

CATALYZING REGIONAL COOPERATION ON WATER NEXUS SOLUTIONS IN A POST-COVID MEDITERRANEAN

WATER POLICY BRIEF



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1. ABSTRACT

Water availability is a key factor for human development and security in the Mediterranean. Decreased water supply due to desertification and climate change, and increased water demand due to population trends, migratory flows and economic development can aggravate water scarcity. Water is also related to energy and food resources in the region, which are all in a critical situation. Given such interdependencies, no country in the region can master these challenges by itself. Mediterranean countries would benefit from enhanced cooperation, including new methods of water management, to deal with water challenges using a nexus approach. This brief capitalizes on Center for Mediterranean Integration (CMI) research and dialogues on the water security nexus in the Maghreb region, making the link with other nexus and wider water issues in the Southern and Eastern Mediterranean (SEM) region (Maghreb and Mashreq). The main goals are to provide an improved understanding of water challenges and interrelations, to highlight crucial factors influencing resource availability that need to be taken into consideration, to discuss the importance of collaboration across countries and regions, and to provide recommendations for policymakers to move towards improved regional cooperation on nexus solutions. Recommendations include launching a Mediterranean dialogue process on water nexus solutions, empowering local territories in water management decisions, strengthening academic research and capitalizing on youth-led hydro-diplomacy.

Keywords: Water management, nexus solutions, regional cooperation, hydro-diplomacy

2. INTRODUCTION

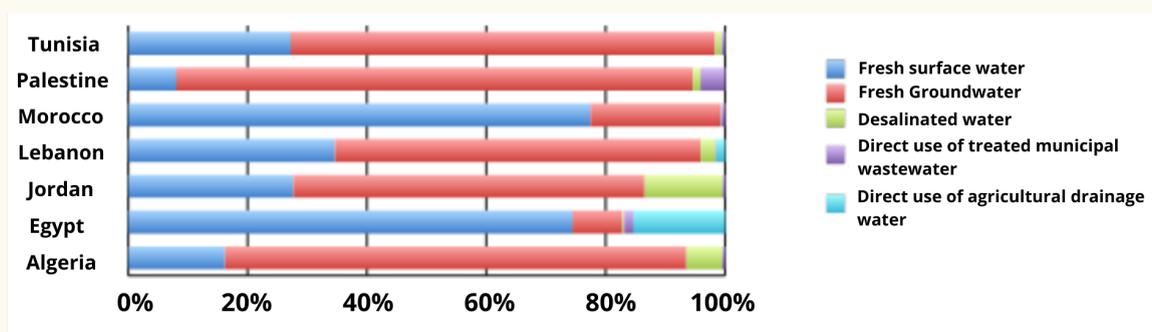
Every country in the Southern and Eastern Mediterranean (SEM) region seems to be concerned by reduced water availability (Augier *et al.* forthcoming). In Egypt, which already receives very little rainfall, the risk of water scarcity is mainly linked to developments in the Ethiopian Nile water tower, while the construction of the Grand Ethiopian Renaissance Dam on the Blue Nile could affect downstream water supplies. In Jordan, aquifers are under such pressure that they are all being depleted. In recent years, the three Maghreb countries have also experienced tension around water. For instance, in 2013, incidents occurred in Setif in Algeria and in Tunisia, in the region of Sidi Bouzid, due to the development of a highly water-intensive agricultural model. In 2017, small incidents broke out in the Drâa region of Morocco, which suffers from water scarcity. A recent study by the United Nations Economic Commission for Europe (UNECE) (n.d.) shows that the largest groundwater reserve in North Africa – the North Western Sahara Aquifer System shared by Algeria, Libya and Tunisia – is at risk.

3. MEDITERRANEAN CONTEXT

Water sustainability is a particularly urgent concern worldwide, but especially in the SEM region. In recent decades, conditions of water use have considerably evolved, making it an even scarcer resource. Specifically:

- **SEM countries have different water resource endowments** that shape their broader water challenges. As seen in Figure 1, several countries rely most heavily on groundwater (Algeria, Jordan, Lebanon, Palestine and Tunisia), but some are much more reliant on large and medium transboundary rivers (Egypt, Morocco). To some extent, SEM countries are also investing in non-conventional water resources, such as desalination and recycling used water for non-potable uses as alternatives to the continued withdrawal of non-renewable “fossil” groundwater.

Figure 1. Water withdrawals by source as a percentage of total withdrawals, by country, 2018

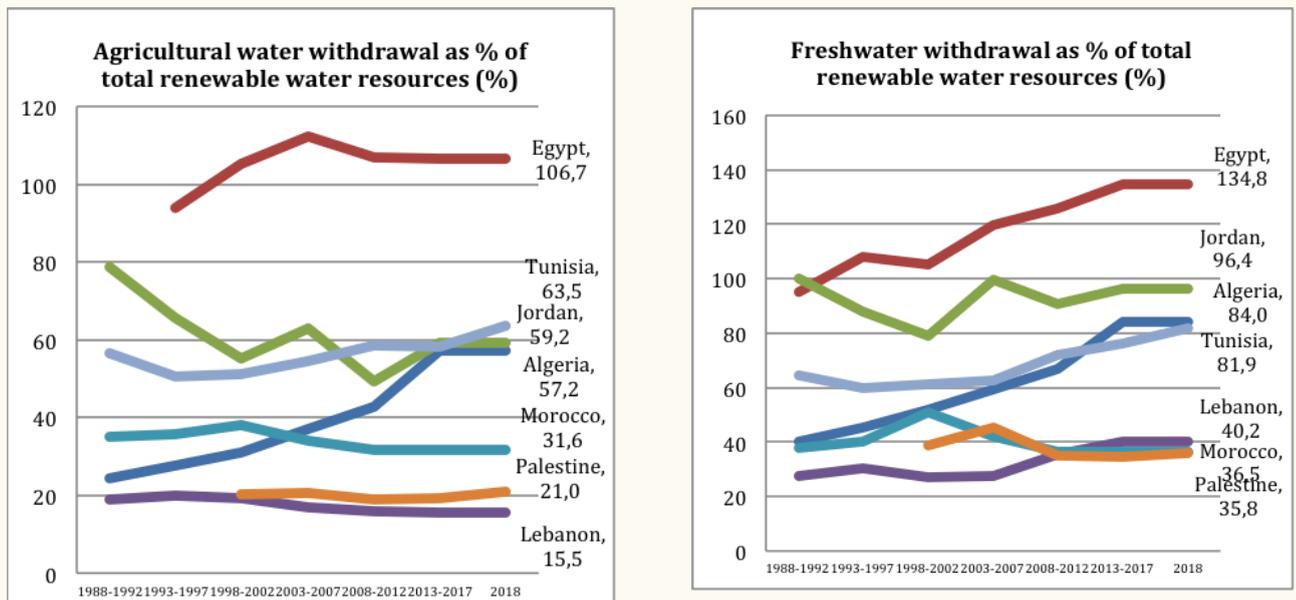


Source: Food and Agriculture Organization of the United Nations (FAO) (n.d.).

- **The region’s population increased** during the 2010s at an annual rate of 2 per cent (excluding Syria), which is higher than the annual average rate of the 2000s. The highest annual population growth rates throughout the recent decade are found in Jordan (3.7 per cent), Lebanon (3.6 per cent), Egypt (2.1 per cent) and Algeria (2 per cent) (World Bank 2019). Meanwhile, the SEM countries’ population is expected to keep growing by 1.3 per cent on average in the next five years, led primarily by coastal North African countries such as Egypt (+1.8 per cent), Algeria (+1.6 per cent) and Morocco (+1.1 per cent), according to a medium-variant UN projection.¹
- Meanwhile, **industrial and agricultural use of water resources have intensified**, increasing pressure on water resources (see Figure 2). In agriculture, water withdrawn for irrigation as a share of renewable water resources has reached 106.7 per cent in Egypt (versus 94 per cent in the mid-1990s) and 63.5 per cent in Tunisia (versus 50.6 per cent in the mid-1990s). Overall, freshwater withdrawal as a share of total renewable water resources has increased markedly in Egypt (134.8 per cent in 2018), Jordan (96.4 per cent in 2018), Algeria (84 per cent in 2018) and Tunisia (81.9 per cent in 2018).

¹ <https://population.un.org/wpp/Publications/>

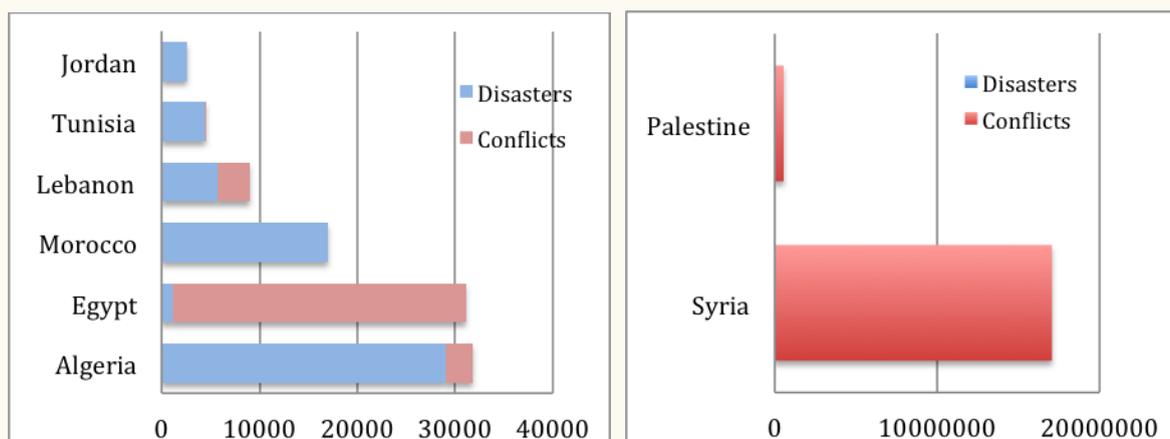
Figure 2. Freshwater and agricultural water withdrawal as a percentage of total renewable water resources, by country, 1988-2018



Source: FAO (n.d.).

- The region also **has the largest refugee population in the world**. Countries such as Lebanon and Jordan are hosting large numbers of refugees, resulting in higher demand and increased pressure on their already vulnerable water resources. The highest numbers of displacements due to conflicts are seen among Syrians (more than 17 million) and Palestinians (more than 500,000), while the highest number of displacements due to disasters are seen among Syrians (49,000), Algerians (29,000), Palestinians (23,000) and Moroccans (17,000). The majority of populations in the region live in high or very high water-stressed areas.

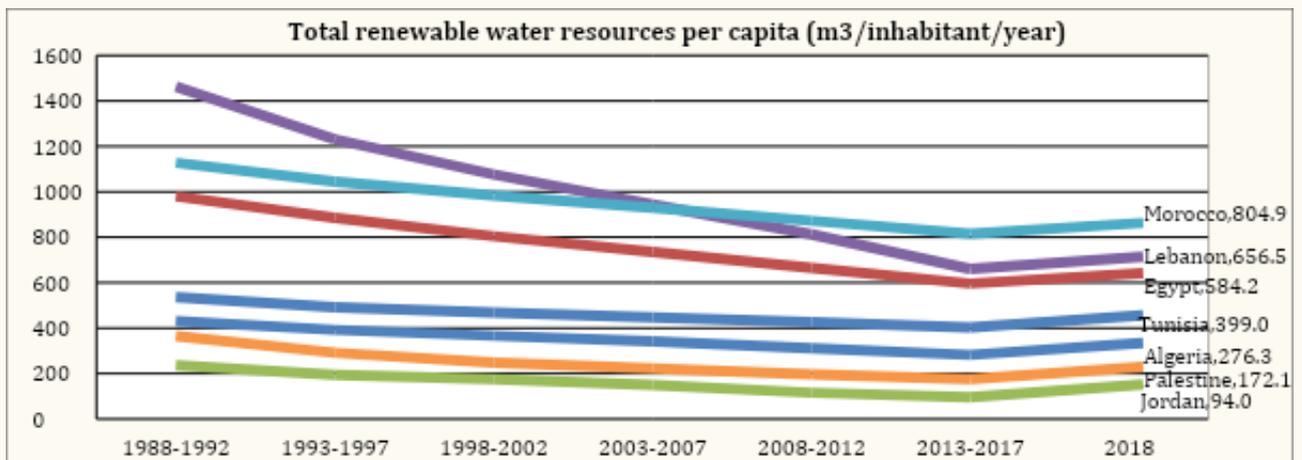
Figure 3. New displacements by conflict and disasters by country, 2010-2019



Source: Internal Displacement Monitoring Centre (IDMC) (2021).

- As a result, the **amount of water available per individual has diminished over time**. This is particularly evident when looking at the evolution of total renewable water resources per capita over time (Figure 4), which are especially low in Tunisia (399 m³/inhabitant/year), Algeria (276.3 m³/inhabitant/year), Palestine (172.1 m³/inhabitant/year) and Jordan (94 m³/inhabitant/year). The country that enjoys the largest share of total renewable water resources per capita in the region is Morocco (804.9 m³/inhabitant/year), but this has markedly decreased in the last 30 years (by 28.6 per cent). As noted by The Growth Dialogue (2021), population growth and expanding urbanization, and associated demands for water in the region, have reduced per capita supply to a quarter of its 1960 levels. Without a fundamental change in policies and practices in land and water use, the situation is expected to worsen, with both political and economic ramifications.

Figure 4. Evolution of total renewable water resources per capita, by country, 1988-2018



Source: FAO (n.d.).

- Such **trends are considered to be aggravated by climate change**, which is likely to lead to altered precipitation patterns and higher evaporation rates in future years, further affecting water availability. In fact, the increase in anthropogenic greenhouse gas emissions has already increased the mean atmospheric temperature. In the Mediterranean, the actual temperature rise is 1.4°C above pre-industrial times (Ganoulis 2021). Furthermore, climate models predict at least 15-20 per cent less rainfall in the Mediterranean by the year 2080, as well as atmospheric instabilities that produce more frequently catastrophic floods and extensive droughts (Cramer *et al.* 2018).
- Last but not least, **COVID-19 has amplified the burden of addressing the increasing demand for water in the region**. Basic hygiene practices to limit the spread of the virus (e.g. handwashing) are putting additional pressure on water resources. Furthermore, for the underprivileged, lack of access to handwashing facilities and/or improved home-based water sources forces them to congregate at crowded public sources to collect water, increasing the risk of contagion (The Growth Dialogue 2021).

4. INTERCONNECTED CHALLENGES REQUIRE APPROPRIATE SOLUTIONS WITHIN A REGIONAL ECOSYSTEM AND ENHANCED REGIONAL COOPERATION

The previous section highlighted how water scarcity is in itself a concern in the Mediterranean. However, water is also connected to several other challenges in the context of climate variability in the region. Water, energy and food security are closely interlinked: water is needed to grow food, energy partly depends on water to generate power, and energy is needed to extract and deliver water to users; in turn, food waste can also be converted into energy. Water scarcity may also lead to political conflicts, domestic and/or regional, with countries fighting over scarce resources. It may also trigger movements of populations, which have no option but to flee from inhospitable environments. These are just some examples of the many interactions, indicating the need to approach these challenges in an integrated manner.

This is why, during the fourth Mediterranean Water Forum 2021, CMI highlighted that “if water challenges are interconnected, so must be solutions” (Moreno-Dodson 2021). The CMI session in Malta promoted nexus solutions, with “nexus” referring to “a connection or series of connections”. A prerequisite for the success of such solutions is enhanced cooperation in management, governance and knowledge-sharing. Cooperation can promote innovative and efficient techniques for water storage and distribution, improve water quality and reduce costs.

Moving towards regional cooperation on the **management of shared water resources** is necessary. For instance, the North Western Sahara Aquifer System, which as mentioned earlier is already under pressure, requires strong cooperation to avoid excessive drawdown. Over the last 40 years, drilling has increased water extraction from 0.6 billion to 2.5 billion m³/year, which has led to worrying signs (Augier et al. forthcoming). In addition to the lowering of the water tables, the Sahara and Sahel Observatory (OSS) has further analysed the functioning and evolution of the system and notes the disappearance of artesian groundwater and the drying up of outlets since the beginning of the millennium. Unfortunately, **water cooperation in the region is currently limited**. As noted by The Growth Dialogue (2021):

- **Not a single formal agreement for joint management of shared water resources exists in the region.** This is despite the fact that a large portion of water resources are transboundary. All major surface-water bodies are shared: Tunisia and Algeria share the waters of several transboundary rivers (including the Medjerda River which accounts for 37 per cent of Tunisia’s surface water and 22 per cent of its renewable water resources); 11 riparian

countries share the Nile; Israel, Jordan and Syria share the Yarmouk River; and Israel, Jordan, Lebanon, Palestine and Syria share the Jordan River.

- **Groundwater resources are under increasing pressure of abstraction.** The competition for groundwater both within national boundaries and transboundary aquifers has become a significant source of agricultural water across the region. Very high rates of withdrawal of both surface and groundwater make agriculture vulnerable to claims from other sectors in addition to the risks of climate change (FAO 2015; El Hajj *et al.* 2017). But despite a long history of shared water in the region, there have been very limited cooperative agreements for joint management. In part, this could be attributed to the fact that countries affected by fragility, conflict and violence are poorly placed to negotiate arrangements. Although there are joint action plans for the large aquifers in North Africa, unfortunately, no legal agreements have been signed along the transboundary rivers or in regulating groundwater aquifers. In contrast, the Pakistan/India agreement governs sharing of the Indus basin and there are also more than 170 legal agreements among the riparian countries along the Danube River.
- **Non-conventional water resources are relatively costly:** countries in the region are exploring water desalination as a way to augment declining natural water resources and increase naturally available resources. Countries are investing in modern infrastructure and water treatment technologies to utilize this expensive non-conventional water resource. Several hurdles are slowing down the upscaling of these resources, including a lack of regional cooperation. However, new technologies for desalination, including those using renewable energies, are being developed and offer great potential in the region if adequate investments are made.

So how can we move forward? The CMI session at the fourth Mediterranean Water Forum offered the opportunity to ask the Mediterranean audience of water stakeholders (online and in person) what they consider to be the most pressing water priorities and how best to collaborate. The questions and voting scores are presented in the annexe. The following three messages emanated from the voting and subsequent dialogue:

- Key challenges that need to be dealt with include i) **building trust between countries** (the lack of which is hindering political will for agreements) and ii) **enhancing coordination between donors, and between diplomatic and development agents and institutions.**
- Solutions related to the **water and climate change adaptation nexus** and **water, energy and food nexus**, and the **water, employment and migration nexus** should be prioritized. Climate change adaptation closely depends on water, with most efforts to reduce greenhouse gas emissions being conditional upon reliable access to water resources.
- The need to **strengthen governance** and “**water education**”. Decision makers need to be aware of existing solutions and be empowered with the capacity to make important decisions.

5. RECOMMENDATIONS

Based on previous dialogues and analyses, we provide a series of policy orientations and recommendations adapted to the Mediterranean context. With the support of actors such as the Foreign, Commonwealth & Development Office (FCDO) and other involved partners and donors, this agenda could pave the way towards enhanced regional cooperation and progress on water issues.

4.1 Launching a Mediterranean dialogue process on water nexus solutions

As highlighted by the World Bank (2018), there is a need to promote an integrated regional approach to managing water scarcity, mainly by strengthening collaboration and integration between different countries that share access to water. A **Mediterranean dialogue** process could thus be initiated to push for an agenda that promotes cooperation on **nexus solutions**. It would include two dimensions: a **dialogue dimension**, where policy stakeholders and concerned actors would discuss issues of regional cooperation and ways to enhance and solidify Mediterranean unity, and a project dimension, discussing the potential of regional innovative entrepreneurial nexus initiatives and their financing.

Regarding dialogue, **a regional approach appears indispensable as nexus initiatives tend to focus on the regional (basin) sphere. However, we should also point out that nexus challenges, and corresponding opportunities for greater collaboration, are often found at the bilateral level and must be deeply rooted in local particularities and adapted solutions.** For a nexus solution to be fruitful, it also needs to have an obvious national component, as it is at the national level that most decisions are made and where agreements are actually implemented. Therefore, the dialogue process could take a twofold form, specifically:

- **National water policy panels:** These would be national task forces that: i) facilitate dialogue on nexus issues at a multisectoral level, ii) raise awareness of the need for better water management practices, and iii) offer experience-sharing and push for regional water collaboration within the country, including territorial jurisdictions. They would ultimately aim for the development of new and holistic policies, harmonized with international standards, and strengthen governance. In each SEM country, the panel would be composed of representatives from policymakers and government institutions (ministries, local water agencies etc.), technical experts and economists, water entrepreneurs, think tanks, and other key stakeholders. Discussions would be supported by presentations of country/territory assessments, best practices and national/territorial policy briefs. Lessons learned from each national panel could then nurture regional policy dialogue, as described next.
- **Regional water nexus policy dialogues:** These would provide a multi-country platform for discussions and public debates, bringing together target groups from all Mediterranean countries, particularly policymakers, researchers, and water and green entrepreneurs. It would aim to build trust, a shared understanding and co-ownership for cooperation on water issues. These dialogues could be organized annually in an SEM country, with the support of local authorities and FCDO, as part of its mission to tackle global challenges with international partners. Discussions would tackle nexus-related subjects, including the priorities identified in Malta, such as how best to establish hydrological water balances at rivers to evaluate the multi-year quantity of renewable water; how to maximize food production by use of renewable surface water; how to capitalize on, and maximize, the renewable energy sources for irrigation; and how to ensure the private sector and financial institutions in the Mediterranean invest more in nexus solutions. They would include, among other things:
 - **Knowledge capitalization sessions**, where water researchers from around the region (academics, scientists) would present their findings and suggest concrete policy solutions and mechanisms for cross-country regulatory harmonization. This could include capitalizing on knowledge generated under the FCDO-funded programme on the water security nexus, such as on improving water accounting practices in the region. It could also include identifying and discussing the best educational policies to support the use of digital technologies for water, since, with more of the population connected to the Internet, this can maximize the benefits brought by the

Internet of Things (IoT) for the energy and water sector (Ben Saad 2021). The sessions could follow a similar model to that of the CMI policy dialogues.

- **Pitch presentations by water entrepreneurs**, including from young entrepreneurs, such as those of the CMI-supported Mediterranean Youth for Water (MedYWat) network and from the EU-funded THE NEXT SOCIETY project, and exchanges with Mediterranean policymakers on innovative entrepreneurial ways to tackle water nexus challenges.
- **Round tables on financing water nexus solutions**, following a similar model to that established by the Organisation for Economic Co-operation and Development (OECD), the World Water Council and the Netherlands, which would aim to facilitate increased financing of investments that contribute to water security and sustainability in the Mediterranean (see also Lagoarde-Segot, T. and Reyes-Ortiz L. 2020).²

4.2 Empowering local territories through increased connections

Subnational territories should also be strengthened, given the need to **strengthen their skills and empower local decision makers** (Quefelec *et al.* 2018). An efficient way to do this is through **experience-sharing**, whereby local stakeholders can be informed by successful examples, as well as robust empirical and theoretical work on successful nexus solutions and water management practices and what they mean for diverse groups of people in their territory. A knowledge and technical platform on water issues at the territorial level could be facilitated and the CMI's Enabling Mediterranean Cities to Climate Action (MedCCA) initiative, a network of municipalities across the Mediterranean, could be the host platform. It would:

- act as a structure that centralizes, transcribes and shares knowledge on water nexus solutions at the territorial level, enabling decision makers in SEM territories to be better informed and providing increased visibility of the different parts of the Mediterranean water ecosystem;
- offer technical assistance to local stakeholders, through capacity-building.

4.3 Increasing awareness of water nexus by strengthening academic research

There is a need for greater support for researchers across the region on water-related topics, such as water-induced migration and the link between water management and food security. Research can also shed light on the best policies to expand high-quality and safe treated reused water for recycling, and policies that have successfully reallocated water from low- to high-value uses. More knowledge is also needed to test, adapt and scale-up new technologies and policies for water resources management and water service delivery, such as smart metering to improve accuracy in billing, evaluate consumption and increase users' awareness of their own consumption (The Growth Dialogue 2021).

Such support could take the form of **research grants for multi-country teams**, provided by FCDO in partnership with water think tanks and national authorities. Meanwhile, regional mentoring programmes could connect senior researchers with young water experts to unleash their potential. Facilitating youth's connection with academia in this way and providing financial support to youth-led research could successfully contribute to increased awareness of water. A good example that

² The round tables could also explore ideas such as the possibility of creating a Euro-Mediterranean financial-rating agency that would take into account environmental (and thus water) risks. Such an agency, which could be created under the impetus of Euro-Mediterranean authorities as Lagoarde-Segot and Reyes-Ortiz (2020) suggest, could be an opportunity to change the business model of financial rating and contribute to orienting capital flows towards projects with a positive impact on water sustainability and the environment more generally.

facilitates such a connection is the collaborative Partnership for Research and Innovation in the Mediterranean Area (PRIMA) project of Mediterranean water management solutions for sustainable agriculture supplied by an Online collaborative platform (MAGO), which develops innovative solutions for integrated management of water resources, for sustainable agriculture. It involves partners from France, Lebanon, Spain and Tunisia, and actively includes members of the CMI youth network MedYWat.

Meanwhile, synergies could also be explored with the **International Observatory of Non-Conventional Water Resources and Associated Renewable Energies**, an initiative announced by the Mediterranean Water Institute during the fourth Mediterranean Water Forum, which is to be launched with the expectation that it would act as a stepping stone to harmonizing standards, approaches, technologies and costs across the basin.

4.4 Capitalizing on youth-led hydro-diplomacy

Mediterranean policymakers should support and empower their youth in driving the transformation required to improve water security in the region. Having youth involvement at all levels, especially in leadership positions related to water management, policymaking and governance, will be key. **National and subnational working groups on water could be created**, which would consist of representatives from the Ministry in charge of youth, national youth councils, youth organizations/networks, youth researchers and other relevant actors.

Youth networks could also be key drivers of hydro-diplomacy efforts. Hydro-diplomacy refers to **getting all water stakeholders together** in the context of new shared governance. It teaches the skills to transform a fixed quantity of water into a flexible and sustainably shared resource. An FCDO-supported regional training course in the field of transboundary water, nexus solutions and hydro-diplomacy could target the upscaling of the capacities of youth water experts (training of trainers) and related stakeholders towards achieving peace and sustainable development. It would capitalize on the technical support of CMI and its vast Mediterranean youth network, and provide an impetus to the transboundary water cooperation processes. The course would highlight, among other things:

- how to utilize new technologies and tools in the assessment and monitoring of water resources during negotiations;
- key aspects of conflict resolution and the principles of international water laws;
- dispute settlement: reaching consensus on an agreed legal and institutional framework;
- how to draft and negotiate international agreements on transboundary water resources;
- linking the activity to regional water agendas, such as that of the Union for the Mediterranean.

National capacity-building could also capitalize on regional youth networks. Regional networks such as MedYWat could organize actions specific to each Mediterranean country and lead local/national training, and policymakers could capitalize on them to strengthen their national initiatives and better insert them in the regional context.³

³ For example, the Moroccan Youth for Water Network (MorYWat) is a subsidiary of MedYWat in Morocco which works on solving environmental challenges in the country. It recently organized a workshop in Taroudant (Morocco) on the use of data analysis tools for successful climate change management.

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ANNEX

The questions and voting scores from the CMI session at the fourth Mediterranean Water Forum were as follows:

Question 1. Which of the following needs the most attention in the Mediterranean?

- Water-energy-food-ecosystem nexus (31%)
- Water-employment-migration nexus (10%)
- Water supply-sanitation-hygiene nexus (6%)
- Water-climate change adaptation nexus (52%)

Question 2. What are the main challenges to regional Mediterranean water cooperation?

- Limited trust between countries hindering political will for agreements (42%)
- Limited understanding of cooperation risks and benefits (16%)
- Limited capacity among water management agencies and stakeholder groups (16%)
- Limited coordination between donors, and between diplomatic and development efforts (27%)

Question 3. What should be prioritized to solve water problems?

- Education/awareness (26%)
- Investment in new technologies (9%)
- Better access to finance (10%)
- Better governance (56%)



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As of July 1st, 2021, and eleven years after its creation, the CMI has officially joined the United Nations (UN), hosted by the United Nations Office for Project Services (UNOPS).

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