The role of international cooperation in addressing water challenges

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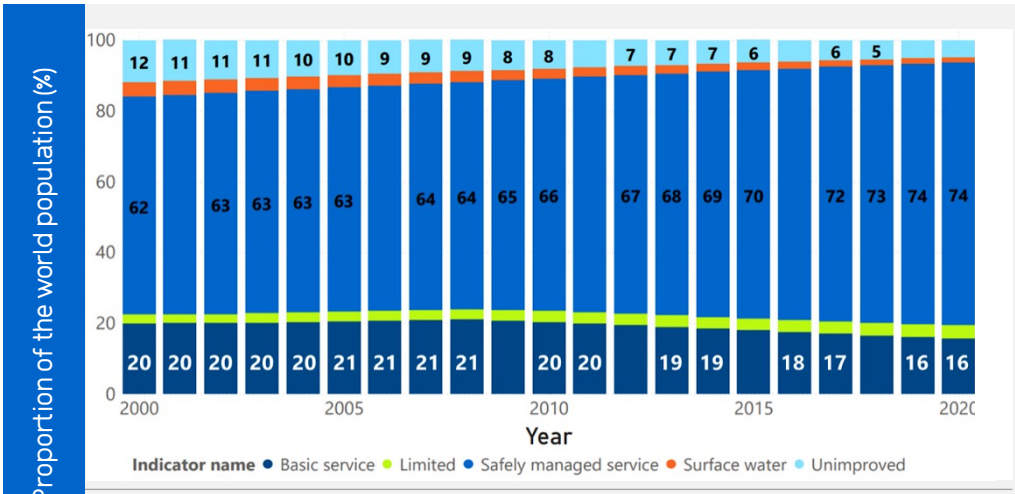
Introduction

UN-Water defines water cooperation as “the peaceful management and use of freshwater resources at local, national, regional and international levels among various players and sectors.” The foundation of water cooperation is to work together toward a common goal in a way that is mutually beneficial (UN-Water, 2013).

Water challenges are plenty and require international cooperation to be addressed. Over the years, access to improved drinking water and sanitation has increased from 62% in 2000 to 74% in 2020 and from 29% in 2000 to 54% in 2020, respectively. However, according to the WHO and UNICEF, around 2 billion people (26% of the world’s population) still lack access to safely managed drinking water services (Figure 1), and 3.6 billion (46% of the world’s population) lack access to sanitation in 2020 (Figure 2) (UN-Water, 2021).

Figure 1: Global Access to Safely Managed Drinking Water Between 2000 and 2020 (SDG 6.1) [1]

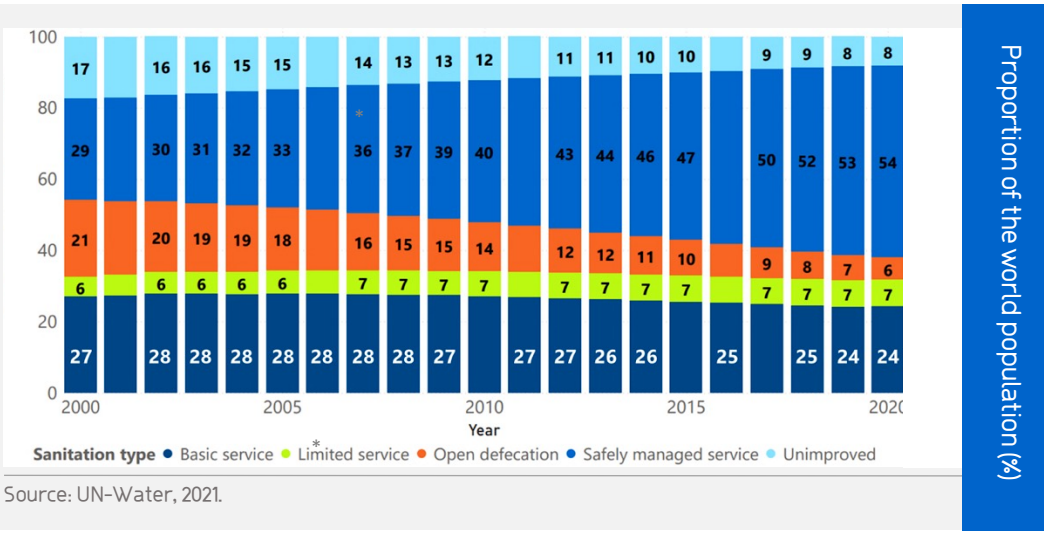
(World Access to Drinking Water by Year and Types of Drinking Water Services).



Source: UN-Water, 2021.

Figure 2: Global Access to Safely Managed Sanitation Services Between 2000 and 2020 (SDG 6.2)[2]

(World Access to Sanitation by Year and Safely Managed Sanitation Services).



Source: UN-Water, 2021.

[1] As measured in the Sustainable Development Goals 6.1, "By 2030, achieve universal and equitable access to safe and affordable drinking water for all".

[2] As measured in the Sustainable Development Goals 6.2, "By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations".

*Water supply system, infrastructure for the collection, transmission, treatment, storage, and distribution of water for homes, commercial establishments, industry, and irrigation.

Cooperation in the water sector is especially important because water is a cross-cutting issue, involving many stakeholders across sectors and regions, and water also cuts across physical, political, and jurisdictional boundaries. Mismanagement of these cross-cutting issues can result in conflicts, while cooperation can create mutual benefits. Typically, international water cooperation is managed around four objectives (Figure 3).

Figure 3: Key Types of International Water Cooperation

Source: Team analysis.

2. The Four Main Types of International Water Cooperation

The four main types of International Water Cooperation are driven by the objective they are trying to achieve:

01 Aid provision to developing

02 Improvement of urban water planning

03 Transboundary water management

04 Advancement of research, development and innovation.

2.1. Provision of Aid to Developing Countries

Development aid can either be provided by official agencies, including state governments and their executive agencies, or by other actors in the water sector, including utilities.

2.1.1. Provision of Development Aid by Governments and Multilateral Agencies

Development aid to the water sector by official agencies can be provided by multilateral development organizations, such as the World Bank or the United Nations, via bilateral donor agencies, such as the United States Agency for International Development (USAID) and Japan International Cooperation Agency (JICA), or via direct government assistance. Bilateral aid is money that is transferred directly from one country to another, as opposed to being channeled through multilateral development banks, such as the World Bank.

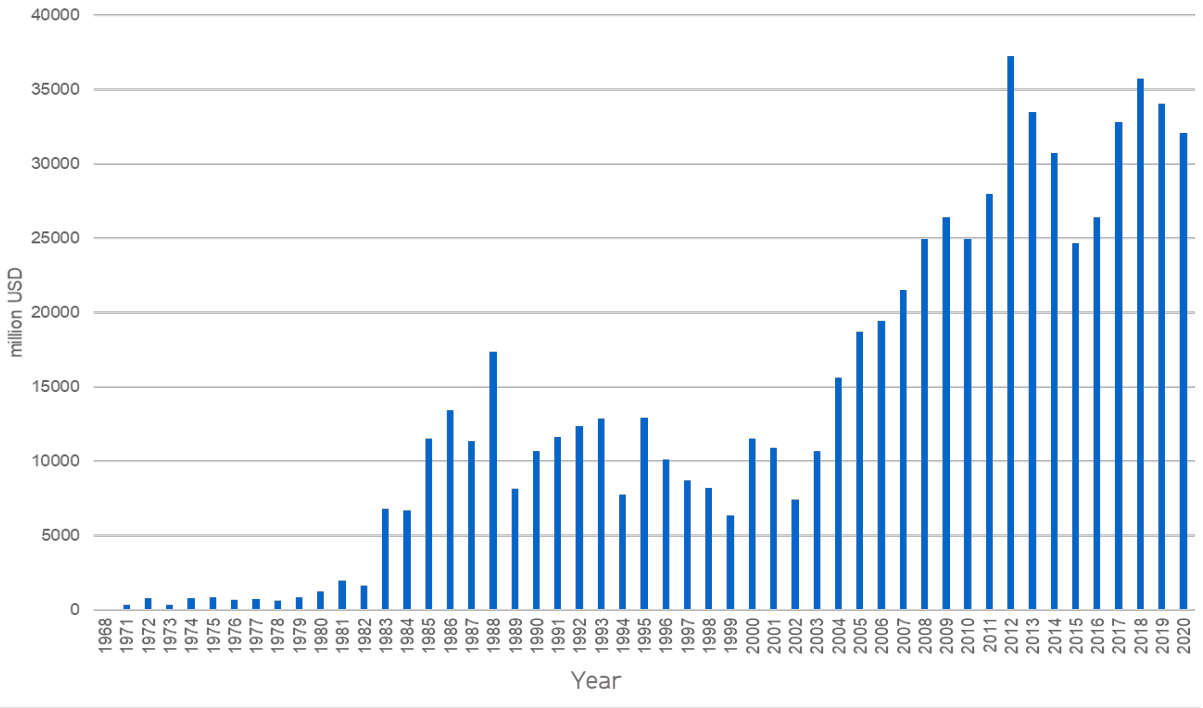
Development aid primarily consists of concessional finance in the form of grants and loans provided by the donors to the recipient countries.[3] It can focus on infrastructure development or on technical assistance to support recipient countries to improve their legal, regulatory, and policy frameworks, strengthen implementation capacities, and support institutional development in general. To drive private-sector investments, it can also include political risk insurances (guarantees) against certain noncommercial risks and support in dispute resolution.

[3] Loans are considered concessional when financial flows contain a minimum of a 25% grant element.

For example, in Accra, Ghana, a World Bank Group guarantee covering noncommercial risks enabled a $179.2 million investment to construct a desalination plant providing water to around 500,000 residents based on a 25-year build-own-operate-transfer basis (MIGABRIEF—Water, 2022).[4]

Overall, development aid in the water and sanitation sector has seen a strong increase since the 2000s (OECD, 2022), coinciding with the implementation of the Millennium Development Goals (MDGs), which were transformed to Sustainable Development Goals (SDGs) in 2016 (Figure 4). Between 2000 and 2020, official development aid increased from USD 11.5 billion to USD 32 billion, a 178% increase.

Figure 4: Total Official Development Aid (ODA) in Water Supply and Sanitation Provided to Recipient Countries (1968–2020).



Source: OECD (2022)

[4] The guarantee was provided by the Multilateral Investment Guarantee Agency (MIGA), part of the World Bank Group.

2.1.1.1. Key Benefits and Drivers

Development aid offers support to less developed countries to accelerate their socioeconomic progress by providing basic services and contributing to ensuring water security—foundations required for economic growth. Beyond the direct financial assistance and related benefits, development aid improves the overall investment climate by supporting the creation of sound regulatory frameworks, building capacity, and increasing public spending effectiveness, and thus it catalyzes, mobilizes, and crowds in additional public and private funds for development. Several factors drive donor countries to embark on development aid. First, supporting countries in addressing water stress can result in reduced conflicts and increased regional stability. Second, offering support to countries in need may propel their international standing and further enhance water diplomacy.

And lastly, depending on the conditions connected to development aid, the support may increase awarded contracts and production in the donor country as well as demand for their services and know-how. Some bilateral agreements offer preferential interest rates in exchange for agreeing to purchase products and services required to complete the financed project from the do - nor country. For example, the interest rate for the loan to build a desalination plant can be lower if the receiving country agrees to purchase a certain percentage of the goods and services required for its construction from the country offering the loan.

2.1.1.2. Delivery Mechanisms and Enablers

Countries in need of development aid typically reach out to multilateral and bilateral development organizations or directly to governments for support. This support can include both the development of specific infrastructure and the improvement of the country's governance. The eligibility and conditions of development aid often depend on the country's Gross Domestic Product (GDP) per capita. Less-developed countries will receive concessional finance at better conditions, i.e., lower interest rates and higher grant components, than middle-income countries. In general, support can be provided via (1) grants, (2) loans, (3) financial guarantees, and (4) technical assistance.

Grants are financial resources that are provided to developing countries free of interest and do not require repayment.

Loans are financial resources that must be repaid with interest but at a significantly lower rate than if developing countries borrowed from commercial banks, and with longer grace periods until the repayment starts.

Financial guarantees are insurances that can be bought by the private sector against certain noncommercial risks, such as war and civil unrest, expropriation, etc., and also include support in dispute resolution[5].

Technical assistance is support in improving the country's governance structure and capacity development, which can be complementary to a loan provided or paid for by the recipient country.

Before an agreement is made, donors conduct a series of analyses to understand what is required and whether the project is compliant with their requirements, including environmental impact assessments and more. These analyses may find that to develop the requested infrastructure, some sort of governance reforms may be required. For example, the development of large-scale irrigation infrastructure may require tariff reform for irrigation water or the development of a new organization that maintains and ensures sustainability.

While the donor will drive its due diligence of the project, development aid is most effective when the recipient country has ownership of the project and agreements exist to ensure continuation of the project once it is completed and handed over to the recipient country. Typically, the donor will agree on joint longer-term goals and national targets with the recipient country before embarking on the implementation (ADB, n.d.).

[5] Fees depend on insured project volume, country category, and expected risk.

2.1.2. Provision of Aid at the Companies and Utilities Level

Beyond the capacity-development activities provided by governments and multilateral agencies, other actors, such as water utilities, can engage in development aid in what is typically called water operators' partnerships (WOPs). WOPs harness the skills, knowledge, and goodwill within a developed utility that can be considered the "mentor" to build the capacity and improve the performance of another utility in a developing country that needs assistance or guidance.

2.1.2.1. Key Benefits and Drivers

The targeted and on-hands support of WOPs paves the way for financial sustainability, enhanced operational performance, and reliability in water services, as the more mature utility can support the less mature one in identifying underlying challenges and suggesting solutions, including training staff.[6] The receiving utility also gains insights on modern approaches, including new equipment, software, systems, and procedures, during field visits to the mentoring utility. For example, the partnership between Metro Cebu, Philippines, and City West Water, Australia, focuses on nonrevenue water reduction and improving operations performance; it resulted in Metro Cebu introducing asset management and being able to respond better overall to challenges they face. The key benefit for mentor utilities is that it is an effective way to execute their corporate social responsibility commitments while increasing the utility's international profile in a cost-effective way. The opportunity offers the mentoring company a chance to train their new joiners and provide them with international experiences while longtime employees experience a welcome change from their day-to-day work, increasing inspiration and motivation (GWOPA—UN Habitat 2012).

[6] Potential topics include high nonrevenue water, inefficient water supply systems, lack of distribution network integration, and mismanagement of financials.

2.1.2.2. Delivery Mechanisms and Enablers

First, the right mentor needs to be matched with the utility requesting support. This can be done through donors and development banks, by regional WOP platforms, or directly between the utilities. The Global Water Operators' Partnerships Alliance (GWOPA), for example, is an international network institutionally anchored within UN-Habitat that supports water operators through WOPs and offers peer support exchanges between two or more water operators on a not-for-profit basis (GWO - PA—UN Habitat, n.d.). Once matched, the current performance of the recipient utility is reviewed by the mentor to define key problems and agree upon recommended solutions.

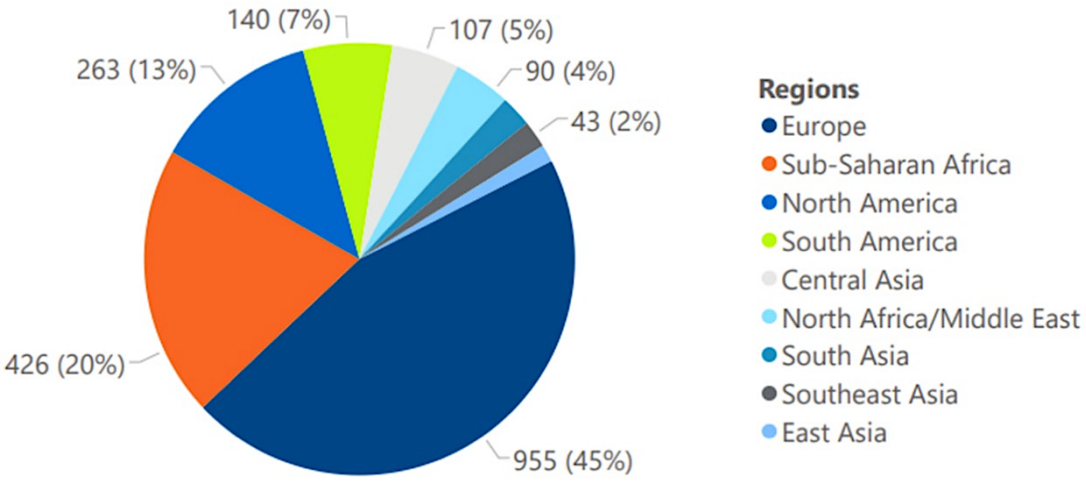
Partnerships can last a few months or even years. To achieve optimal results, the support needs to be tailored to the recipient utility, and the recipient utility needs to be com - mitted and allocate required financial and human resources to achieve the agreed targets. Compared to other forms of capacity-building activities or consultancies, the cost of WOPs is generally low, as operations are managed at cost and no profits are expected. Twinning can happen between utilities in developed and developing countries or between utilities that are both located in developing countries.

2.2. Transboundary Water Management

Transboundary water management takes place when two or more countries sharing freshwater resources start cooperating. The cooperation can range from informal agreements to signing legal treaties, developing joint commissions, and setting up courts for arbitration. Transboundary water cooperation manages resources use, pollution, land use management, and infrastructure development to create win-win solutions for neighboring countries and avoid any conflict potential over water resources.

Between 1820 and 2007, around 1,940 treaties have been signed across the world (Figure 5). The majority of the treaties were signed between European countries (45%), followed by countries in sub-Saharan Africa (20%) and North America (13%).

Figure 5: Overview of International Freshwater Treaties Signed Between Countries, by Region (1820–2007)



Source: Oregon State University (n. d.)

2.2.1. Key Benefits and Drivers

Across history, water has often been a powerful incentive to drive cooperation and dialogue, bringing together even hostile stakeholders. Over the past 50 years, around 37 cases of violence between states over water were reported, while more than 200 water treaties have been negotiated (UN-Water, 2013). Some of these, such as the Indus Waters Treaty between India and Pakistan, show strong resilience and have remained operational even in times of war between the signatories (UN-Water, 2013).

Around 60% of global freshwater resources are shared across transboundary basins, i.e., across countries, providing water to about 42% of the population (Global Water Partnership, 2020). Disputes can arise between upstream and downstream countries on how to equitably share

water resources, manage pollution, and develop infrastructure, such as dams; Transboundary cooperation can avoid conflicts and pave the way for win-win solutions such as building a hydropower dam upstream and sharing the energy generated. Successful transboundary cooperation can result in accelerated economic growth, improved human well-being, enhanced environmental sustainability, and increased political stability (UN-Water, 2013).

2.2.2. Delivery Mechanisms and Enablers

Transboundary agreements are typically legal agreements based on two international water laws, namely the UN Convention on the Law of the Non-Navigational Uses of International Watercourses and the UN General Assembly Resolution on the Law of Transboundary Aquifers. Transboundary cooperation starts with an analysis of potential benefits, costs, and requirements for the concerned parties. If parties agree to move ahead, the parties negotiate benefit and cost-sharing arrangements and joint projects, which are finalized in the legal agreements. Alignment on the agreement terms, such as water sharing, can take place directly between the concerned countries or through a mediator in cases of contested transboundary basins. This was the case, for example, in the Indus Waters Treaty—the World Bank spent nine years brokering the agreement between India and Pakistan (Bauer, 2022).

For effective management of the treaty, concerned countries typically establish a permanent commission, e.g., the Permanent Indus Commission, consisting of representatives of all transboundary parties as a mechanism for cooperation, project execution, and information exchange. Members of the permanent commission meet at least once a year and whenever requested by the commissioner. Further, a court of arbitration can be set up to solve any disputes that may arise.

2.3 Advancement of Research, Development, and Innovation (RDI)

To drive RDI, multiple players can cooperate, including universities, utilities, the private sector, development aid organizations, and even government entities. Cooperation can include simple collaborative research and extend to joint development and commercialization of prototypes—transforming research into practice.

2.3.1. Key Benefits and Drivers

International cooperation around RDI allows the pooling of resources to tackle challenging problems. Typically, research departments across utilities, universities and the private sector tend to focus on specific core areas due to their limited resources. These core research areas differ across institutes and countries. Moreover, RDI collaboration brings synergies as it leads to an exchange of ideas and the creation of an output that individual parties could not have reached. It can act as a catalyst for growth, and rapidly developing knowledge economies. For example, a partnership between the University of Manchester (UK) and Khalifa University of Science and Technology (UAE) resulted in the development of graphene-based membranes to enhance the desalination processes.

2.3.2. Delivery Mechanisms and Enablers

International water cooperation around RDI can be either bilateral or involve multiple countries—e.g., in the EU, wide research projects such as the European Commission Framework Programs[7] or the Partnership for Water Cooperation and Diplomacy across eight universities globally.[8]

Cooperation can be formal or informal. For instance, stakeholders can sign a "Declaration of Interests" or contracts to formalize long-term cooperation. On the other hand, collaborations can be arranged informally to work on research projects jointly. Cooperation is typically time-specific and can range from short-term engagements to multi-year engagements to allow for more extensive research to tackle key challenges.

Key to successful execution is a clear agreement on a problem statement, targets to be achieved, and ensuring the availability of funding until project completion. Funding is typically pooled from government entities, investment funds, private-sector companies, development banks, or RDI funding agencies.

[7] Framework programs are the main financial tool to support research and development activities across all disciplines in the European Union.

[8] The partnership focuses on socioeconomic and geopolitical issues in shared water management locally, regionally, and globally.

2.4. Improvement of Urban Water Planning

To address emerging challenges around urban water management, cities facing similar water-related challenges can enter into twinning agreements or join a city-based partnership network to jointly develop new and innovative solutions and share lessons learned.

2.4.1. Key Benefits and Drivers

Historical development pathways for cities are often unsuitable for planning future urban water systems as they fail to consider the challenges emerging from climate change and rising populations. While water management has been traditionally just the responsibility of water utilities, new challenges require water management to be looked at across sectors and multiple stakeholders. City-to-city cooperation allows learning from best practices globally to generate novel urban solutions required for a paradigm shift in urban water management.

2.4.2. Delivery Mechanisms and Enablers

While city-to-city cooperation can take the form of twinning two cities that support each other, the creation of a wider network of cities across the world is more frequent.

The city networks offer a knowledge-exchange platform in which cities can share their challenges and solutions. Networks engage in joint research to identify priority themes and share best practices. Further, they can bring together players across sectors and cities, including government officials, urban planners, water service providers, consultants, and civil society organizations in multi-stakeholder platforms to understand underlying challenges their cities face and identify actionable solutions.

The city networks are typically initiated by a sponsor, with the intention that the cities see value in the network and continue it on their own. For example, the Sustainable Water Management Improves Tomorrow's Cities Health (SWITCH) project was initiated by the European Commission and created a network across cities in 12 countries. Their goal was to identify the "city of the future" and promote more sustainable alternatives to the conventional ways of managing urban water (Butterworth, McIntyre, and da Silva Wells, 2011).

Another example is the 100 Resilient Cities (100RC) initiative that was pioneered and funded by the Rockefeller Foundation in 2013. The 100RC initiative resulted in transformational change in cities by offering support in developing resilience plans as well as for early implementation of projects. Once the Rockefeller Foundation support ended in 2019, around 30% of the member cities continued to drive the network, calling it the Resilient Cities Network (R-Cities).[9]

To ensure the efficient functioning of these networks, a dedicated team is required to lead activities within each city. In addition, a management team or international institution is required to manage the network across cities, specifically focusing on project management, international knowledge sharing, monitoring, evaluation, funding, and other key tasks. If the city network was initiated by an entity as part of a time bound project, care needs to be taken to organize engagements and institutional structures in a manner that allows the network to continue after the project has ended.

[9] (Resilient Cities Network, n.d.).

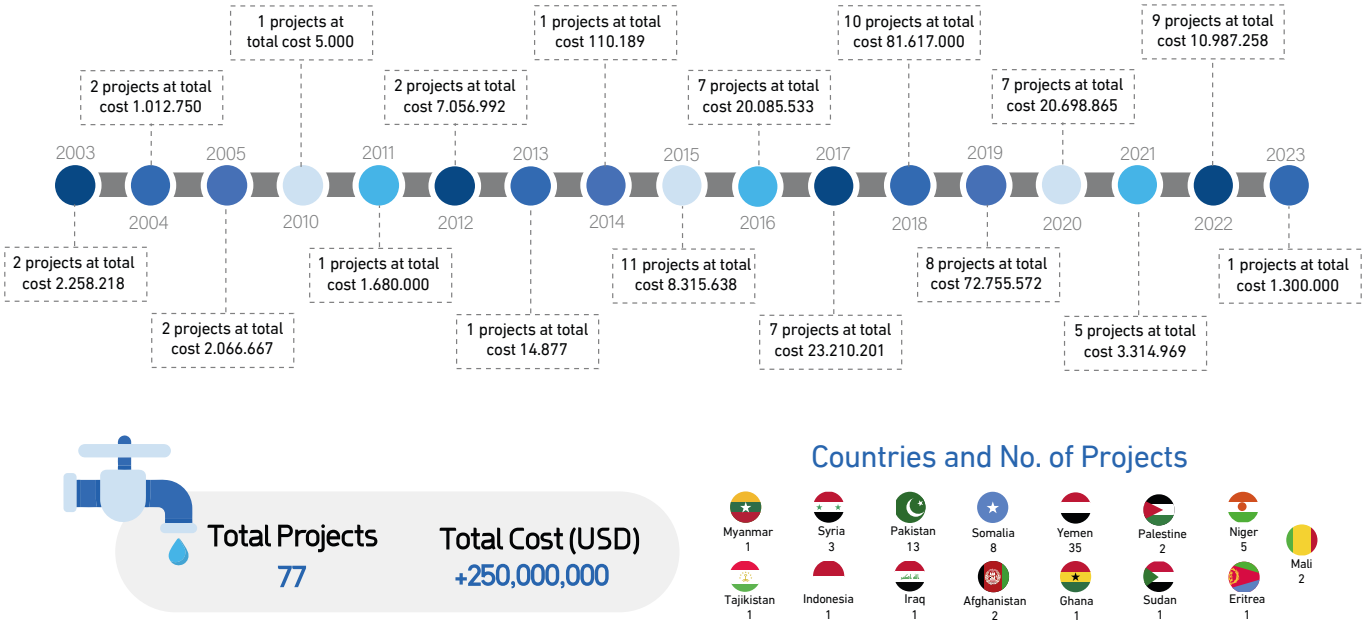
3. International Water Cooperation Around Desalination

International water cooperation focusing on desalination has increased over the past few years—and may even have the potential to contribute to peace in regions suffering from tensions over water resources. A few examples of international cooperation around desalination are mentioned below.

3.1. Provision of Aid to Developing Countries

Desalination can be an important tool to support countries in their socioeconomic development. For example, King Salman Humanitarian Aid and Relief Center (KSrelief), The center's activities are founded upon noble fundamental humanitarian goals and principles. Elements needed to carry out the programs, the highly coordinated and advanced transportation of aid through highly trusted UN agencies and local and international non-profit organizations in the recipient countries. General Statistics about relief Projects (completed – ongoing) Until 31- December – 2022 by Water, Sanitation and Hygiene Sector (Figure 6).

Figure 6: General Statistics about relief Projects (completed – ongoing) Sanitation and Hygiene Sector



Source: King Salman Humanitarian Aid and Relief Center.

Also, the Kuwait Fund for Arab Economic Development is financing four desalination projects (20.5 million m^3/year) at a cost of around USD 50 billion for the South Sinai Governorate in Egypt (Kuwait Fund, 2019). And the World Bank and the Kuwait Fund for Arab Economic. Development is financing the Gaza Central Desalination Program, which will provide around 55 million m^3/year, to provide desalinated water for all of Gaza (World Bank, 2020).[10]

3.2. Transboundary Water Management

Mexico and the State of Arizona, USA, are considering constructing a binational desalination plant as increasing demands of the shared Colorado River are making it challenging to ensure that Mexico—which is downstream of Arizona—receives its fair share of water. The binational desalination plant would provide desalinated water to both Mexico and Arizona (IBWC, 2020).[11] Moreover, Saudi Arabia and Jordan are exploring the possibility of cooperating around the planned city of NEOM, which is located close to Jordan, on critical areas including energy and water desalination along the Red Sea (Omari, 2022).

3.3. Advancement of Research, Development, and Innovation (RDI)

International cooperation on RDI in desalination can be conducted in the form of partnerships with governments, corporations, utilities, and development aid organizations. The following paragraphs will discuss select examples.

[10] World Bank is contributing USD 42 million; Kuwait Fund is contributing USD 60 million.

[11] Construction is pending based on the financing gap (Campa, 2022).

4. Enabling the Framework for Setting Up International Water Cooperation

To develop successful international water cooperation that addresses water challenges sustainably, typically four requirements need to be met (Figure 7).

Figure 7: Requirements for a Successful International Water Cooperation.

Source: Team analysis

4.1. Alignment of Interests

To kick start and maintain long-term cooperation, clear mutual benefits—monetary or non-monetary—need to be evident throughout the project. Monetary benefits can include sharing the profits of a jointly developed technology or grants and preferential interest rates for loans. Nonmonetary benefits can include shared recognition, technology transfer, human capital development, and collaboration on RDI.

Engaging in water partnership activities requires the right coordination. To do this, an in-depth stakeholder analysis should be conducted to identify and appoint the right custodians for the identified roles. Partnerships can then be formalized with memorandum of understanding (MOU) or contractual agreements to ensure that benefits to both parties will materialize. For example,

SWCC supports the growth of the desalination industry at the lowest economic and environmental cost, through partnerships and agreements existing between SWCC and many entities to benefit from the outputs and to meet national and global challenges, and to make a tangible societal impact.

4.2. Clarity of Delivery Mechanisms, Roles, and Responsibilities

Achieving the targets and objectives identified for international cooperation requires a clear implementation setup, as well as well-defined roles and responsibilities across all parties.

A good implementation setup includes a dedicated steering committee (supervisory) and working teams (executional). The steering committee reviews progress and key deliverables, resolves issues and risks, and provides overall guidance. The working teams execute the guidance provided by the steering committee and meet as needed to discuss progress, review deliverables, and make decisions. Any issues and risks will be escalated by the working teams to the steering committee to receive further guidance. It is important that decision-making is open and transparent. Achieving the targets and objectives identified for international cooperation requires a clear scope of work.

It typically sets out milestones, deliverables, and end products that are expected and define roles. A clear definition of each entity's roles and responsibilities helps eliminate misalignment and disagreements and gives each entity control of its domain.

Depending on the objectives of the water cooperation, some more extensive institutional structures may be required. For example, if the water cooperation includes twinning utilities or cities to support each other, a digital platform to connect the players may be required, e.g., a WOP. If, on the other hand, the water cooperation requires bringing together a wide range of stakeholders, the setup of a multi-stakeholder platform can be considered. In the latter case, key stakeholders across the public and private sectors, as well as civil society, are identified. Jointly, these stakeholders will prioritize challenges and identify solutions collaboratively, e.g., the 2030 Water Resources Group.

4.3. Allocate Financial and Human Resources

To ensure successful cooperation, it is critical to secure required budgets for the entire lifecycle to avoid a premature closure—without results— when the money runs out. A survey conducted by UN-Water high - lighted that obtaining financing ranks “high” or “highest” when establishing cooperation (UN-Water, 2013). Some financing mechanisms and sources used for water cooperation can include national budgets, external bilateral or multilateral do - nor-funded pro jects, strategic programs and funds, and private public partnerships. Further, to successfully drive the execution of the scope of work, relevant parties should ensure the availability of a dedicated team that has specific time blocked for this cooperation. Otherwise, daily tasks and urgent deadlines typically get priority.

4.4. Active Partnership Management

Partnerships do not manage themselves, so to ensure an effective execution, the partnership should be actively managed. This includes ensuring continuous interactions, communication and knowledge sharing, as well as monitoring and evaluation.

To ensure continuous interactions, progress meetings need to be conducted frequently. This allows participants to confirm that the right direction is followed and resolve any roadblocks early on. Further, communication and knowledge sharing are key in any relationship, including international water cooperation. Relevant stakeholders should have equal access to knowledge and information through joint data management systems, regular communication channels, and collaboration tools. Managing and sharing knowledge effectively closes the knowledge gap faced between relevant stakeholders and enables access to information more rapidly. This allows for higher growth and innovation, reduces cost, and establishes trust among relevant parties.

> External communication on the cooperation and establishing an international presence allows the creation of a strong global network in the water sector that can eventually translate into further partnerships and cooperation.

An international presence can take on many forms, from attending and/or leading conferences and events to establishing a dedicated office in target markets. To ensure that the cooperation is on track to meet its objectives, continuous review and evaluation of performance against identified objectives, targets, and KPIs is required.

4.4.1. Government Partnership

In advancing the thinking of the desalination industry, the Ministry of Environment, Water, and Agriculture (MEWA) in Saudi Arabia and the Department of Energy (DOE) in the USA signed a Memorandum of Understanding (MOU) on establishing long-term cooperation to jointly develop the desalination strategy, exchange expertise, and enhance capacity building. Furthermore, the Saline Water Conversion Company (SWCC) in Saudi Arabia started to cooperate with the Ministry of Natural Resources in China to develop new and innovative technologies targeting energy and environmental impact reduction requirements for desalination (SWCC, n.d.).

4.4.2. Corporate Partnership

Another way to drive innovation as a government/water agency is to start cooperating with corporations. For example, ENOWA, the energy, water, and hydrogen subsidiary of the planned city of NEOM in Saudi Arabia, started a cooperation with the Japanese trading company ITOCHU and French water, waste, and energy management solutions company Veolia to jointly develop a first-of-its-kind desalination plant powered by 100% renewable energy (NEOM, 2022).

4.4.3. Utility Partnership

Singapore's national water agency PUB partnered with SWCC in Saudi Arabia to share best practices and focus on driving innovation around desalination technology, energy reduction, water management systems (SCADA), leak detection, nonrevenue water, and automated metering (water: desalination reuse, 2017).

4.4.4. Development Aid Partner - ship

In driving innovation, the Middle East Desalination Research Center (MEDRC) and USAID are funding the Oman Humanitarian Desalination Challenge, which aims to develop (1) a hand-held, off-grid desalination device that can be rapidly deployed in the aftermath of a humanitarian

crisis, and (2) a family-size desalination device (MEDRC, n.d.). Similarly, US - AID, the Swedish International Development Agency, and the Dutch Ministry of Foreign Affairs started the Desal Prize, which will award a prize of up to USD 500,000 to individuals or organizations that develop cost-effective and energy-efficient desalination technologies for brackish water and will further provide seed funding for prototype development (U.S. Embassy in Chile, 2014).

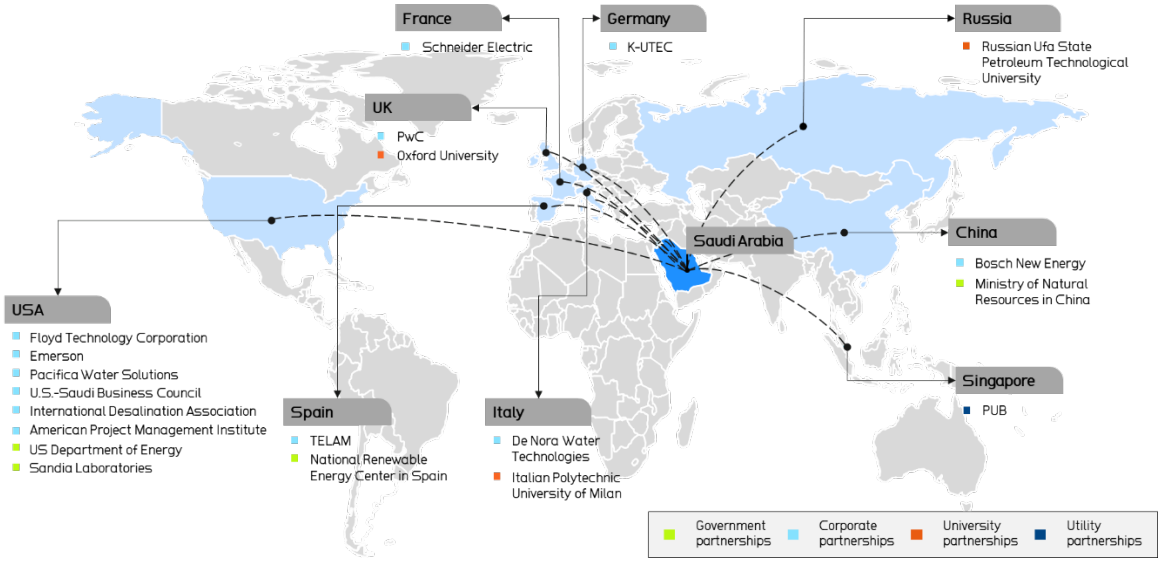
5. SWCC's Experiences on Water Cooperation and Potential for the Future

The Saline Water Conversion Cooperation has been responsible for providing desalinated water to the Kingdom of Saudi Arabia since 1974—nearly half a century. Today, SWCC manages the biggest desalination production capacity in the world and set the Guinness World Re - cord for the lowest energy consumption (2.271 kWh per cubic meter) required for desalination (Kaddoura, 2021).

5.1. SWCC's Current Partnerships

SWCC has partnered with entities around the topic of desalination across nine countries globally (Figure 8). These partnerships were mostly focused on RDI and were formed with other governments, utilities, universities, and corporations (see Table 1 for details).

Figure 8: SWCC's Global Partnerships on International Water Cooperation



Source: Saline Water Conversion Corporation (SWCC),

Partnership Type	Entity Name	Country	Details/Objectives of Partnership
Government Partnerships	Ministry of Natural Resources in China	China	Agreement to develop new and innovative technologies that reduce the environmental impact of desalination(i)
	US Department of Energy	USA	MOU to increase the energy efficiency of desalination[(i)].
	US Department of Energy (Sandia Laboratories)	USA	Partnership to drive research and development of innovative reverse-osmosis membranes, corrosion-resistant materials, analyses, and monitoring technologies[(i)]
	National Renewable Energy Center in Spain (CENER)	Spain	MOU to conduct joint research work in the field of desalination with renewable energies[(i)]
Utility Partnerships	Public Utilities Board (PUB)	Singapore	Partnership to share best practices and focus on driving innovation around desalination technology, energy reduction, water management systems (SCADA), leak detection, nonrevenue water, and automated metering[(ii)]
University Partnerships	Oxford University	UK	Potential cooperation on research on innovative desalination [(i)]
	Russian Ufa State Petroleum Technological University	Russia	Partnership on brine mining and high-pressure pumps[(i)]
	Italian Polytechnic University of Milan	Italy	Partnership on innovative desalination technologies[(iii)]
	National Institute of Ocean Technology	India	Potential cooperation on research on the future technologies in the field of seawater desalination
	University of Science and Technology (AGH)	Poland	MoU to enhance cooperation between both parties in the field of seawater and brackish water desalination technologies powered by renewable energy sources.
	Shinshu University	Japan	MoU to Develop/ optimize/Design of Seawater Reverse Osmosis (SWRO) technologies and Innovative Technologies Development, such as Zero Liquid Discharge (ZLD), Seawater Nano Filtration (SWNF)

Corporate Partnerships	UralTechProm (UTP)	Russia	Partnership on brine mining and high-pressure pump and desalination technology
	Floyd Technology Corporation	USA	MOU to drive the production of high-quality and highly concentrated brine solutions that are suitable for the chlor-alkali industry required in Saudi Arabia and especially in Aramco's affiliated institutions[i]
	Pacifica Water Solutions	USA	Partnership resulted in the development of RO membranes, zero brine discharge technology, and prototyped Nano-membranes[iv]
	Emerson	USA	Partnership to drive the digitization of SWCC's operations[iv]
	American Project Management Institute (PMI)	USA	MOU to develop SWCC's competencies in project management[iv]
	U.S.-Saudi Business Council	USA	Partnership to host a roundtable meeting with notable American water companies to explore their potential to start production in Saudi Arabia, in line with Saudi Arabia's localization efforts[v]
	International Desalination Association (IDA)	USA	Cooperation to organize conferences and workshops, such as the "International Conference on Saline Water Mining" [vi]
	K-UTEC	Germany	Cooperation on zero brine discharge[i]
	TELAM	Spain	Focused on developing new and advanced desalination technologies[i]
	Schneider Electric	France	Goal to develop AI applications for desalination production systems[iv]
	Bosch New Energy	China	Research cooperation agreement around solar energy to push the agenda on renewable energy[iv]
	PwC	UK	Cooperation with PwC as a knowledge partner to organize "Future of Desalination" conference[vi]
	De Nora Technologies	Italy	Partnership focused on brine mining[vii]

Sources: (i) Saline Water Conversion Corporation (SWCC), n.d., (ii) water: desalination+ reuse, 2017, (iii) Saudi Press Agency, 2022, (iv) SWCC Sustainability Report 2021, 2021, (v) U.S.-Saudi Business Council, 2022, (vi) H2O Global News, 2022 (vii) De Nora, 2022,

5.2. Potential Areas to Expand SWCC's International Cooperation

As well as with Saudi philanthropic development aid efforts, such as the King Faisal and King Khalid Foundations, to identify regions where desalination can contribute to socioeconomic development and offer required support", not memorandum into the agreement between the King Salman Humanitarian Aid & Relief Center & SWCC, which signed in 2022.

The agreement aims to provide KSRELIEF with technical and logistical support for the water and environmental sanitation projects of the Center around the world, and to benefit from KSRELIEF expertise in supplying future stations, "mobile water desalination systems" for the Center's projects. And training technical personnel to operate and maintain desalination plants, in addition to supporting voluntary programs outside the Kingdom and raising awareness of the role of the center and its relief and humanitarian activities.

Given SWCC's longstanding expertise in the desalination field, there is potential to further expand and drive SWCC's international collaboration to support these regions.

> **SWCC would like to cooperate with King Salman Humanitarian Aid & Relief Center, the World Bank and UNICEF to build and operate small scale desalination plants (Mobile) and to provide consultations and transfer expertise's to developing countries and rural**

SWCC is currently exploring different avenues on how this international cooperation can be taken forward. For one, SWCC can identify potential regions of interest and position these to MEWA and MOFA to initiate formal, a bilateral collaboration between countries. Further, there is potential to cooperate with multilateral development banks, such as the Islamic Development Bank, World Bank, as well as with Saudi philanthropic development aid efforts, such as King Faisal and King Khalid Foundations, to identify regions where desalination can contribute to socioeconomic development and offer the required support. In line with increased localization efforts of critical desalination components, Saudi Arabia will also be in a good position to provide materials required for desalination construction to recipient countries—potentially shortening supply chains and reducing overall costs of development aid efforts.

Given SWCC's extensive expertise, there is significant potential to expand the peer-to-peer cooperation and take a mentoring role for other utilities operating—or planning to operate—desalination plants. To optimize its peer-to-peer capacity development, SWCC can leverage the Saudi Water Academy and offer tailored training courses for its partner utilities. SWCC can also explore partnering with Development Aid Organizations, such as Islamic Development Bank and World Bank, to develop tailored training courses for utilities in developing countries that are part of the development organizations' technical and capacity-building assistance. While supporting countries in need, this can also support Saudi Arabia in developing political ties and strengthening regional water security and cooperation in the Middle East.

References

2020. *Binational Study of Water Desalination Opportunities in the Sea f Cortez.* TM1: Water Supply Availability and Demand Analysis. [online] Available at <https://www.ibwc.gov/Files/TMs_All_Portfolio.pdf> [Accessed 19 October 2022].

Bauer, P., 2022. *Indus Waters Treaty.* [online] Britannica. Available at <https://www.britannica.com/event/Indus-Waters-Treaty> [Accessed 19 October 2022].

Butterworth, J., McIntyre, P. and da Silva Wells, C., 2011. *SWITCH in the city.* [online] The Hague, The Netherlands: IRC International Water and Sanitation Centre. Available at <https://www.ircwash.org/sites/default/files/Butterworth-2011-SWITCH_13.pdf> [Accessed 19 October 2022].

Campa, A., 2022. As Lake Powell Hits Landmark Low, Arizona Looks to a $1 Billion Investment and Mexican Seawater to Slake Its Thirst. [online] Inside Climate News. Available at https://insideclimatenews.org/news/20032022/lake-powell-water-drought-arizona-desalination/ [Accessed 19 October 2022].

da Silva Wells, C., 2009. *Twinning: boosting performance in Asian water utilities.* [online] IRC. Available at <https://www.ircwash.org/blog/twinning-boosting-performance-asian-water-utilities> [Accessed 19 October 2022].

De Nora. 2022. *De Nora signs MOU with SWCC.* [online] Available at <https://denora.com/media/press-release/2022/De-Nora-signs-MOU-with-SWCC.html> [Accessed 19 October 2022].

Dutch Water Sector. 2017. *Seawater desalination in Jordan begins with training by IHE Delft.* [online] Available at <https://www.dutchwatersector.com/news/seawater-desalination-in-jordan-begins-with-training-by-ihe-delft> [Accessed 19 October 2022].

Euro-Mediterranean Information System on know-how in the Water sector. 2008. *EUROMED 2008: Desalination Cooperation among Mediterranean Countries of Europe and the MENA Region.* [online] Available at <http://www.emwis.org/thematicdirs/events/2008/11/sev554153> [Accessed 19 October 2022].

Geneva Water Hub. n.d. *Universities Partnership for Water Cooperation and Diplomacy.* [online] Available at <https://www.genevawaterhub.org/platforms/universities-partnership-water-cooperation-and-diplomacy> [Accessed 19 October 2022].

Global Water Partnership, 2020. *Transboundary Water Cooperation.* [online] Available at <https://www.gwp.org/en/we-act/themesprogrammes/Transboundary_Cooperation/> [Accessed 19 October 2022].

GWOPA—UN Habitat. n.d. *Connecting water and sanitation service providers to improve services for all.* [online] Available at <https://gwopa.org/> [Accessed 19 October 2022].

GWOPA–UN Habitat. 2012. Water Operators' Partnerships in Asia. [online] Available at https://unhabitat.org/sites/default/files/download-manager-files/Water%20Operators%20Partnerships%20in%20Asia%20%2C%20Case%20Study%201%20Metro-Cebu%20Water%20District%2C%20Philippines%20and%20City%20West%20Water%2C%20Australia.pdf [Accessed 19 October 2022].

H2O Global News. 2022. *De Nora sponsors SWCC IDA Innovation Conference*. [online] Available at <https://h2oglobalnews.com/de-nora-sponsors-swcc-ida-innovation-conference/> [Accessed 19 October 2022].

IHE Delft Institute for Water Education. n.d. *Online Course on Desalination and Membrane Technology*. [online] Available at <https://www.un-ihe.org/online-course-desalination-and-membrane-technology-0> [Accessed 19 October 2022].

Kaddoura, M., 2021. *World's lowest energy water desalination plant built in Saudi desert* [online] Guinness World Records. Available at <https://www.guinnessworldrecords.com/news/commercial/2021/3/worlds-lowest-energy-water-desalination-plant-built-in-saudi-desert-653013> [Accessed 19 October 2022].

Kuwait Fund, 2019. *Four desalination plants to be built in Egypt with Kuwait Fund financing*. [online] Smart Water Magazine. Available at <https://smartwatermagazine.com/news/kuwait-fund/four-desalination-plants-be-built-egypt-financing-kuwait-fund> [Accessed 19 October 2022].

MEDRC. n.d. *USAID to Support MEDRC Desalination Innovation Drive*. [online] Available at <https://www.medrc.org/usaid-to-support-medrc-desalination-innovation-drive/> [Accessed 19 October 2022].

MIGABRIEF—Water, 2022. *MIGA: Guaranteeing Investments in Water and Sanitation Projects*. [online] Available at <https://www.miga.org/sites/default/files/2018-06/waterbrief.pdf> [Accessed 19 October 2022].

Ministry of Foreign Affairs Singapore. n.d. *Water Agreements*. [online] Available at <https://www.mfa.gov.sg/SINGAPORES-FOREIGN-POLICY/Key-Issues/Water-Agreements> [Accessed 19 October 2022].

n.d. *Working together for more effective development cooperation*. Multilateral Development Banks. [online] ADB. Available at <https://www.adb.org/sites/default/files/mdb-brochure.pdf> [Accessed 19 October 2022].

NEOM. 2022. *ENOWA, ITOCHU and Veolia sign MoU to build new generation of desalination plant powered by 100% renewable energy in NEOM*. [online] Available at <https://www.neom.com/en-us/newsroom/build-generation-of-desalination-plant> [Accessed 19 October 2022].

OECD, 2018. Financing water—Investing in sustainable growth. *OECD Environment Policy Paper,* [online] 11(2309-7841). Available at <https://www.oecd.org/water/Policy-Paper-Financing-Water-Investing-in-Sustainable-Growth.pdf> [Accessed 19 October 2022].

OECD, 2022. *Official bilateral commitments by sector.* [online] OECD iLibrary. Available at <https://www.oecd-ilibrary.org/development/data/oecd-international-development-statistics/official-bilateral-commitments-by-sector_data-00073-en> [Accessed 19 October 2022].

OECD.Stat. 2020. *Aid (ODA) by sector and donor [DAC5].* [online] Available at <https://stats.oecd.org/viewhtml.aspx?datasetcode=TABLE5&lang=en#> [Accessed 19 October 2022].

Omari, R., 2022. *Saudi-Jordanian cooperation 'a role model' for the entire Middle East.* [online] Arab News. Available at <https://www.arabnews.com/node/2108456/middle-east> [Accessed 19 October 2022].

Oregon State University College of Earth, Ocean, and Atmospheric Sciences & Program in Water Conflict Management and Transformation, n.d. International Freshwater Treaties Database. [online] Available at <https://transboundarywaters.science.oregonstate.edu/content/international-freshwater-treaties-database> [Accessed 31 October 2022].

Philippine Statistics Authority. 2022. *How are the Sustainable Development Goals different from MDGs?.* [online] Available at <https://psa.gov.ph/content/how-are-sustainable-development-goals-different-mdgs#:~:text=Unlike%20the%20MDGs%2C%20which%20only,framework%20in%20achieving%20the%20SDGs> [Accessed 19 October 2022].

Resilient Cities Network, n.d. Our Story. [online] Available at <https://resilientcitiesnetwork.org/our-story/>

Saline Water Conversion Corporation (SWCC). n.d. *SWCC and the Chinese Ministry of Natural Resources in tandem have initiated the development of a cutting-edge technology for seawater desalination - SWCC.* [online] Available at <https://www.swcc.gov.sa/en/News/NewsDetails/11> [Accessed 19 October 2022].

Saline Water Conversion Corporation (SWCC). n.d. *"SWCC" Inspires the World and Sets a Roadmap for the Future of Water.* [online] Available at <https://www.swcc.gov.sa/en/News/NewsDetails/1071> [Accessed 19 October 2022].

Saudi Press Agency. 2022. *SWCC Delegation Visits Polytechnic University of Milan.* [online] Available at < https://www.spa.gov.sa/viewfullstory.php?lang=en&newsid=2391896> [Accessed 19 October 2022].

Shubber, S., n.d. *Agreement Between the Government of the Hashemite Kingdom of Jordan and the Government of the Kingdom of Saudi Arabia for the Management and Utilization of the Ground Waters in the Al-Sag/Al-Disi Layer. [online] International Water Law.* Available at <https://www.internationalwaterlaw.org/documents/regionaldocs/Disi_Aquifer_Agreement-English2015.pdf> [Accessed 19 October 2022].

Smart Water Magazine. 2020. *Saudi Arabia's MEWA and US DOE sign MoU on cooperation in the field of desalination.* [online] Available at <https://smartwatermagazine.com/news/smart-water-magazine/saudi-arabias-mewa-and-us-doe-sign-mou-cooperation-field-desalination> [Accessed 19 October 2022].

UN Water, n.d. Sustainable Development Goal 6 on water and sanitation (SDG 6). [online] Available at https://sdg6data.org/en [Accessed 31 October 2022]

UN Water, 2013. *Water cooperation in action: approaches, tools and processes.* [online] Zaragoza. Available at <http://www.zaragoza.es/contenidos/medioambiente/onu/1027_eng_water_cooperation_in_action.pdf> [Accessed 19 October 2022].

UN Water, 2021. *Summary Progress Update 2021: SDG 6 — water and sanitation for all.* [online] Geneva, Switzerland. Available at <http://www.zaragoza.es/contenidos/medioambiente/onu/1027_eng_water_cooperation_in_action.pdf> [Accessed 19 October 2022].

UN Water, 2021. Charts: SDG 6 Data. [online] Available at <https://sdg6data.org/en/charts/column> [Accessed 31 October 2022].

UNESCO, International Groundwater Resources Assessment Centre, and World Meteorological Organization, 2021. *Transboundary aquifers of the world, update 2021.* [online] UNESDOC Digital Library. Available at <https://unesdoc.unesco.org/ark:/48223/pf0000380193> [Accessed 19 October 2022].

Universities Partnership for Water Cooperation and Diplomacy. n.d. *Who we are.* [online] Available at <https://upwcd.org/who-we-are> [Accessed 19 October 2022].

U.S.-Saudi Business Council. 2022. *U.S.-Saudi Business Council, SWCC Forge New Relationships in the Growing Saudi Water Industry.* [online] Available at <https://ussaudi.org/u-s-saudi-business-council-swcc-forge-new-relationships-in-the-growing-saudi-water-industry/> [Accessed 19 October 2022].

U.S. Embassy in Chile. 2014. *USAID and Swedish, Dutch Agencies Partner for Desalination Prize.* [online] Available at <https://cl.usembassy.gov/usaid-swedish-dutch-agencies-partner-desalination-prize/> [Accessed 19 October 2022].

King Salman Humanitarian Aid and Relief Centre: General Statistics about KSrelief Projects (completed – ongoing). *https://ksrelief.org/Statistics/ProjectSectorDetails/7* [Accessed 1 January 2023].

water: desalination+reuse. 2017. *PUB partners with SWCC and Water Corporation on shared challenges | desalination.* [online] Available at <https://www.desalination.biz/projects/pub-partners-with-swcc-and-water-corporation-on-shared-challenges/?register=success> [Accessed 19 October 2022].

World Bank. 2018. *Fact Sheet: The Indus Waters Treaty 1960 and the Role of the World Bank.* [online] Available at <https://www.worldbank.org/en/region/sar/brief/fact-sheet-the-indus-waters-treaty-1960-and-the-world-bank> [Accessed 19 October 2022].

World Bank. 2020. *World Bank and Partners Invest US$117 million in Water for Palestinians in Gaza.* [online] Available at <https://www.worldbank.org/en/news/press-release/2020/02/10/world-bank-and-partners-invest-us117-million-in-water-for-palestinians-in-gaza> [Accessed 19 October 2022].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