



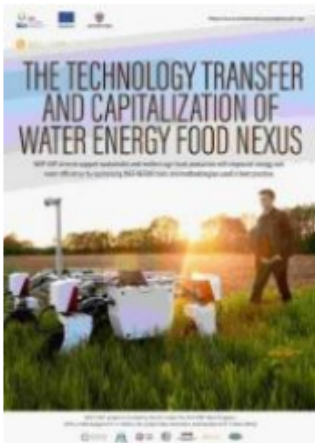
POLICY
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The Technology Transfer and Capitalization of Water Energy Food NEXUS: Evaluation of WEF Nexus best practices for replication in the Mediterranean region

Executive Summary

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 **WEF - CAP**
The WEF-CAP project aims to support sustainable & resilient agri-food production with improved energy & water efficiency by capitalizing WEF Nexus tools & methodologies used in best practices.



The implementation of the Water-Energy-Food Nexus (WEFN) integrated approach is proving effective in preserving natural resources and promoting human well-being and economic growth through the development of innovative and inclusive solutions in the face of insecurities and external shocks.

However this approach is confronted with numerous challenges, particularly when looking at the Mediterranean Partners Countries (MPC), which are facing serious implications of climate change such as droughts, floods and extreme weather conditions affecting their food security, water resources and livelihoods. Despite the existence of some national initiatives targeting the availability and efficiency of food, water and energy productions, a WEFN approach is hardly existent in these countries[1].

In this context, the Technology Transfer and Capitalization of Water Energy Food NEXUS (WEF-CAP) project seized an opportunity to efficiently capitalize WEFN practices, commercialization tools and methodologies. Following the mapping and stocktaking exercises of WEF best practices in the EU-MPC region[2] and in order to better integrate stakeholders in the formulation of adequate policies for an adapted WEFN approach, a public consultation was conducted targeting multi-stakeholders in the region. The results confirmed the need to enhance public awareness about climate change and WEFN in particular, the urgent need to create adequate legal framework that ensures an integrated natural resource management, the need to enhance efficient cooperation between the different actors in the three sectors, the urgent need for financial instruments to help implement the required strategies, better regional cooperation that takes into account climate and WEFN issues and an enabling environment conducive to innovation.

[1] Louis, Maryse & Dahdouh, Sophie. 2022. WEF-CAP Policy Brief N°1. WATER-ENERGY-FOOD NEXUS: The Way Forward for the Mediterranean Region in the Face of Insecurities.

[2] The EU-MPC region refers to European Union (EU) countries in addition to the Mediterranean Partners Countries (MPC), comprising Algeria, Egypt, Jordan, Lebanon, Morocco, Palestine and Tunisia

This policy brief provides an overview of the findings gathered through this public consultation. More specifically, it offers an analysis of the inputs received on stakeholders' awareness, knowledge, perception and expectations regarding the state of climate change in the EU-MPC region, the extent of the water-energy-food interdependence and the challenges to the implementation of the WEFN integrated approach in the region, as well as the impacts derived from their implementation in order to evaluate/validate the outputs that have been produced by the project. Finally, the brief provides evidence-based operational recommendations on how to move forward and adopt the WEFN approach.

1. Introduction

Global warming is one of the main drivers of ecosystem disruption resulting in extreme weather conditions that affect water availability and potential agricultural and energy productivity. Being the most water-poor region in the world, the MENA region is holding only 1.4% of the world's freshwater resources[3] while their population represents 6.3% of the world. Two thirds of these water resources cross one or more international boundaries[4]. The region has to grapple with extreme water stress, falling below the absolute water scarcity threshold of 500 m³[5]. This situation is further aggravated by agriculture consuming between 65 and 86% of water compared to only 59% in Europe[6], raising the question of the proper management of water, which should be prioritized as an irreplaceable and finite resource, essential for sustainable agriculture and energy production[7].

As access to water shrinks, resources for food production will become increasingly scarce and unable to meet the domestic demands of countries in the region, thus exacerbating food insecurity and accentuating the occurrence of poverty. In addition to facing poor harvests and overall yield reductions due to extreme weather conditions, most of the region's land is unsuitable for agriculture, with only 14.6% being cultivated[8]. Not to mention that the dependence of countries in the region on cereal imports, which are witnessing an exponential increase in prices due to the war in Ukraine, is around 73.4%[9], with an alarming figure observed for Jordan where more than 97% of cereal food and feed requirements in 2022 are satisfied by imports, increasing the country's vulnerability to external shocks[10]

[3] GIZ, 2022. Factsheet: Nexus Regional Dialogue in the Middle East and North Africa <https://www.water-energy-food.org/nexus-regional-dialogue-in-the-middle-east-and-north-africa-mena>

[4] ESCWA, 2016

[5] Ibid

[6] Louis, Maryse & Dahdouh, Sophie, 2022

[7] Ganoulis, Jacques, 2021

[8] Louis, Maryse & Dahdouh, Sophie. 2023, WEF-CAP Policy Brief N°2. Opportunities for an Integrated Water-Energy-Food Nexus approach in the MENA region: Egypt, Jordan, Lebanon & Tunisia

[9] Ibid

[10] Louis, Maryse & Dahdouh, Sophie. 2023, WEF-CAP White paper N°1. Towards the Adoption of an Integrated Water-Energy-Food Nexus approach in Jordan: Challenges & Opportunities

2-Successful national initiatives to face the WEF challenges

In the face of these water, energy and food challenges, countries of the region have adopted a number of national initiatives that are aimed to respond to the demands of their growing populations. This includes strategies to improve the monitoring and control of water supply and demand management, reduce water losses and promote water re-usages while introducing energy and water efficient techniques in food production to ensure sustainable agriculture, which will guarantee food security to meet present and future needs. For example, Tunisia has developed a complex and diverse water infrastructure allowing the country to mobilize and exploit available water resources in order to improve access to drinking water for the majority of the urban and rural population and to provide supplies for agricultural irrigation, as well as the industrial and tourism sectors[11]. Jordan's determination to solve water issues has led to the planning of the largest water generation scheme to be implemented in the country along the project pipelines route from Aqaba to Amman: the Amman Aqaba Water Desalination and Conveyance Project (AAWDCP) which aims to deliver a safe and reliable freshwater supply for Amman and other governorates[12]. This also includes strategies aimed at increasing energy efficiency and renewable energy by diversifying the energy mix in line with the Sustainable Development Goals (SDGs) and the mandates of the Paris Agreement on climate change. In this regard, it is worth noting that the Egyptian government has embarked on a broad range of projects that reflect its ambitious contribution to the global efforts such as building new power plants with the private sector's participation in recent years, the most prominent renewable energy accomplishment in the power sector being the launch of Benban Solar Park, a complex of 41 solar power plants and currently the fourth largest solar power plant in the world[13] [14].

However, despite these efforts, climate-related challenges in the region remain significant and pressing. Added to this are population growth and rapid urbanization, which lead to the depletion of the limited resources available, and external shocks such as the impact of COVID-19 and the crisis due to the war in Ukraine which have further exacerbated the situation in the EU-MPC region imposing huge pressure on the economic, social, and environmental dimensions of sustainable development.

This is raising the urgent need for societal adaptation to climate change, through new cross-sectoral approaches to efficiently administer energy/water resources, foster agricultural productivity and thus stimulate social and economic development and resilience in the region, these three sectors being so closely linked to one another that their mutual impact is evident in any action taken. While agriculture is the largest consumer of the region's freshwater resources, water is considered key for energy production and more than a quarter of the energy used worldwide is needed for food production and supply. This implies the necessity to capitalize Water-Energy-Food Nexus (WEFN) innovations and best practices.

3-Water-Energy-Food Capitalization (WEF-CAP): A Public Consultation

The Technology Transfer and Capitalization of Water Energy Food NEXUS (WEF-CAP) project has grasped an opportunity to efficiently capitalize WEFN practices, commercialization tools and methodologies. WEF-CAP aims to strengthen a regional metacluster that promotes cooperation and tech-transfer, highlighting best practices and mainstreaming policy impact for innovation-driven progress to effectively support education, research, technological advancement, and innovation.

[11] Louis, Maryse & Dahdouh, Sophie. 2023, WEF-CAP White paper N°3. Towards the governance of the Water-Energy-Food Nexus in Tunisia in the face of insecurities

[12] Louis, Maryse & Dahdouh, Sophie. 2023, WEF-CAP White paper N°1. Towards the Adoption of an Integrated Water-Energy-Food Nexus approach in Jordan: Challenges & Opportunities

[13] Louis, Maryse & Dahdouh, Sophie. 2023, WEF-CAP Policy Brief N°2. Opportunities for an Integrated Water-Energy-Food Nexus approach in the MENA region: Egypt, Jordan, Lebanon & Tunisia

[14] World Bank, 2020

Given the importance of integrating the stakeholders in the outputs of the project, a survey-style questionnaire was designed to collect first-hand information from stakeholders about their awareness, perception and expectations with regards to the WEFN and the climate change challenges in general. The survey targeted the multi-stakeholders from across the EU-MPC region, including national policy makers, experts, academia, and civil society. In addition the survey included statements and questions to validate the outputs gathered by the project in terms of mapping of WEF best practices, replication scenarios and the WEF-Nexus [observatory](#). In five sections, the questionnaire aimed to engage stakeholders and policy makers in the process of streamlining the evidence-based results and shaping up recommendations on major challenges and potential solutions.

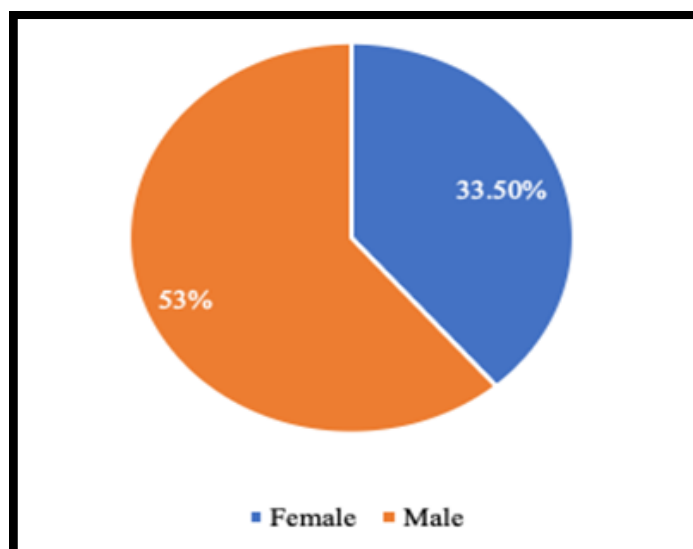
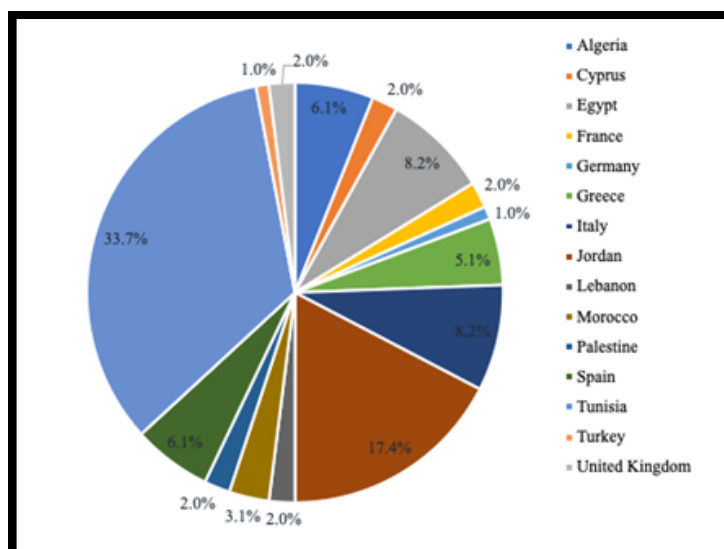
Launched in March 2023 for a duration of 8 weeks, the questionnaire was directed to relevant stakeholders and the WEF community in the EU-MPC region. Target groups included, but are not limited to: agencies, associations, banks, funding programmes, clusters, technology transfer offices, living labs, consultancy companies, research centers, academia, think tanks, higher education institutions, public administration, public corporations, small and mid-sized businesses (SME), multinationals, international organizations, international administrations, non-governmental organizations and foundations/charities

3.1. Structure of the respondents

The public consultation collected 98 responses from relevant stakeholders in 15 countries across the EU-MPC region with the largest share of responses coming from Tunisia (33.7%), followed by Jordan (17.4%), Egypt and Italy (8.2%), Algeria and Spain (6.1%), Greece (5.1%), Morocco (3.1%), Cyprus, France, Lebanon, Palestine and the United Kingdom (2.0%), Germany and Turkey (1.0%) (Figure 1). Interestingly, 33.5% of the respondents to the gender question (93/98 respondents) are females (Figure 2), reflecting the importance of this subject and its impact on all lives. In fact, studies show that climate change is often affecting women more than men and hence the participation of women in the formulation of mitigation and adaptation efforts and policy formulations would be essential.

Figure 1: Distribution of responses by country

Figure 2: Distribution of responses by gender

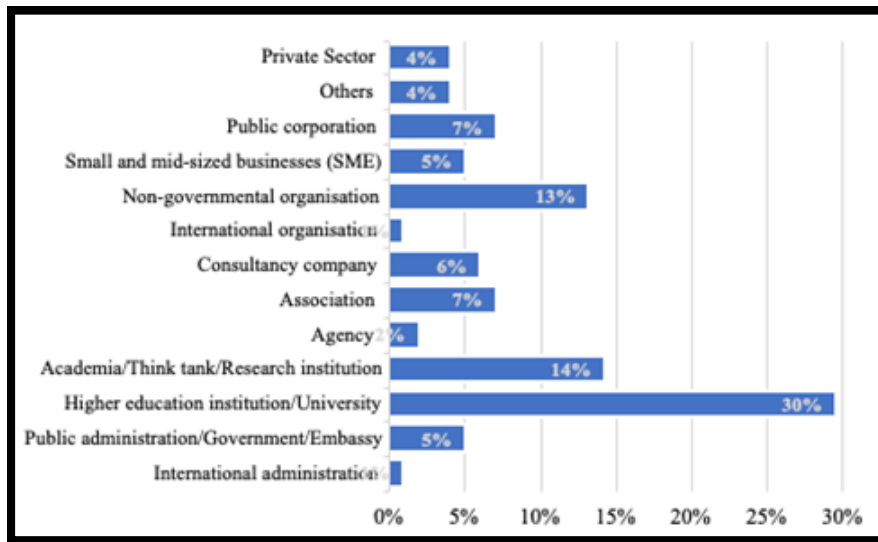


Source: Results from the public consultation. 98 respondents

Source: Results from the public consultation. 93 respondents

Although the questionnaire targeted various types of organizations, the responses came largely from higher education institutions and universities (30%) and from academia, think tanks and research institutions (14%) followed by non-governmental organizations (13%). Policy makers represent 12% of respondents, combining associations and public corporations with Public administration/Government (Figure 3). While various reasons could be behind this relatively low participation of policy makers, it could signal the importance of raising awareness with regards to WEF issues within this sphere.

Figure3 : Distribution of responses by country

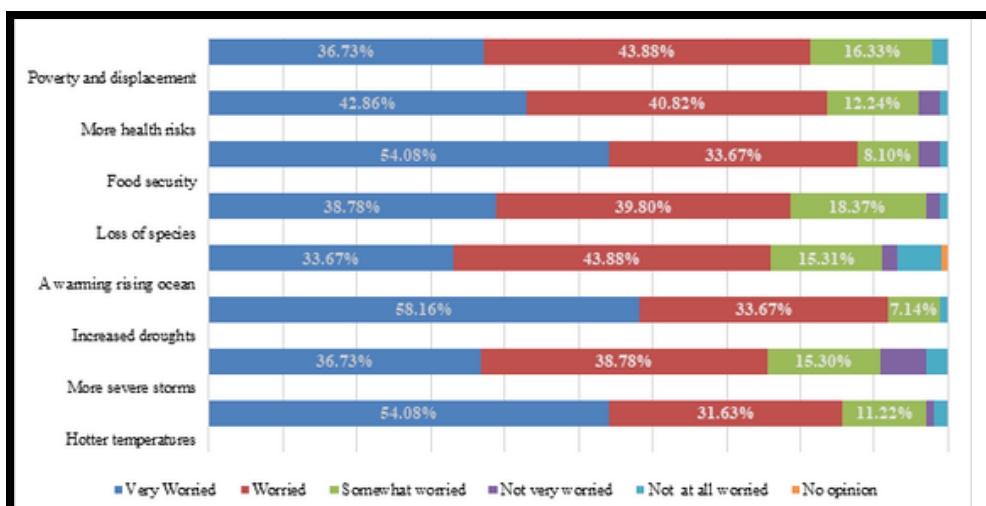


Source: Results from the public consultation. 98 respondents

3.2. Public Perception and awareness about status of the Climate Change in the EU-MPC region

When asked how worried they are about climate change, most respondents say they are very concerned about its negative implications and risks. Modelling and predictions show that the “impacts of climate change on the human population, in the long term, are grim”, as described by one respondent. Increasing droughts was signalled by most respondents (58.2%) as one of the most worrying implications of climate change, this is due to its serious implication on health and loss of livelihoods for millions of people as mentioned by many respondents. In fact, 42.9% are very worried about the increase in health risks related to climate change, which disproportionately affects vulnerable populations, such as rural communities, women and marginalized groups. About 54.1% are very worried about warming temperatures and 54.1% are very concerned about food security. Moreover, 43.9% are worried about rising oceans and 38.8% of respondents are worried about severe storms. According to Tunisian respondents, water stress and sea level rise are the most threatening externalities of climate change in their country as well as in the Mediterranean and Africa. It is clear that all this will have implications of increasing levels of poverty and displacement. 36.7% of respondents signalled that poverty and displacement are very worrying. As stated by respondents from Jordan and Morocco, climate change is likely to increase the frequency and intensity of storms, leading to more floods, landslides and infrastructure damage, and is associated with extreme drought conditions due to changes in rainfall which directly impact agricultural production and, therefore, food and economic security.

Figure 4: Public concern about climate change and its related implications

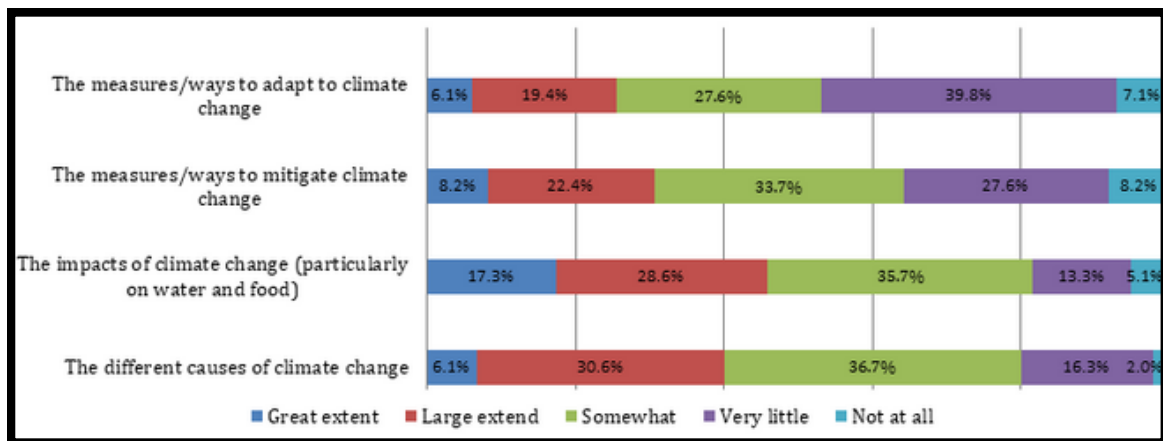


Source: Results from the public consultation. 98 respondents

When asked about how they believe the public is well informed about climate change issues in terms of its causes, impact and mitigation and adaptation measures, through the media, government announcements, etc., interestingly, almost half of the respondents (about 47%) report not having adequate information: either “very little” informed about adaptation measures (39.8%) or not informed at all (7.1%). Information about mitigation measures also didn’t score very well with about 36% being either “very little” informed (27.6%) or “not at all” informed (8.2%). At the same time, 17.3% of the respondents agree that they are informed to a ‘great extent’ about the impact of climate change (particularly on water and food security) (Figure 5).

Some respondents state that the media and governments do not publish enough climate change awareness campaigns, prompting them to do their own searches for scientific articles to keep them informed/updated on the issues and their impacts. In fact, only 30.6% of respondents believe that they are ‘well informed’ about the causes of climate change through government campaigns and media. A Tunisian respondent confides that awareness and education around the different causes of climate change, its impacts on water and food, and mitigation and adaptation measures are insufficient in Tunisia. The media and government announcements are not always effective in communicating this information, leaving many people uninformed. Others believe that the information on these different issues is very biased, with the media and governments focusing mainly on the impacts of climate change but to a lesser extent on the different causes and on the measures/means of mitigation and adaptation. In fact, according to some respondents, there is a scarcity of scientific studies on the subject and a lack of official data and reports, mainly due to the lack of political will to address the adverse effects of climate change. With this regard, an Algerian respondent states that the environmental consequences of climate change and extractive industries (such as pollution, carbon footprint, greenhouse gas flows, biodiversity loss and land use) are still not a priority for public authorities, which explains the absence of these media topics. More effort is needed, according to some, to transfer all this information from the scientific community to society at large as the media treats issues superficially and not through experts.

Figure 5: The extent of public awareness of the various issues related to climate change



Source: Results from the public consultation. 98 respondents

3.3. Public expectations and perception about governments’ approach towards climate change and recommendations

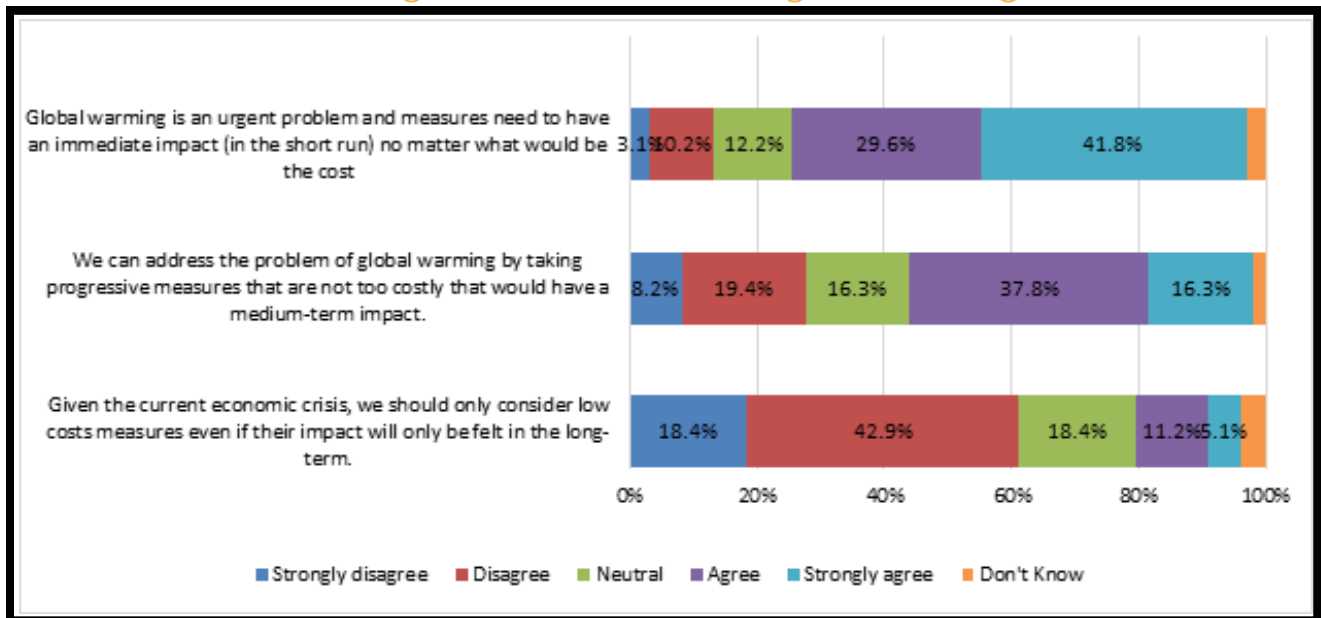
When asked about their opinions on what approach should their governments adopt to face global warming taking into account effectiveness vs costs, most respondents (72%)[15] believe that global warming is an urgent problem and measures need to have an immediate impact (in the short run) regardless of the cost, whereas 54%[16] of respondents prefer a more progressive approach and cost-effective measures with a medium-term impact while taking into account the current economic crisis. "

[15] This figure was obtained by combining the measurement scales "agree" and "strongly agree". It is important to note that 42% of respondents strongly agree with the statement.

[16] This figure was obtained by combining the measurement scales "agree" and "strongly agree"

Only 16% [17] of respondents opted for a longer term less costly approach. According to some respondents, the financial impact of restoring climate damages will be even higher for long and medium term actions and some damages will be irreversible. There is a need to preserve biodiversity and natural resources for future generations as stressed by many respondents. Any measure taken must be weighed against its cost. Balancing the benefits as well as the economic and environmental costs is, according to them, the key to finding effective solutions.

Figure 6: Public opinion on the effectiveness and cost of the measures to be adopted by their government in the face of global warming



Source: Results from the public consultation. 98 respondents

In a way to tackle climate change, most respondents (more than 50%) recommend a mix of measures for their national governments (Figure 7), which includes:

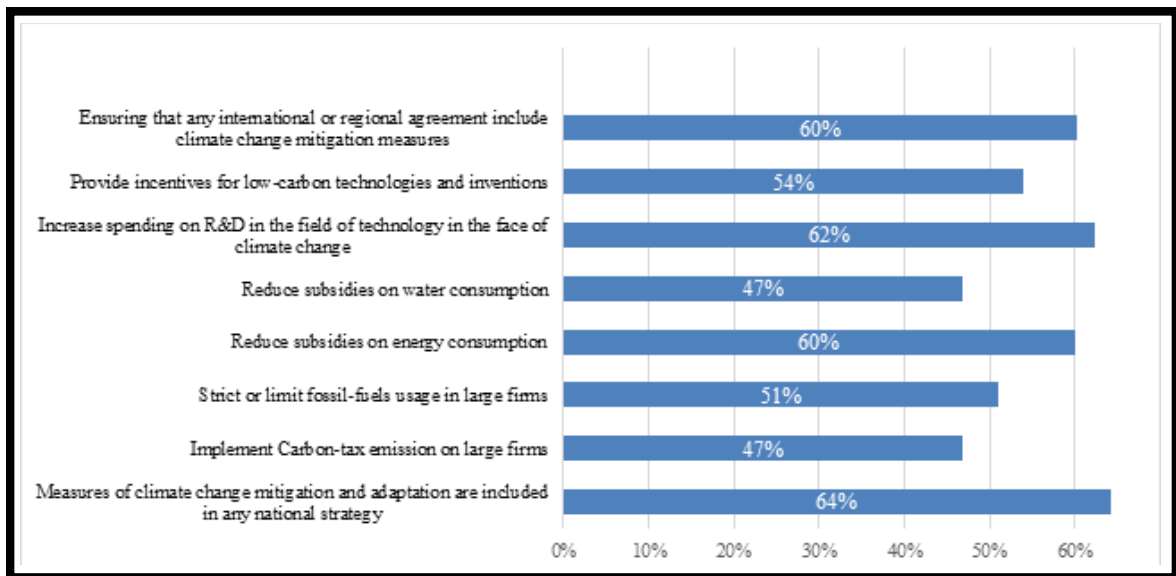
- incorporating measures of climate change mitigation and adaptation in any national strategy (64%);
- increasing spending on Research and Development (R&D) in the field of technology in the face of climate change (62%);
- ensuring that any international or regional agreement includes climate change mitigation measures (60%);
- reducing subsidies on energy consumption (60%);
- providing incentives for low-carbon technologies and inventions (54%);
- restricting/limiting fossil-fuels usage in large firms (51%); and
- Implement Carbon-tax emission on large firms (47%);

Not surprisingly, 44% [18] of respondents were more cautious with regards to reducing subsidies on water consumption with 22.5% stating that this measure is not suitable and 21.6% “somewhat” suitable. This is given the potential negative impact of such a measure on the poorer communities and any measures taken with this regard needs to be targeted. It is important to note that only three measures are seen as “already adopted” at the national level by almost 7% of the respondents in their countries: mitigation measures are included in the national strategy; international or regional agreements include climate change mitigation measures; and the national government provides incentives for low-carbon technologies and inventions. Other suggested measures received less than 7%.

[17] This figure was obtained by combining the measurement scales "agree" and "strongly agree"

[18] This figure was obtained by combining the measurement scales "not suitable 22.5%" and "somewhat suitable".

Figure 7: Public opinion on the relevance of a set of measures that can be adopted in their country



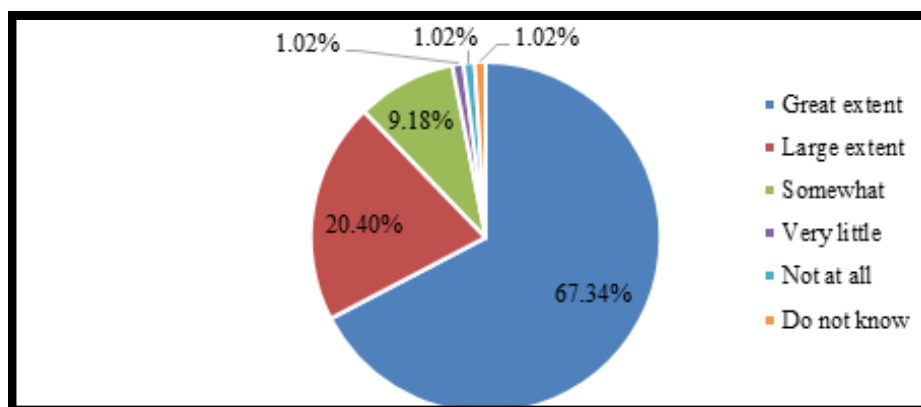
Source: Results from the public consultation. 98 respondents

Note: this graph is based on adding “highly suitable” and “suitable” responses

3.4. Public understanding of Water-Energy-Food interdependence and Challenges in the EU-MPC region

The public consultation shows a consensus about the very strong cross-sectoral and interdisciplinary relationship between food, energy, and water, with 67.3% of respondents believing that there is an interconnection to a ‘great extent’ and 20.1% to a ‘large extent’ (Figure 8). This confirms that the general public are practically feeling the WEFN impacting their lives and livelihood confirming both the operational and theoretical consensus.

Figure 8: Public opinion on the extent of Water-Energy-Food interdependence



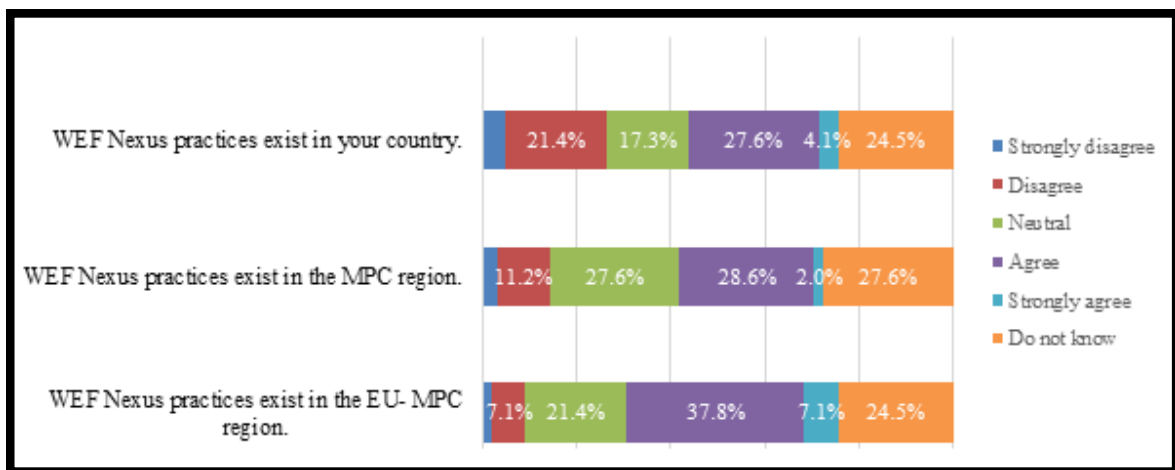
Source: Results from the public consultation. 98 respondents

This validates the call for adopting a WEFN integrated approach when addressing climate related issues as this approach will contribute to ensure the formulation, implementation and adoption of national policies that can resolve the existent environmental and resources challenges. The development of an integrated management of water and energy resources will make it possible to support the functioning of the energy system without affecting agriculture and water supply, and similarly for the other sectors, with the overall objective of strengthening the economy

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Despite the belief of the public to the importance of the integrated approach, many see that WEFN practices are still not strongly implemented at either the regional or national levels: 45% of respondents stating that WEFN practices exist in the EU-MPC region, 30.6% believing that they exist in MPC region and only 31.6% seeing that they are implemented in their country (Figure 9)[1]. Interestingly, according to a respondent from Tunisia, the Mediterranean MPCs have been actively involved in the implementation of the WEFN, with an emphasis on regional cooperation and mutual technical assistance, efforts which have resulted in the establishment of regional frameworks and initiatives, such as the Mediterranean Water Initiative, which promote the sustainable use of resources. Tunisia, as pointed out, is actively involved in the WEFN, having taken steps to promote the sustainable use of resources, including the development of a national water strategy, the implementation of water efficiency projects and the promotion of renewable energy sources. However, while several respondents are knowledgeable about the implementation of WEFN practices, an average of 26.6% of respondents claim to be unaware/uninformed about them. Others believe that they are very little implemented in developing countries.

Figure 9: Public perception on the existence & implementation of WEF Nexus practices



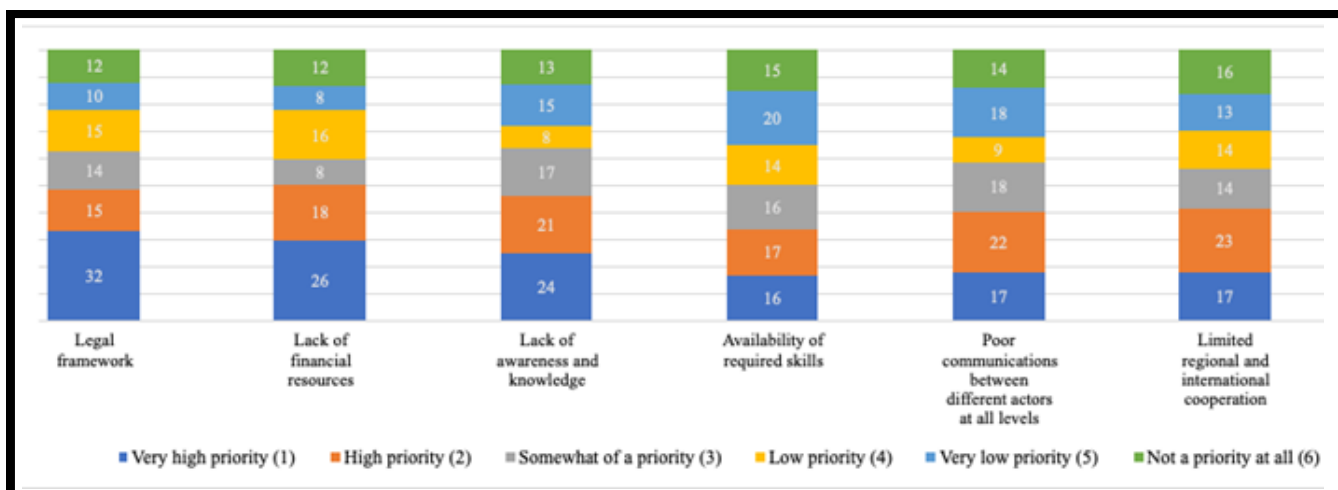
Source: Results from the public consultation. 98 respondents

3.5. Public perception about Challenges and priorities in implementing WEFN practices

A number of challenges were investigated within the survey as the respondents were asked to order them according to their priorities from their views. An effective legal framework was placed as number one priority to address by 32.7% of respondents in order to ensure that WEFN practices in the EU-MPC region are implemented in a transparent, accountable and equitable manner. 26.5% believe that the lack of financial resources should rather be prioritized as it hinders the implementation of WEFN practices in the region, while 24.5% believe that the main priority that should be addressed is the lack of awareness and knowledge about WEFN practices in the region. Only 17.4% of respondents believe that poor communication between different actors at all levels and limited regional and international cooperation can be major barriers to their effective implementation and their sustainability. Interestingly, ‘availability of required skills’ does not seem to represent a major challenge for WEF practices as only 16% place it as number one priority, whereas 20% regarded it as a “very low” priority (Figure 10)

[19] These figures were obtained by combining the measurement scales "agree" and "strongly agree"

Figure 10: Main challenges facing WEFN practices in the EU-MPC region in order of importance (on a scale from 1 to 6)



Source: Results from the public consultation. 98 respondents

3.6. Public perception about importance of regional cooperation in WEFN practices

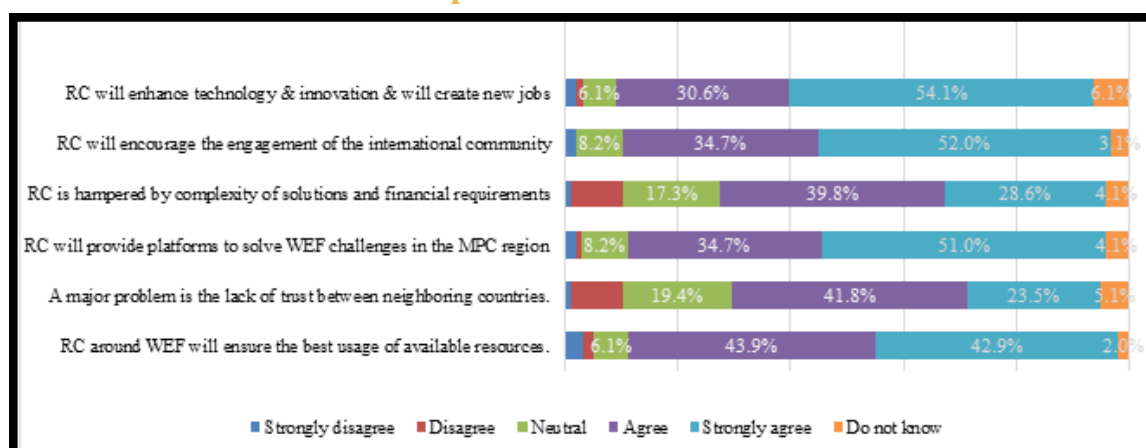
To emphasise the importance of regional and international cooperation in WEFN practices, respondents were asked about what they perceive as benefits and challenges in this cooperation (Figure 11). Most respondents “strongly agree” on the benefits of regional cooperation (RC) around the WEF which will:

- improve technology and innovation and create new jobs (54.1%)
- encourage the engagement of the international community to provide technical support through training, knowledge transfer and financial support (52%);
- provide platforms for young people and NGOs, researchers and civil society to exchange and share their experiences in order to solve the WEF challenges in the region (51%) ; and
- allow the best use of available resources (42.9%)

Respondents believe that the main constraints to reaching cooperative solutions around the WEF are:

- its complexity and financial requirements (68%)[20] ; and
- the lack of trust between neighbouring countries (65%)[21]

Figure 11: Public perception on the importance of regional and international cooperation around the WEF



Source: Results from the public consultation. 98 respondents

[20]These figures were obtained by combining the measurement scales "agree" and "strongly agree".

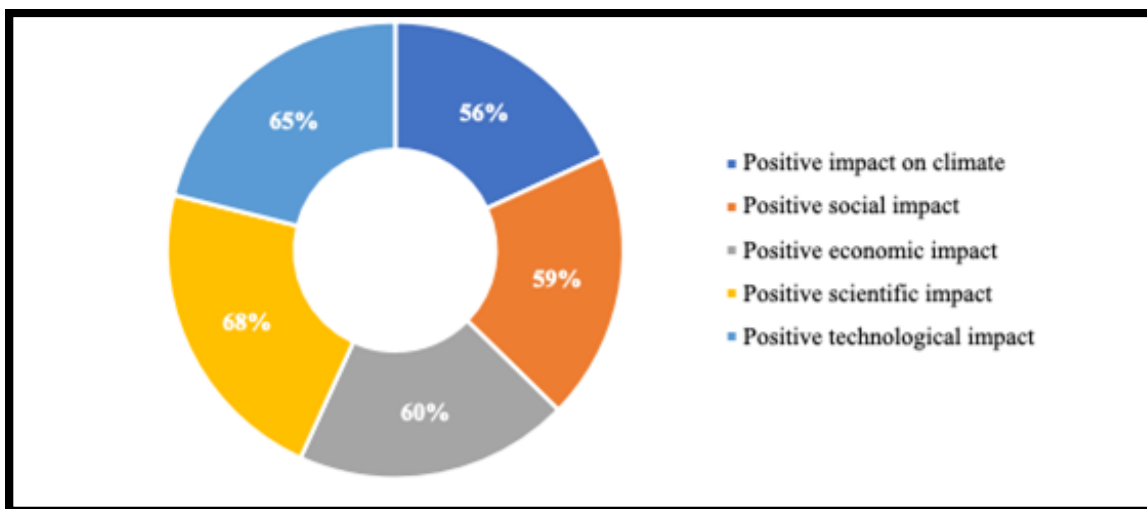
[21] Ibid

3.7 Public perception on the impacts derived from the WEFN practices implementation: WEF CAP project outputs validation

The fourth section of the questionnaire aims to collect perceptions about the impacts of the WEFN approach to help draw recommendations but also to validate the results obtained through the WEF-CAP project outputs. The outputs were presented in the form of statements and respondents were asked to state their agreement/disagreement on a scale.

Respondents agree that the implementation of a WEFN integrated approach in dealing with the scarce resources in the EU-MPC region has many expected and significant positive impacts on climate (56%), economic growth (60%), scientific progress (68%) and technological (65%) development as well as on society (59%) (Figure 12).

Figure 12: Public perception on the importance of regional and international cooperation around the WEF



Source: Results from the public consultation. 98 respondents

The questionnaire then provided more details on each of these implications and respondents provided their perception on what types of impact they would expect[22].

1. Impact on Climate: most respondents believe that implementing WEFN practices leads to more efficient use of water resources (90.8%), helps alleviate food insecurity (81.6%), and contributes to better energy efficiency and reduced negative environmental impact (77.6%).
2. Economic impact: most respondents believe that the implementation of WEFN practices generates innovation and sustainable growth (87.8%), creates more and better jobs (80.6%) and has the potential to leverage investment (74%). 82.7% believe that best practices driven by the Public-private WEF partnerships can raise more funding to ensure their implementation compared to those of solution providers.
3. Scientific impact: 75.5% of respondents believe that WEFN practices with a regional coverage approach are more likely to generate new knowledge than practices with a national/local approach, whereas those with an international coverage approach are more likely to focus on stimulating the dissemination of knowledge and strengthening human capital, than those with a national/local approach.
4. Social impact[23]: 75.5% of respondents believe that WEFN practices are more likely to generate societal impact. Respondents believe that those practices with an international coverage approach are less likely to consider political priorities than WEFN practices with a regional coverage approach (51%), but more likely to address WEFN challenges (56%).

[22] These figures were obtained by combining the measurement scales "agree" and "strongly agree"

[23] Social impact is defined as: 1. addressing EU-MPC policy priorities & WEFN challenges through Research & Innovation (R&I); 2. delivering benefits & impact on WEFN via R&I clusters; and 3. strengthening the uptake of WEFN R&I by society..

In brief, as respondents point out, the implementation of a WEFN integrated approach can help promote better resource management, reduce emissions and the risk of natural disasters, promote sustainable energy production as well as economic growth and the development of new technologies while bringing greater social cohesion and better access to resources and job creations thus helping to reduce inequalities in the region. However, the implementation of this approach encounters many challenges, as stated by many respondents, such as the inadequacy of the existing legal and institutional frameworks to ensure the integrated management of natural resources by strengthening multi-sectoral cooperation at all levels, the lack of political will to prioritize mitigation and adaptation measures, the insufficiency of financial resources and the lack of public awareness around WEF consumption and implementation of WEFN practices as well as limited regional and international cooperation.

4- Conclusion

Addressing the complex challenges of the WEF requires a multidisciplinary and integrated approach in order to identify potential trade-offs and synergies between these three sectors and prioritize actions that maximize benefits and minimize negative impacts. This will enable the implementation of an integrated planning and management strategy taking into account the interdependencies between water, energy and food, thus ensuring the sustainable use of resources.

It is clear that these findings validate the outputs that have been produced by the project in terms of mapping of WEF best practices which was conducted with the aim of identifying the pivotal issues and driving trends that make them suitable for replications in the Mediterranean region to address the future challenges posed by the WEFN. It also confirms that the WEFN integrated approach, as advocated by the project's policy briefs and white papers, is the most effective measure to face the challenges of climate change in the region given the scarce resources[24]. Undoubtedly, although the WEFN approach is still in its early phase, it has a lot of potential within the EU-MPC region. WEFN practices can prove to have environmental, societal and economic impacts on their communities and represent a source of knowledge and learning lessons that will help reduce the learning curve and facilitate their replication and implementation across the region.

In this regard, several initiatives were highlighted by respondents that could be adopted in the EU-MPC region to address the challenges of the WEF, including but not limited to:

- implementing water conservation and management strategies, such as water reuse systems, rainwater harvesting, installation of low-flow plumbing fixtures and implementation of leak detection programs, which can help reduce water consumption and address water shortages. It is essential to encourage farmers to adopt more efficient irrigation practices and to invest in desalination plants to increase the supply of drinking water.
- promoting the use of renewable energy sources such as solar, wind and hydroelectric power, in order to diversify the energy mix and reduce dependence on imported fossil fuels. This can help address energy shortages while reducing greenhouse gas emissions and mitigating the impacts of climate change. Governments can offer incentives such as tax breaks, grants and feed-in tariffs to encourage the development of renewable energy infrastructure.
- stimulating sustainable agricultural practices, such as crop rotation, organic farming, and the use of drought-tolerant crops to help conserve water resources and improve soil health, which can lead to increased crop yields and improved food security.

[24] Please refer to the list of publications at the following link: <https://www.enicbmed.eu/projects/wef-cap>

5- Policy recommendations

The analysis derived from the respondents' contributions collected as part of this public consultation could be considered as the “roadmap” for MPCs on how to tackle the climate change impact while adopting the WEFN integrated approach which has accumulated a consensus around its importance and effectiveness from different stakeholders (represented in the respondents type).

At the national level, governments of MPCs need to consider the following recommendations:

1. It is crucial to prioritize remedying the inadequacy of the legal framework to ensure transparent, accountable and equitable implementation of WEFN practices in the EU-MPC region while strengthening governance and the institutional framework to ensure their effective management. This requires, as stated by many respondents, political will among policy and decision-makers to achieve sustainable development by creating an enabling environment for allocating part of the national budget to climate change adaptation and mitigation efforts. As respondents pointed out, governments could lead this effort by creating inter-ministerial committees to support the development of new regulations and policies adapted to the future, that can resolve the existent environmental and resources challenges while providing integrated solutions aimed at mitigating nexus-related risks.
2. The urgency of preserving biodiversity and natural resources in the face of global warming requires adopting measures with an immediate impact despite the cost. As stated by most respondents in the survey, balancing the benefits as well as the economic and environmental costs against the financial cost is key to finding effective solutions. Not only the economic impacts of repairing climate losses and damages could be even greater with long- and medium-term actions, but some damages will be irreversible for the environment.
3. There is a need to work towards the inclusion of mitigation measures in any national strategy, such as restricting/limiting fossil-fuels usage in large firms, providing incentives for low-carbon technologies and inventions, implementing Carbon-tax emission on large firms and implementing efficient and targeted subsidies on water and energy consumptions. This latter should be taken with caution, according to many respondents, to avoid any potential negative impact on poor communities. While the MENA region is one of the most water-constrained regions in the world, it has the lowest water tariffs in the world, due to the heavy government subsidies (which consume almost 2% of the GDP). Hence, targeted efficient measures such as “Smarter subsidy for water” for drinking, agriculture and industrial usage should be designed.
4. In fact and as stressed by respondents, there is a need to raise awareness on water scarcity and more generally to change the culture about WEF consumption. Due to low water tariffs, there is both huge water-waste (an estimate of 30% to 50% of generated water is wasted[25] and water overuse in most MPCs countries. This requires active communication through media and government announcements (through traditional media, TV & Radio but also through social media campaigns) and more transparency.
5. More generally, it is important to raise awareness about the various issues related to climate change (such as its various causes and impacts and mitigation and adaptation measures), as well as the implementation of WEFN to the general public. The starting point should be through education and integrating this information within schools' curriculum across the MPCs. In fact, many respondents stressed on the importance of integrating climate change, its impacts and mitigation measures in the national curriculum in order to provide the knowledge, skills, values and attitudes necessary for young people to act as agents of change, thus participating effectively in the transition towards climate-positive societies.

[25] Zafar, Salman. 2021, Water Scarcity in MENA, EcoMENA. <https://www.ecomena.org/water-scarcity-in-mena/>

This requires including climate change education in all educational institutions and making it a mandatory part of the national curriculum as a key climate risk mitigation strategy that could potentially be a more effective way to reduce emissions.

6. Moreover, transparency and credible information sharing is essential in raising public trust. Leveraging different communication channels and educational tools to enable them to make informed decisions to reduce their own environmental footprint is key to the success of this approach. In this regard, more public awareness campaigns should be conducted, according to many respondents, by governments, international organizations and NGOs in addition to the integration of best practices addressing WEF challenges (such as reducing water and energy consumption) into youth education.

7. Official data and reports on climate-related risks, essential to support research aimed at improving the understanding, modelling and prediction of the climate system and informing decision-making, should be available and accessible to the general public, as well as to researchers and innovators seeking to find effective solutions to WEF challenges. More generally, further efforts are needed to transfer all issues related to climate change from the scientific community to society at large, rather than allowing the media to treat these issues superficially.

8. Governments, civil society and the private sector should be encouraged to invest in training programs, as recommended by respondents, to promote sustainable practices while improving skills and knowledge, thereby creating a culture of sustainability. This may include capacity building workshops and training targeting different groups in different sectors such as policy and decision-makers, professional staff, entrepreneurs, practitioners and workers to support the implementation of an integrated WEFN approach.

9. It is important to foster a culture of innovation and knowledge by stimulating the innovation activities of small and medium enterprises in the field of WEFN, which will require strengthening the partnership between the public and private sectors to increase the volume of investments in innovation. This implies, as mentioned by respondents, investing in research and development of new technologies and practices that improve resource efficiency, such as smart irrigation systems, renewable energy solutions, and sustainable farming practices.

10. Clearly, there is a need to strengthen stakeholder engagement and collaboration to overcome the challenges of the WEF. Governments and stakeholders in the region should engage with local communities, civil society organizations and other relevant actors to understand their needs and concerns and integrate their perspectives into decision-making processes thus ensuring social inclusion and equity. As stated by respondents, this can help ensure that interventions are context-specific, participatory and sustainable and that benefits are equitably distributed among all stakeholders, including vulnerable populations, such as rural communities, women and marginalized groups.

Respondents emphasize the various benefits of regional cooperation around WEFN, from improving technology and innovation, creating jobs, to encouraging engagement with international community which should leverage technical and financial support, providing platforms for youth and civil society to engage in the fight against climate change, and provide a better and more effective way of usage of scarce resources. However, as pointed out by many respondents, there are some challenges which should be addressed. At the regional level, the following recommendations should be considered:

1. MPCs governments should seek further regional cooperation around the WEF, as it will further develop innovative and inclusive solutions in the region ensuring the best use of available resources while contributing to the creation of much needed jobs.
2. As raised by most respondents, the complexity of the financial requirements often represent a constraint within regional cooperation agreements, which could discourage parties from engaging in these cooperation. Hence, it will be important to facilitate and simplify the financial procedures and provide sufficient financial tools that will support the cooperation.
3. According to many respondents, any international or regional agreement should include climate change mitigation measures aimed at increasing energy efficiency and renewable energy to mitigate the impact on climate, thereby reducing greenhouse gas emissions.
4. As several respondents indicated, international organizations can play an important role in supporting WEFN initiatives by providing funding, technical assistance and knowledge sharing, facilitating cross-border cooperation and coordination, and supporting capacity building efforts to help local actors better understand and implement the WEFN approach. Therefore, international organizations should be included in dialogues and strategies, and ensure that their efforts are better aligned with local needs and priorities. This can be achieved through regular consultation and engagement, as well as fostering partnerships and collaborations (scientific, technical and/or other).
5. Youth, as respondents pointed out, can play an important role in promoting regional cooperation and building trust among countries in the region in diplomacy efforts. The initiative may involve creating a platform for young people from across the region to come together to deliberate on the opportunities and challenges of embracing a nexus approach and develop solutions.
6. Last, but not least, it is important to engage in communication to facilitate the cooperation between neighbouring countries. As raised by most respondents, lack of trust and disagreements could hinder regional cooperation. For example, the MENA region shares most of its fresh water resources (aquifers) with its neighbours hence cooperation around these shared resources and transparent communication will be essential to achieve the most beneficial outcomes for all parties.

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