (UNFAO, 2023).
In partnership with the UNFAO, the Global Framework for Action to Cope with Water Scarcity in Agriculture (WASAG) brings together key players across the globe and from different sectors

to tackle the collective challenge of using water better in agriculture to ensure food security for everyone around the world. The UNFAO formed the partnership with WASAG, which fosters collaboration among government agencies, international organizations, research institutions, advocacy groups, and professional/membership organizations for the development and deployment of policies, strategies, and programs that assist in the development of water resources management to meet the challenges of drought and food security (UNWASAG, 2023).

The world must produce an estimated 60 percent more food by 2050 to ensure global food security (UNWASAG, 2023). Water is key to food production from the fields to the supply chain. Therefore, sustainable use of water in agriculture is pivotal for achieving the objectives articulated in the SDGs as well as assuring the viability of the livelihoods of hundreds of millions of smallholder farmers and rural communities worldwide. Farmers play an essential role in any process of change in agriculture; the UN depends on the actions and policies developed through WASAG to provide incentives to farmers to empower them to "conserve biodiversity, protect ecosystems and minimize environmental impacts (UNWASAG, 2023). These policies and incentives extend to irrigation organizations to respond to the needs of farmers by "ensuring the reliable delivery of sufficient water, increasing the transparency of irrigation management, and achieving efficiency and equity in access to water (UNWASAG, 2023)." WASAG provides access to investments in infrastructure for the modernization of irrigation systems while assisting in the facilitation of technical capacities of farmers and water managers (UNWASAG, 2023). A WASAG working group focused on finance has identified financial mechanisms to support new approaches to provide financial assistance for the investments for modernizing the world's farming infrastructure (UN Finance, 2023).

United Nations Educational Scientific & Cultural Organization's World Water Assessment Program (UNESCO's WWAP)

UNESCO established the World Water Assessment Programme (WWAP) in 2000 in response to a call from the UN Commission on Sustainable Development (CSD) to produce a UN system-wide periodic global overview of the status, use, and management of freshwater resources. (UNESCO, 2023). Its overall objective is "to meet the growing requirements of UN Member States and the international community for a wider range of policy-relevant, timely and reliable information in various fields of water resources developments and management, in particular through the production of the United Nations World Water Development Report (UN WWDR)." WWAP issues World Water Development Reports and undertakes activities on a local, regional, and international level to equip water managers with knowledge, tools, and skills to develop and implement sustainable water policies (UNESCO WWAP, 2023). The Government of Italy funds UNESCO WWAP and has since 2017 (UNESCO WWAP, 2023), and this relationship has fomented local programs from academic research to new policies in farming and irrigation systems, as discussed later in this article (UNESCO WWAP, 2023).

UNICEF and Water Scarcity

Another UN organization focused on water scarcity and actions to produce technologies to increase access to safe water is UNICEF, the UN Children's Fund (UNICEF, 2023). UNICEF focuses on:

1) identifying new water resources with technologies such as remote sensing, geophysical surveys, and field investigations;
2) improving the efficiency of water resources by providing support for the rehabilitation of urban water distribution networks and promoting wastewater reuse for agriculture to protect groundwater;
3) planning for urban scarcity by identifying available resources to reduce the risk of cities running out of water;
4) expanding technologies to ensure climate resilience which includes the use of deeper groundwater reserves by using solar-powered networks, the use of small-scale retention structures to manage aquifer recharge, and rainwater harvesting where possible;
5) promoting an understanding of the value of water and the importance of its protection by working with schools and local communities;
6) and developing technical guidance, manuals, and online training programs to improve water access (UNICEF, 2023).

World Economic Forum: Achieving SDGs requires public-private collaboration

The United Nations, however, is not working alone in the world's efforts to close the gap between water demand and supply. With the stark realization that the world is not on track to achieve SDG No. 6 on water and that a 40% gap between global water supply and demand looms by 2030, the World Economic Forum (WEF) initiated the 2030 Water Resources Group (2030 WRG) at its annual meeting in 2008 (WEF 2030 WRG, 2023). More than 1,000 partners from the private sector, government and local communities work together to facilitate financing for water-related programs for agricultural water efficiency, urban and industrial water management, wastewater treatment, and improved farming techniques for large and small farmers (WEF 2030 WRG, 2023). The 2030 WRG oversees a multi-donor trust fund hosted by the World Bank Group (WEF 2030 WRG, 2023). To date the 2030 WRG has provided over $893 million for financing these kinds of projects (WEF 2030 WRG, 2023).

The WEF fosters public-private partnerships (PPPs) to help find investors and users in both upstream and downstream communities in order to "shift the paradigm" of the underinvestment in the water infrastructure around the world (Mazzucato, 2023). The WEF estimates that a tripling of investments is needed to ensure universal access to water to help meet the water objectives articulated in SDG 6 (Mazzucato, 2023). The WEF has identified key areas for investments that include smart technologies that combine data and communication technologies such as smart sensors and meters that can improve water systems' efficiency as well as innovations for detecting leakage in water delivery systems, agriculture, recycling of industrial wastewater and water-efficient energy systems (Mazzucato, 2023). One example of the financial

assistance coming from WEF is the financing of some programs of the US space agency NASA in solving water problems around the world. NASA is currently using satellites to monitor water resources and track changes in water quality and is developing new technologies to desalinate seawater and extract water from the air (WEF, 2023). The WEF holds hope for the implementation of the optimistic goals that were prioritized at the UN's SDG 2023 Summit (Mazzucato, 2023). Despite the stumbling of the actions toward realizing the achievements of SDG 6 on water, a plethora of successful examples illustrate how local universities, farmers, irrigation companies, and local communities have rallied to meet the water scarcity challenges of the 21st century.

LOCAL RESPONSES AND EXAMPLES OF PUBLIC-PRIVATE COLLABORATION

Examples of how local research and educational institutions, water irrigators, and farmers have embraced the invitations from the UN and the WEF to meet the challenges presented by the world's water scarcity crisis illustrate that this world and its people can, indeed, find answers to the problems articulated in SDG 6 on water. From Colorado to Nebraska, from Italy to Brazil, teachers, students, political leaders, and farmers are answering the call to revolutionize water management policies and practices.

University Partnerships: Steps towards achieving SDG No. 6:

Surprisingly, there are few universities that offer water studies programs outside of environmental and atmospheric studies programs. The One World One Water Center (OWOW) is one of them which is a collaboration between the Metropolitan State University of Denver and Denver Botanic Gardens. The OWOW Center's mission is to "prepare an educated, empowered, solution-oriented Colorado citizenry to protect and preserve our precious water resources (OWOW, 2023). In partnership with Denver Botanic Gardens, OWOW is able to expand the "reach and breadth of educational programs on water and environmental issues; attract funding for joint research in these areas; and raise awareness of water and the environment through collaborative water stewardship (OWOW, 2023)."

OWOW formed a partnership with the Università per Stranieri di Perugia (UNISTRAPG) in the Umbrian town of Perugia, Italy, located two hours from Rome and the meeting place of the 2018 UNESCO/UN's conference on the use of data technology in water management (OWOW, 2023). UNISTRAPG established the Water Resources Research and Documentation Center (WARREDOC) in 1985 and worked to develop research, advanced training, and scientific communication focused on water, environment, and disaster risk management (UNISTRAPG WARREDOC, 2023). The partnership between OWOW and UNISTRAPG has led to study-abroad programs for students and professionals from Colorado and Italy. This partnership allowed OWOW to develop a partnership with UNESCO's World Water Assessment Programme (WWAP), which focuses on "equipping water managers and key decision-makers with information, data, tools and skills" to develop effective policies to respond to the food, water, energy nexus critical to feeding the world (UNESCO WWAP, OWOW, 2023). In 2018,

OWOW, UNISTRAPG, and UNESCO hosted a forum focused on UNESCO's efforts in developing technologies to respond to the food and water nexus (OWOW, 2023). Another workshop held in Rome in 2022 brought together professionals from local communities-- the "custodians of world change and a key asset to resilience in managing water crisis"—and how communities in Colorado and Italy are responding to the water crises, especially how local agriculture endeavors, from irrigators to farmers, in these two different, yet similar, places in the world are involved in changes towards a sustainable water future (OWOW, 2023). The workshop "Water Extremes: Building Sustainable and Resilient Communities" included presenters that offered an inter-continental debate on shared drought and flood events and included a delegation from Colorado, a state that includes high mountains, arid plains, and an important agricultural sector for the United States, as well as water management leaders from Italy (OWOW, UNISTRAPG WARREDOC, 2023). The workshop focused on how these diverse areas could benefit from each other's experiences in water management and natural hazard mitigation (Italy (OWOW, UNISTRAPG WARREDOC, 2023). From the Governor of Colorado to the managers of the largest irrigation organization in Italy to delegates from UNESCO to representatives from the U.S. Department of Agriculture, as well as directors of the two university water studies programs, the workshop resulted in additional partnerships envisioned by the UN and WEF to forge forth towards meeting the goals of SDG 6.

The partnership between OWOW and UNISTRAPG has been a catalyst for OWOW to join the UN FAO's Global Framework on Water Scarcity in Agriculture, where it has combined resources of the Metropolitan State University of Denver and the Denver Botanic Gardens to develop and improve best practices in water-efficient urban agriculture and food access, extending its research to developing-world applications (OWOW, UN FAO, 2023). The partnerships between these two universities also led to an agreement with Canal Emiliano Romagnolo (CER), one of Italy's largest irrigation canals and water management districts that supplies water throughout the northern Italian, Emilia-Romagna region for agriculture, industry, and potable uses (OWOW, CER, 2023). The agreement opens opportunities for professional and student exchanges. CER is an 83 mile canal that supplies water to more than 84,000 farms and has developed an IT/web-based system that farmers can use for more efficient water management (CER). This system helps farmers optimize their use of water resources for sustainable agriculture production, especially in dry years (CER). OWOW forged a similar agreement with the Colorado Department of Agriculture, which has also implemented a similarly-based IT water management program (Ag Colorado, 2023).

OWOW and the Colorado Department of Agriculture

OWOW, the Denver Botanic Gardens, and the Colorado Department of Agriculture have joined hands to implement new processes for water-efficient urban agriculture through soil management (OWOW, 2023). The Colorado Department of Agriculture, like Canal Emiliano Romagnolo, has launched projects for local farmers and ranchers to help evaluate their current production system and identify areas for improved management to increase soil health, water quality, and water availability (Ag Colorado, 2023). The Colorado STAR Plus program encourages farmers to commit to practices that have been proven to improve soil health, water quality, and water

availability (Ag Colorado, STAR, 2023). The STAR Plus program provides financial and technical assistance to producers as they implement new practices; the state government and federal grants provide stimulus funding to provide equipment grants and training; this program and the relationship with OWOW illustrate the policy ambitions first articulated by the UN FAO.

The University of Nebraska Daugherty Water for Food Global Institute (DWFI)

The state of Nebraska in the Great Plains of the North American continent has been one of the most important agricultural producers in the world for over a century. A well-endowed foundation, the Robert B. Daughtery Foundation, chose the University of Nebraska, known for its advanced research on agriculture and the environment, to house the Daugherty Water for Food Global Institute (DWFI) to "address the global challenge of achieving food security with less stress on water resources through water management in agriculture and food systems (UN DWFI, 2023)." In step with the international ambitions of the UN FAO and SDG 6, the DWFI leverages the University of Nebraska's expertise to forge partnerships across the state, nation, and globe (UN DWFI, 2023). DWFI collaborates with other universities, businesses, non-governmental organizations and government agencies around the world to foster future water and food security (UN DWFI, 2023).

Recent examples include working with Rwanda in Africa to develop a business ecosystem for smallholder irrigation. Out of Rwanda's more than 1.5 million acres of irrigable land, only 10% is currently irrigated (UN DWFI, FY 2022 Annual Report, 2022). A more developed irrigation system would enable farmers to take advantage of three growing systems instead of only one, but this depends upon access to irrigation pumps and other equipment that farmers can share (UN DWFI, FY 2022 Annual Report, 2022). DWFI completed maps and analyses for the Rwanda farmers to jumpstart these efforts. In line with the goals of the UN FAO, DWFI researches ways to help growers around the world to achieve food production goals while taking on and overcoming environmental challenges (UN DWFI, FY 2022 Annual Report, 2022).

Another example of an international partnership fostered by the University of Nebraska's DWFI is a water management partnership with Brazil and the country's and world's largest agricultural producer, the state of Mato Grosso (UN DWFI, FY 2022 Annual Report, 2022). The government of Mato Grosso, Brazil, signed a technical collaboration agreement with the UN's DWFI to map its water resources in order to identify and monitor its water resources. The cooperation between DWFI and Mato Grasso is focused on creating a plan to improve the sustainable use of water for irrigation of crops, maintenance of pastures, and increasing family farming (UN DWFI, FY 2022 Annual Report, 2022). Because Mato Grosso depends on the Urucuia Aquifer, similar to how Nebraska depends on the High Plains Ogalla Aquifer, DWFI, through its partnerships with Mato Grosso as well as other Brazilian water management entities, continues to pursue its mission to achieve food security worldwide with less pressure on scarce water resources (UN DWFI, FY 2022 Annual Report, 2022).

Some of the technological advances that DWFI has developed recently include the development of the *Parallel 41 Flux Network,* which is a series of towers across the central plains of the U.S. that determine the movement of water vapor and other gasses in cropped fields (UN DWFI FY 2022 Annual Report, 2022). This data helps growers more precisely apply the amount of irrigation water that crops need and also is being used to compile data from satellites and NASA projects that are funded by the WEF—all in pursuit of the realization of SDG 6 on water. DWFI developed a free website portal to view and download global daily Evapotranspiration (ET) spatial datasets (UN DWFI FY 2022 Annual Report, 2022). DWFI worked also with the U.S. Department of Agriculture's Agricultural Research Service to develop these ET spatial datasets—another example of global water management efforts.

The *Dashboard for Agricultural Water Use and Nutrient Management* (DAWN) project is another example of a partnership between a government policy-maker—the U.S. Department of Agriculture and the National Institute of Food and Agriculture—and a university, University of Nebraska, and local community stakeholders—farmers and ranchers—aims to provide farmers with a predictive tool to sustain food crop production (UN DWFI FY 2022 Annual Report, 2022). DAWN incorporates modeling based on the ET Modeling using the NASA satellites to help farmers maintain a soil water balance in the root zone to predict irrigation needs (UN DWFI FY 2022 Annual Report, 2022).

WATER ETHICS: AN OPTIMISM FOR THE FUTURE CONCLUDING THOUGHTS

The principle of "Water ethics" motivates global efforts for sustainable water management in this 21st century. As the world faces a crisis over water scarcity and food availability, the "Principles of Water Ethics" resonate with the missions and actions of communities around the world (Jennings et al., 2016). The "Principles of Water Ethics" enumerates three main principles that reverberate through all of the above-described accomplishments and undertakings:

- Human Dignity: There is no life without water;
- Solidarity: There must be up and downstream collaboration; and
- Common good: The improper management of water means that human potential is diminished for all.

The call to all stakeholders implicit in the above-described efforts from the United Nations and the World Economic Forum, as well as the multiple examples of national, regional, and local partnerships between universities, NGOs, and private sectors, illustrate how communities across the globe embrace the reality that we all have a role in the stewardship of our resources and land. We are all charged with finding an ethical balance in using, changing, and preserving our water resources.

REFERENCES

Canal Emiligano Rogiano (CER). (September 2023). Retrieved from https://consorziocer.it/en/.

Climate Adapt. (September 2023). Canal Emiliano Romagnolo (CER). IRRINET: IT irrigation system for agriculture water management. Retrieved from https://climate-adapt.eea.europa.eu/en/metadata/case-studies/irrinet-it-irrigation-system-for-agricultural-water-management-in-emilia-romagna-italy.

Colorado Department of Agriculture (AG Colorado). (September 2023). Soil Health. Retrieved from https://ag.colorado.gov/soil-health.

Colorado Department of Agriculture (March 16, 2023). Soil Health and Water Management. Retrieved from https://ag.colorado.gov/soil-health.

Global Agriculture (September 2023). Retrieved from https://www.globalagriculture.org/report-topics/water.html#:~:text=69%25%20of%20the%20world's%20freshwater,for%20households%20and%20municipal%20use..

Jennings, B., Heltne, P., Kintzele, K. (March 20, 2016). Principles of Water Ethics. *Humans & Nature.* Retrieved from https://humansandnature.org/principles-of-water-ethics/.

Mazzucato, M. (September 13, 2023). Achieving the SDGs requires public-private collaboration. Here's why. *World Economic Forum.* Retrieved from https://www.weforum.org/agenda/2023/09/public-private-collaboration-key-achieving-sdgs-water/.

One World One Water Center for Water Studies at Metropolitan State University of Denver (OWOW). (September 2023). Retrieved from https://www.msudenver.edu/one-world-one-water/.

One World One Water Center for Water Studies at Metropolitan State University of Denver (OWOW). (September 2023). Retrieved from https://www.msudenver.edu/one-world-one-water/partnerships/italy-global-impact/.

One World One Water Center for Water Studies at Metropolitan State University of Denver (OWOW). (September 2023). Story Maps. Retrieved from https://www.msudenver.edu/one-world-one-water/action/story-maps/.

NASA Spinoff. (September 4, 2023). Nine ways NASA is solving water problems around the globe. *World Economic Forum.* Retrieved from https://www.weforum.org/agenda/2023/09/nasa-solving-water-problems.

UN Food and Agriculture Organization (UN FAO). (September, 2023). Retrieved from https://www.fao.org/about/about-fao/en/.

UN FAO. (2022). The State of the World's Land & Water Resources for Food & Agriculture 2021—Systems at a Breaking Point. (Rome, Italy). Retrieved from https://www.fao.org/documents/card/en/c/cb9910en.

UN Sustainable Development Goals (UN SDGS). (September 2023). Retrieved from https://sdgs.un.org/goals.

UN SDG 2023 Summit. (September 2023). Retrieved from https://www.un.org/en/conferences/SDGSummit2023/.

UNESCO World Water Assessment Programme. (UNESCO WWAP). (September, 2023). Retrieved from https://www.unesco.org/en/wwap.

UNESCO Water Scarcity. (September 2023). Retrieved from https://www.unicef.org/wash/water-scarcity.
UNICEF. (2023). Retrieved from https://www.unicef.org/wash/water-scarcity.

UN Water as Global Issue. (September, 2023). Retrieved from https://www. https://www.un.org/en/global-issues/water.

UN WASAG Financing. (September, 2023). Retrieved from https://www.unwater.org/news/wasag-unlocking-finance-water-and-agriculture.

UN Water Scarcity in Agriculture (WASAG). (September, 2023). Retrieved from https://www.fao.org/en.

UN WASAG Land and Water. (September, 2023). Retrieved from https://www.fao.org/land-water/home/en.

UN Secretary General's Action Plan: Water Action Decade (March, 2018). Retrieved from http://www.wateractiondecade.org/wp-content/uploads/2018/03/UN-SG-Action-Plan_Water-Action-Decade-web.pdf.

UN HLP. (March 14, 2018). High-Level Panel on Water Outcomes: Making Every Drop Count. Retrieved from https://sustainabledevelopment.un.org/content/documents/17825HLPW_Outcome.pdf.

Università per Stranieri di Perugia, Italy. (September 2023). Retrieved from https://www.unistrapg.it/en/unescowaterchair/we-do#edu.

Università per Stranieri di Perugia, Italy. (April 5, 2022). World Water Day Celebration. Retrieved from https://www.unistrapg.it/it/celebrazioni-per-la-giornata-mondiale-dell-acqua-2022.

Università per Stranieri di Perugia, Italy. One World One Water Center, Metropolitan State University of Denver. (November 22, 2022). Water Extremes: Building Sustainable and Resilient Communities: A Comparative Look at Colorado and Italy. Retrieved from https://warredoc-unistrapg.org/en/cambiamenti-climatici-e-comunita-sostenibili-crisi-idriche-e-rischi-idrogeologici-a-confronto-colorado-e-italia/.

Università per Stranieri di Perugia, Italy. Water Resources Research and Documentation Center. (UNSWARREDOC). (September 2023). Retrieved from https://warredoc-unistrapg.org/en/chisiamo/.

University of Nebraska Daugherty Water for Food Global Institute. (September 2023). (UNDWFI). Retrieved from https://waterforfood.nebraska.edu/

University of Nebraska Daughtery Water for Food Global Institute. Fiscal Year 2022 Annual Report. (July 1, 2022). Retrieved from https://waterforfood.nebraska.edu/resources/annual-report-2022.

University of Nebraska Daughtery Water for Food Global Institute. (July 1, 2022). FY 2022 Annual Report. New Report Explores the Business Ecosystem for Smallholder Irrigation in Rwanda. Retrieved from https://waterforfood.nebraska.edu/resources/annual-report-2022/research-and-policy/global-national/new-report-explores-the-business-ecosystem-for-smallholder-irrigation-in-rwanda.

University of Nebraska Daughtery Water for Food Global Institute. (July 1, 2022). FY 2022 Annual Report. DWFI offers suite of tools to improve irrigation water use and agricultural production. Retrieved from https://waterforfood.nebraska.edu/resources/annual-report-2022/research-and-policy/nebraska-regional/research-suite-of-tools-update.

University of Nebraska Daughtery Water for Food Global Institute. (July 1, 2022). FY 2022 Annual Report. Visit to Nebraska results in water management partnership with Brazil. Retrieved from https://waterforfood.nebraska.edu/resources/annual-report-2022/research-and-policy/global-national/brazilian-visit-to-nebraska-results-in-collaboration-agreement-with-dwfi-university-of-nebraska.

World Economic Forum (WEF). (September 2023). Retrieved from https://www.weforum.org/.

World Economic Forum 2030 Water Resources Group. (September 2023). Retrieved from https://2030wrg.org/