



WATER-ENERGY-FOOD-ECOSYSTEM (WEFE) NEXUS TO INCREASE FOOD SYSTEMS' RESILIENCE TO CLIMATE CHANGE AND CONFLICT'S CASCADING EFFECTS IN THE MEDITERRANEAN REGION

WEBINAR OUTCOMES

KEY MESSAGES

- **Being a hotspot for highly interconnected climate risks, the Mediterranean region is affected by climate change significantly more than the world average**, which endangers the sustainable provision of water, energy, food and ecosystem services. In a context of population growth, the demand for water, food and energy in the Mediterranean is projected to increase by over 50 percent by 2050,¹ leading to competing needs in a region already deeply impacted by food and water shortages. All currently projected pathways of climate change will exacerbate climate-related risks in multiple systems and economic sectors in the region, amplifying current pressures on local ecosystems, economies and human wellbeing.²
- Linkages between conflicts and control over natural resources are deeply rooted in history, and recent wars and crises have put even more pressure on Mediterranean food systems. There is a **need for transformation towards sustainable food systems that embrace a WEFE nexus approach to promote peace, recovery and resilience**, characterized by interdisciplinary research and knowledge sharing, to be applied in practice through the collaboration of all stakeholders. The holistic, integrated and transversal approach to natural resource management embodied by the WEFE Nexus represents a paradigm shift in the international development agenda, **moving from disjointed sectoral development interventions to a more integrated resource management and sustainable use**, which recognizes and balances between the different goals, interests and needs of people and the environment.
- **Nexus collaborative models or processes entail high-level political will supported by a sound governance system.** The nexus approach acts as a platform for synergistic decision-making, where diverse stakeholders are actively engaged through an inclusive process of dialogue supported by reliable science, data evidence and scenario building.
- **Bridging the nexus knowledge gap** requires capacity building and combined action by the scientific community, policymakers and practitioners on the ground. From a sustainable food systems perspective, trade-off analysis is key to addressing the nexus, and science-based debates can help reveal the most pressing issues and prioritize those areas where all four sectors can work together. However, a greater involvement of social and economic actors in trade-off analysis exercises is needed. Findings and lessons learned from demonstration sites on the ground may represent possible ways towards better theory-practice linkages and a broader stakeholder engagement.
- **Technological innovation and nature-based solutions spearheaded by the private sector** have the potential to democratize data generation and use and to minimize costs for the sustainable management and restoration of natural resources. Such innovations must be complemented by sound governance to minimize the risk of negative environmental externalities and social inequalities. For this transformation to happen, there is a need for financial innovation in de-risking and investment mechanisms that target innovative agri-food businesses and incentivize WEFE nexus solutions.

SPEAKERS

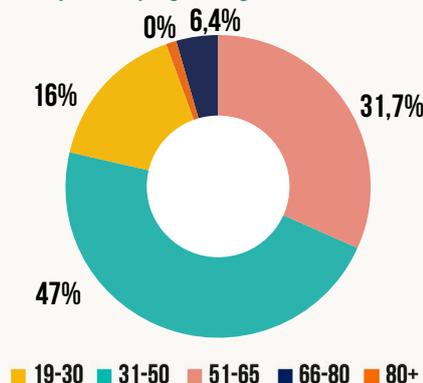
 <p>Sasha Koo-Oshima Deputy Director, Land and Water Division, FAO</p>	 <p>Domitille Vallée Chief Technical Adviser, FAO Regional Office for Near East and North Africa Project: <i>Water efficiency, productivity and sustainability in the NENA regions (WEPS-NENA)</i></p>	 <p>Ramy Boujawdeh Chief Operating Officer, Berytech</p>
 <p>Dimitris Faloutsos Deputy Regional Coordinator, Global Water Partnership Mediterranean (GWP-Med) Theme Leader on <i>Transboundary, WEFE Nexus, and Environment</i></p>	 <p>Mona Fakh Director, Water Resources, Ministry of Energy and Water of Lebanon Chair, UfM Task Force on WEFE Nexus</p>	 <p>Rabi Mohtar Dean, Faculty of Agricultural and Food Sciences, American University of Beirut (AUB) Research Professor, Departments of Biological and Agricultural Engineering, Texas A&M University</p>
 <p>Almotaz Abadi Water Managing Director, Union for the Mediterranean (UfM)</p>	 <p>Moderator: Maroun El Moujabber Scientific Officer, CIHEAM Bari Chair, PRIMA Scientific Advisory Committee</p>	

Participation statistics | 250 participants from 42 countries. Of which, 208 participants from 18 Mediterranean countries.

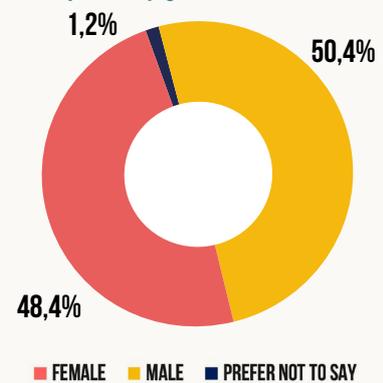
Number of participants by stakeholder group



Participants by age range



Participants by gender



THE CONTEXT: UNDERSTANDING THE WEFE NEXUS

Opening remarks and technical background to the panel discussion were provided by:



[Partnership for Research and Innovation in the Mediterranean Area \(PRIMA\)](#)

represented by Ms Antonella Autino, Programme Coordinator.

PRIMA Foundation implements a joint programme to build research and innovation capacities and to develop knowledge and innovation solutions for agriculture and food systems in the Mediterranean area. The WEFE Nexus is one of PRIMA's thematic areas alongside water management, farming systems, and agri-food value chain. Since 2019, PRIMA has devoted a significant budget (approximately EUR 20 million) for the WEFE Nexus theme and intends to streamline the nexus approach across most PRIMA calls for project proposals. PRIMA research and innovation activities are underpinned by a strong commitment to national, regional, and international networking, and are open to collaboration and synergies among researchers, governmental agencies and private stakeholders. The strategic goal is strengthening innovation capacity, aligning national programmes and critical mass engagement within PRIMA participating countries.



[Food and Agriculture Organization of the United Nations](#)

[Food and Agriculture Organization of the United Nations \(FAO\)](#)

represented by Ms Sasha Koo-Oshima, Deputy Director, Land and Water Division.

FAO is a specialized agency of the United Nations system established in 1945 that aims at achieving food security and raising levels of nutrition and standards of living for all people, securing improvements in the efficiency of production and distribution of agri-food products, and contributing toward expanding world economy and ensuring humanity's freedom from hunger. FAO's work in land and water is relevant to several dimensions of sustainable development, such as the governance and management of food production systems; the provision of essential ecosystem services; food security; human health; biodiversity conservation; and the mitigation of, and adaptation to, climate change. With a view to drawing attention to the interrelated nature of global resource systems, FAO is exploring how the WEFE nexus can support food security and sustainable agriculture worldwide.

The opening remarks presented the technical background for this webinar, highlighting how **the Mediterranean region is affected by climate change significantly more than the world average, endangering the sustainable provision of water, energy, food and ecosystem services.** In a context of population growth, the demand for water, food and energy in the Mediterranean is projected to increase by over 50 percent by 2050,³ with the Southern Mediterranean currently accounting for 40 percent of the region's energy demand and set to expand to 61 percent by 2050.⁴

Water is a key driver of development for the whole Mediterranean region: food and energy production depend on water availability, and water has a major impact on employment in the region, considering that jobs in agriculture, forestry, inland fisheries and food manufacturing are heavily water dependent.⁵ However, exacerbated by the ongoing climate emergency, water scarcity and water stress are common challenges for most Mediterranean countries. The Middle East and North Africa (MENA) region has the lowest rate of renewable internal freshwater resources (513 cubic meters per capita),⁶ and is one of the largest net importers of cereals in the world.⁷ Such trends are of increasing concern, considering that agriculture is the largest user of water in the region, especially in the southern Mediterranean (76 percent) and in the Eastern Mediterranean (79 percent).⁸ Competing needs for scarce resources already affected by climate change impacts will exacerbate regional dependencies on imports and international trade markets.

Furthermore, the unfolding crisis in Ukraine and the ongoing fallout from the COVID-19 pandemic have disrupted commodi-

ty markets and led to an increase of food and energy prices, threatening global food security, and jeopardising sustainable development and resource efficiency, putting even more pressure on Mediterranean food systems. Addressing this situation effectively necessitates urgent, deeper, and more substantial transformation to sustainable food systems.

THE WEFE NEXUS REPRESENTS A PARADIGM SHIFT IN THE INTERNATIONAL DEVELOPMENT AGENDA

The close linkages between conflicts and natural resources are deeply rooted in history: oftentimes, wars and conflicts have been triggered by clashes around the control of national resources, since the ancient Roman and Greek civilizations but also during the post-industrial period. It can be estimated that around 1 300 conflicts⁹ have taken place over the control of water resources, and food-related wars can still be counted worldwide. This shows how water, energy and food, and the nexus between them are vital to human beings and humanity. However, there is a need to promote WEFE as a "peace and cooperation" nexus, characterized by interdisciplinary research, knowledge sharing and capacity building, through collaboration among all stakeholders for greater resilience.

In this context, a better management of interconnected resources shall be ensured. This requires an integrated approach, i.e. the "nexus" approach, allowing decision-makers to gain relevant and accurate information about trade-offs and synergies, which can help identify options to manage resources more sustainably. Such **holistic, integrated and transversal approach to resource management embodied by the WEFE Nexus represents a paradigm shift in the international development agenda**, moving from sectoral development interventions to a

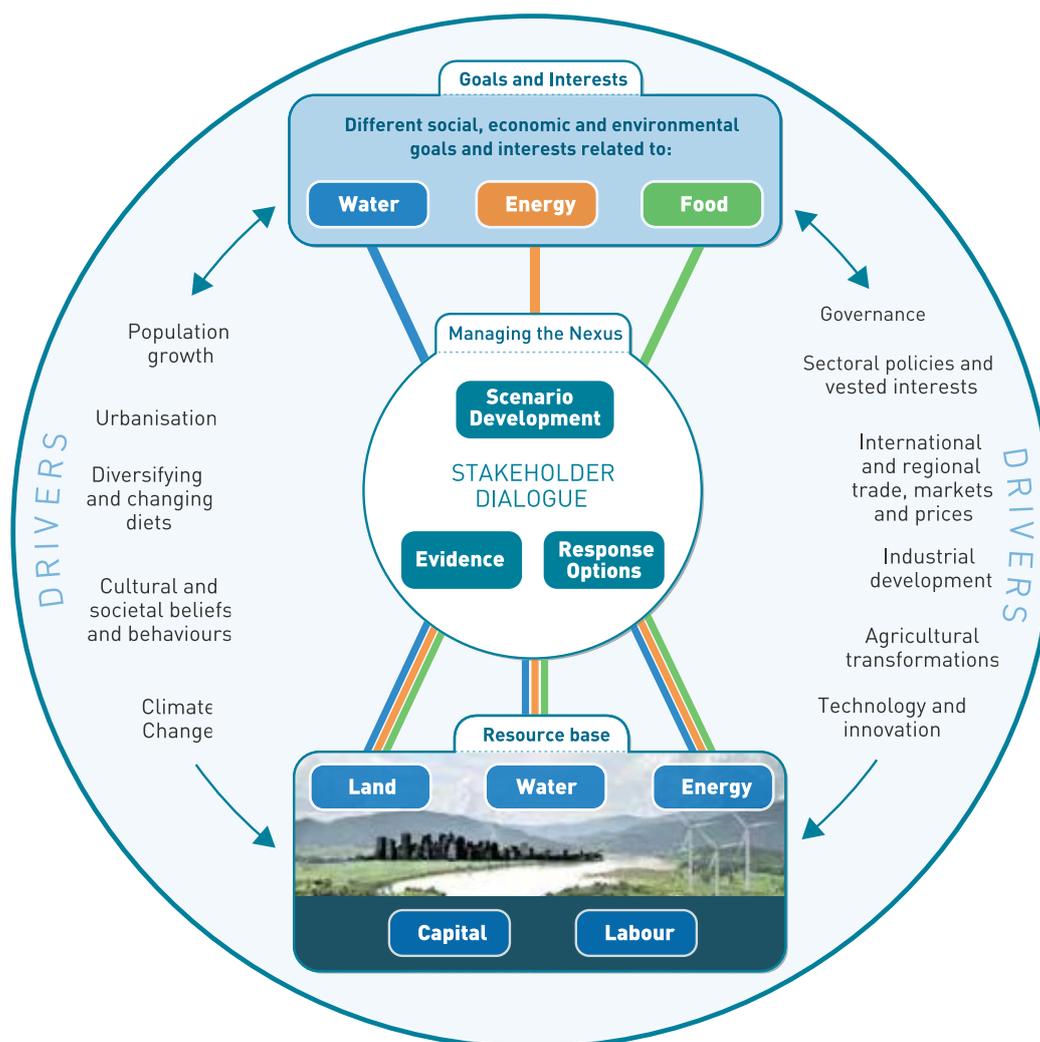
more integrated resource use, pivotal to a successful transition to a green economy. The WEF nexus approach uses various context-specific solutions based on horizontal (inter-Ministerial coordination) and vertical (multi-level governance) interventions that will contribute to the achievement of the Sustainable Development Goals (SDGs) and the Paris Agreement. Post-COVID-19 recovery as well as combating climate change can profit from WEF approaches leading to improved management of natural resources, while delivering human rights, economic prosperity, decent jobs and wider well-being, along with the effort to address pressing environmental challenges and improve the environmental health and resilience of societies.

To this effect, the WEF Nexus highlights interdependencies across water, energy and food security and natural resources (water, soil, land), identifying mutually beneficial responses based on informed data and transparent frameworks to determine appropriate policies that weigh trade-offs, maximize synergies,

and balance the different goals and interests of resource users' (industrial, agricultural, domestic, urban), while maintaining the integrity and sustainability of ecosystems.

The nexus concept is considered as a means to evaluate trade-offs between issues not from one perspective only but considering all the sectors equally. As shown in Figure 1, **FAO's Water-Energy-Food (WEF) approach is a holistic vision of sustainability that recognizes and tries to strike balance between the different goals, interests and needs of people and the environment.** It addresses complex interactions and feedback between human and natural systems. Nexus interactions are managed through dialogue among stakeholders, and based on three pillars: evidence, scenario development and designing and appraising response options. Interactions take place within the context of globally relevant drivers as well as more context-specific drivers.

Figure 1 The FAO approach to the Water-Energy-Food Nexus



Source: FAO. 2014. The Water-Energy-Food Nexus. A New Approach in Support of Food Security and Sustainable Agriculture. Rome, FAO. fao.org/3/a-bl496e.pdf

OUTCOMES OF THE PANEL DISCUSSION

The webinar aimed to address the following key question: **how could the application of the WEFE nexus influence food systems transformation in the Mediterranean towards increased resilience to climate change and conflicts?** The panel discussion allowed to provide elements from the experience of several groups of stakeholders.

WEFE NEXUS APPLICATION: FROM THEORY TO PRACTICE

Key elements for moving from theory to the concrete application of the WEFE Nexus were presented by:



FAO Regional Office for Near East and North Africa

represented by Ms Domitille Vallée, Chief Technical Adviser for the project “Water efficiency, productivity and sustainability in the Near East and North Africa region – [WEPS-NENA](#)”.

The mission of FAO in the Near East and North Africa is to achieve sustainable food security for all and to help vulnerable communities cope with and recover from shocks and crises. To do this, FAO helps Member States to work toward sustainable increases in agriculture production, minimize depletion and degradation of already scarce natural resources, boost rural development and reduce food loss and waste. FAO is helping governments to face food and agriculture-related challenges by improving the capacity of countries to collect, produce and analyse data for policy formulation. FAO also provides direct support to improve the livelihoods of millions of small farmers and rural communities, especially in countries undergoing conflict where the Organization helps farmers and their families to recover from crises.



Union for the Mediterranean (UfM)

represented by Mr Almotaz Abadi, Managing Director – Water.

Since the 2017 Ministerial declaration on Water, UfM has led the development of a regional Water Agenda to address the problem of water poverty and ensure access to safe drinking water as a basic need for sustainable development. The [UfM Water Agenda](#) comprises four priority nexuses, namely WEFE; Water-Employment-Migration; Water Supply, Sanitation, and Hygiene; and Water and Climate Change Adaptation. It sets out a series of technical and financial recommendations, which aim to ensure that each country receives the necessary technical, administrative, and financial advice to help it achieve water security for its populations and their economic activities. The Agenda is accompanied by a Financial Strategy for Water that aims to facilitate investments and enhance the financial sustainability of the water sector.

As illustrated above, water, energy and agri-food systems are deeply intertwined, especially in the Mediterranean region. A WEFE Nexus approach is critical in moving towards more sustainable agrifood systems. Several dialogues held in preparation for the UN Food Systems Summit in 2021 throughout the Mediterranean emphasised the need to promote the WEFE Nexus approach and its practical implementation in land and water management, and to mainstream it in national and regional strategies.¹⁰ Moving the WEFE Nexus from theory to practice is a complex task; however, the elements presented below can be instrumental.

HIGH-LEVEL POLITICAL WILL

Interlinkages across sectors (water, food, energy) and the natural resources base (water, land, soils) are not yet adequately reflected in policies. Research and science have developed integrated models and assessment tools to generate evidence about the importance of adopting an integrated approach to food systems transformation, but their uptake by governments and policymakers in decision-making processes is still low. Therefore, a first critical requirement is **high-level political will to drive inter-sectoral engagement**. In the MENA region, an example of political will is reflected in the set up in 2019 by the League of Arab States of the High-Level Joint Water-Agriculture Technical Committee, with support from FAO and the United Nations Economic and Social Commission for Western Asia (ESCWA), and making the WEF Nexus one of its priority areas.

MULTI-STAKEHOLDER DIALOGUE AND COLLABORATION

In addition to political will, a successful implementation of the Nexus requires the involvement of a wide range of stakeholders in cross-sectoral approaches, policies, and commitments, also beyond the WEFE-related sectors, enhancing collaboration and communication between scientists, decision makers and users of natural resources and ecosystem services. Coordination and collaboration across sectors and the **active engagement of stakeholders through a broad dialogue process** enables the four sectors (water, energy, food, and environment) to exchange and understand each other’s views and perceptions, overcoming possible disagreements and misunderstanding, aligning towards co-benefits, and fostering partnerships at the global, national and local level.

SCIENCE-PRACTICE LINKAGES

To this effect, it is paramount to provide stakeholders, including communities, decision-makers and the private sector, with evidence that demonstrates the collective benefits of adopting a nexus transformative approach rather than a “silo” approach with disjointed sectoral actions. Research and innovation are key to understand the complexities of the nexus approach and demonstrate concrete, feasible and sustainable solutions. Science is needed to substantiate the multi-stakeholder dialogues with evidence. **The role of scientific research is very important in bridging the nexus knowledge gap**, quantifying nexus critical

interlinkages and interactions, and identifying trade-offs and possible synergies to support evidence-based policymaking. Science-based debates can, indeed, help reveal the most pressing issues and prioritize those areas where all four sectors can work together. In the research world, trade-off analysis is key to addressing the Nexus: however, social and economic actors are often not involved in trade-off analysis exercises conducted by the academia and research. Findings and lessons learned from demonstration sites on the ground may represent possible ways towards better theory-practice linkages and a broader stakeholder engagement.

CROSS-SECTORAL DATA COLLECTION AND ANALYSIS

Additionally, suitable data on WEFE nexus interactions is also needed in order to assess and analyse nexus performance, revealing unsustainable paths, and unintended consequences of individual sector's strategies over the others. The lack of exact and uniform data is a key hurdle to the technical implementation of the WEF nexus. Precise socio-economic and environmental data is required to undertake a WEF nexus study on a sectoral and inter-sectoral scale, but several countries have poor data availability and accuracy. Building on existing and planned observation systems around the world and supporting the development of new data systems, tools and services is essential for integrated cross-sectoral data collection and analysis to influence policy development. The engagement of local stakeholders is pivotal in this interface, as they are in the position to provide first-hand **reliable data that can inform stakeholders' dialogues and be used to develop different scenarios** looking at social, economic and environmental factors and also taking into account uncertainties such as climate change.

SUSTAINABLE INNOVATIONS

To adapt to recent and future climate change impacts, **investments in innovations for water and energy infrastructures** are increasing. However, the sustainability of these solutions needs to be assessed and **complemented by sound governance to mi-**

nimize the risk of negative environmental impacts and social inequalities. For example, digital IT solutions, such as satellite remote sensing to increase water productivity are being implemented by stakeholders on the ground. Alternative nature-based solutions should be considered in future planning for the optimization of ecosystems and to contribute to circular economy, including non-conventional and renewable water resources, such as wastewater reuse. Concrete examples include recycled nutrients (nitrogen and phosphorus recovery), methane capture systems, biogas, aquifer recharge and wetland restoration and conservation. For example, wetland ecosystems have the capacity to contribute to carbon sequestration twice more than forests, as well as to flood and draught mitigation, and to water purification, by retaining and dissipating sediment and nutrient loading.¹¹

The role of soil was also highlighted: good soil quality is key for food security and sustainable management of water resources. The advancement in terms of the characterization of soil and the long-term impact of agro-environmental characteristics help achieve better engagement of soil as a nexus tool for its role in water and food security.

Other innovations that promote the nexus approach for more sustainable agrifood systems consist in business models that reduce the reliance on blue water and the use of new water (brackish, waste and green water) for food production, considering the implications for nutrition, energy use, as well as the impact on soil health.

To summarize, a concrete shift towards sustainability would entail that nexus collaborative models or processes become part and parcel of development planning at local, regional and national levels. To do so, high-level political will, supported by a sound governance system and informed by science and data are key to ensure that the WEFE Nexus is integrated and mainstreamed in planning, monitoring and evaluation systems at all levels.

HIGH-LEVEL JOINT WATER-AGRICULTURE TECHNICAL COMMITTEE

COLLABORATION / ARAB STATES

The [High-Level Joint Water-Agriculture Technical Committee \(HLJTC\)](#) is the technical arm of the Joint Water-Agriculture Ministerial Council of the League of Arab States that elaborates regional policies and programs to ensure proper coordination and coherence between water and agriculture policies, with support from ESCWA and FAO. During its first meeting in October 2019, the HLJTC has adopted five priority areas for its work on agriculture and water: water allocation in agriculture, water productivity, efficient water usage, use of non-conventional water in agriculture, water-energy-food nexus. Aside from establishing the policy action framework and programming priorities for the water-agriculture nexus in the Arab region, the HLJTC is developing an action plan for the period 2021- 2025, as well as guidelines for sustainable allocation of water resources for agriculture.

WATER EFFICIENCY, PRODUCTIVITY AND SUSTAINABILITY IN THE NENA REGIONS (WEPS-NENA)

EXPERIENCE /  NEAR EAST AND NORTH AFRICA

The [WEPS-NENA project](#), funded by the Swedish International Development Cooperation Agency (SIDA) and implemented by FAO under the [NENA Water Scarcity Initiative](#), aims to contribute to transformational change and strategic planning in managing natural resources in eight countries (Algeria, Egypt, Jordan, Iran, Lebanon, Morocco, Palestine, and Tunisia). It addresses regional priorities through three main interrelated components: assessing water situation efficiency and productivity, understanding how agriculture practices can be improved to produce more with less water, and integrating Water-Energy-Food through a nexus approach. The project tested the use of an integrated water-food-energy-climate-ecosystem nexus model in Jordan and in the Moroccan region of Souss-Massa, which was developed in a collaborative manner by the Stockholm Environment Institute (SEI) and the Royal University of Stockholm (KTH) with the local stakeholders, including a dialogue process and close interaction for data collection and analysis between model developers and local practitioners. The project succeeded in generating the political will to enable key governmental bodies to engage in the process of shared learning, data sharing and knowledge creation. At sub-national level, this process has proven easier, with the committed engagement of local stakeholders who led the generation of models and scenarios for more trusted results. The project is also using a Community of Practice ([dggroup](#)) to share knowledge and collect shared data at country and regional levels. The project's strategy is to facilitate change by creating or customizing the necessary tools, skills and capacities and by helping countries to develop the momentum needed to adopt new ways of dealing with water scarcity. To this effect, the project has demonstrated that a WEF Nexus dialogue is an enabler to build trust among stakeholders, understanding and managing agreements and disagreements, and informing trade-offs, which need to be tackled from the multiple WEF perspectives, thus limiting the risk of conflicts.

NEXUS FRAMEWORK AND ICT TOOLS IN LEBANON

EXPERIENCE /  LEBANON

FAO has supported the American University of Beirut (AUB) in a [study](#) to identify and quantify the critical interconnections between water, energy and food systems in Lebanon, and to develop a framework to assess the trade-offs associated with adopting interventions within current water, energy, and agriculture portfolios and practices. Using scenario development tools, the study recommended a number of areas to be explored such as alternative water resources, land reclamation options, as well as improvements of high-yielding nutritious crops, but most of all it recommended multi-sectoral stakeholder engagement and cross-government collaborations as requirements. Within this framework, FAO, the International Water Management Institute ([IWMI](#)) and other partners embarked on a [project](#) focusing on the use of remote sensing and other ICT tools to improve water productivity in Lebanon (among other countries). In partnership with the Lebanese Agricultural Research Institute ([LARI](#)), FAO has developed a mobile app that integrates geo-specific weather data, extracts crop evapotranspiration values, and translates technical data into readable irrigation schedules, helping farmers to optimize agricultural water use. The app provides farmers with information about how much they need to irrigate in the next seven days, as well as details on crop evolution and health using FAO's open-access portal for monitoring Water Productivity through Open access of Remotely sensed derived data ([WaPOR](#)).

PRIVATE BUSINESSES AND FINANCE SECTOR'S CONTRIBUTION TO THE WEF NEXUS APPLICATION

The perspective of the private sector was provided first-hand by:

 **Berytech** represented by R amy Boujawdeh, Chief Operating Officer.

Established in 2002, Berytech supports innovative companies to scale up and shape the tech and innovation scene in Lebanon and the MENA region with the ultimate goal to create jobs. Berytech offers an ecosystem for entrepreneurs, providing a dynamic environment for the creation and development of start-ups and small and medium enterprises (SMEs), fostering innovation, technology and entrepreneurship, from the idea stage to internationalization. Berytech supports innovation and works with scientists, researchers and entrepreneurs leading them to think beyond silos, adopting a WEF Nexus approach. Berytech has organized hackathons, dialogues, bootcamps, living labs, and has collaborated with universities, research institutions, and ministries to understand how the WEF Nexus can be mainstreamed in practice on the ground.

Partnerships between the private and the public sectors must be leveraged to apply the Nexus approach in practice on the ground, engaging stakeholders from sectors such as engineering, information and communication technology (ICT), science, social sciences such as economics, and fostering cross-fertilization and collaborative approaches. The gap between science and practice should be filled using applied sciences as a driver of change, but ensuring, at the same time, a bottom-up approach that reflects the perspective of farmers and agri-food businesses and addresses their needs.

Policies have the power to inspire and drive transformation, and they need to be coupled with finance, both business-to-business (B2B) and government-to-business (G2B), to operationalize their strategic priorities. Working at the interface between public sector, businesses and investors, Berytech fosters and promotes research and innovation for commercialisation, trying to attract investments in businesses that propose WEFE nexus solutions to produce food more sustainably and access new markets. However, being agri-food a high-risk business due to many variables (weather and climate, trade disruptions, etc.), **polymakers need to promote de-risking and financing mechanisms to foster investments in companies as incentives to transform agri-food systems through WEFE nexus solutions.**

Nowadays, many agri-food businesses in the Mediterranean region recognize the need to innovate sustainably in order to maintain a long-term growth, but are failing to establish the neces-

sary links with other stakeholders, such as the public sector and research organizations. Many obstacles and challenges are hindering this process, such as a lack of communication and of mutual understanding, or variations in the dynamics of the various sectors. As mentioned above, multi-stakeholder dialogue is key to overcome these hurdles and challenges, bringing together the various goals and interests into projects or programmes that can simultaneously boost the entrepreneur's business model while also helping to break down the WEFE nexus complexities. Such collaborative processes should help examining the circumstances, constraints, and opportunities for the private sector's effective engagement in promoting the nexus, and proposing concerted strategies for moving forward. The skills and talents already present in the region shall be used locally to generate transformative change from within, using the WEFE Nexus as a tool to create opportunities

and jobs in several sectors, ensuring food security through more sustainable production and consumption (including waste management).

Investment efficiency is a must: the private sector can play a key role to advance **technological innovation** (through artificial intelligence, machine learning, etc.) that can lead to the democratisation of data generation and use and to a minimization of costs for the best possible use of natural resources. **Financial innovation** is also needed: financing mechanisms need to be defined to upscale proven solutions. Private funds managed by foundations and not-for-profit partnerships can assist in launching new ventures.

TECHNOLOGICAL AND FINANCIAL INNOVATION ARE KEY TO ADOPT WEFE NEXUS SOLUTIONS

MENA REGIONAL INNOVATION HUB (MENA RIH)

COLLABORATION / MIDDLE EAST AND NORTH AFRICA

As part of the [Water & Energy For Food Grand Challenge \(WE4F\)](#), a joint international initiative of the German Federal Ministry for Economic Cooperation and Development, the Foreign Ministry of the Netherlands, SIDA, the US Agency for International Development (USAID), and the European Union (EU), the [Middle East and North Africa Regional Innovation Hub \(MENA RIH\)](#) was launched and it is run by Berytech, [Chemonics Egypt](#), [cewas](#), and the International [Water Management Institute \(IWMI\)](#). The Hub supports mid-to-late-stage enterprises to scale ground-breaking innovations that positively impact food security in an environmentally sustainable way, using less water and more sustainable energy to produce more food, protect biodiversity and mitigate the effects of climate change, while providing opportunities to women, youth and the poor. Through WE4F, innovators from the MENA region can now access the financial support, technical support, and investment matching necessary to make food production and farming more sustainable, productive, and bountiful. Supported projects must fulfil strict environmental, social, and governance (ESG) criteria, have positive effects on the environment, strive for gender equality and inclusion, and ensure secure access to food for all.

The panel discussion benefitted from the views provided by:



[Global Water Partnership – Mediterranean \(GWP-Med\)](#) represented by Dimitris Faloutsos, Deputy Regional Coordinator.

Established in 2002 as the Mediterranean branch of the inter-governmental organisation Global Water Partnership (GWP), GWP-Med works at the regional, transboundary, national, basin and local level, promoting action and facilitating dialogue on integrated water resources management, providing technical support to policy making, implementing demonstration activities, and contributing to skills and knowledge development. Strategic priorities include adaptation to climate vulnerability and change, and river basin/transboundary water management. Gender and youth issues, as well as private sector participation in water financing, are also key, cross-cutting issues for GWP-Med. Moreover, GWP-Med facilitates a multi-stakeholder platform that brings together almost 100 water institutions and organisations, including 10 major regional networks of different water disciplines.



[Ministry of Energy and Water of Lebanon](#) represented by Mona Fakhri, Director, Water Resources.

The Ministry of Energy and Water manages the affairs related to water, electricity, oil, minerals, mines and quarries in the country. Moreover, the Ministry is responsible for water management, development of strategies, policies and plans for the water sector in Lebanon, through the planning, formulation, financing, and management of national water strategies and policies. Under the Directorate General of Hydraulic and Electric Resources, the Water Directorate is responsible, inter alia, for monitoring and managing the state and usage of water resources as well as the quality and standards of surface and groundwater, managing major water facilities, developing and implementing drinking water and irrigation projects, conducting research, and fostering investments. Lebanon is leading the UfM Water Agenda's Task Force on the WEFE Nexus, which assists UfM Member States towards meeting water-related socio-economic challenges, promoting climate resilience responses while assisting women and youth towards job creation as a contribution for improving livelihoods and tackling migration impacts.

The role of science is important to foster the WEFE Nexus through a deeper understanding of the interrelations among the different sectors contributing to natural resource management. Scientific data is crucial, but not sufficient per se. Despite progress in data collection over the last decade, data analysis and use remain difficult and science-based tools and data are not adequately understood by policymakers. To this effect, **capacity building and awareness raising of all stakeholders are key so that the outputs of scientific work and research on the WEFE Nexus can be thoroughly incorporated in policies and mainstreamed on the ground** through practice, actively involving local communities and civil society. In this context, science shall guide and inform the decisions of institutional bodies that define systematic and clear roadmaps, determining strategies and action plans for implementing projects that can bridge science with practice on the ground.

Science-based evidence can indeed help governments and civil society better understand the interactions and trade-offs among different sectors. Moreover, **governance is of utmost relevance for taking decisions on how to address diverse, often conflicting objectives and interests and power dynamics that condition relations between sectors and actors**. However, governance gaps still exist, and fragmented and "independent" approaches to governance lead to uncoordinated policies and unsustainable practices in the management of natural resources and to the risk of creating new silos. Even in cases where interdependencies are

described in policy documents, oftentimes the organizational structure of the ministries leads to disjointed sectoral strategies and financing mechanisms, due to complicated bureaucracy or lack of common methodologies. In the case of Lebanon, for example, while energy and water agendas are part of the same ministry, dialogue between the stakeholders of this two sectors is still a challenge).

Multi-stakeholder dialogue and integrated, multi-stakeholder resource planning should rely on the identification of **entry points**

MULTI-LEVEL GOVERNANCE IS NEEDED TO ADDRESS DIVERSE OBJECTIVES AND INTERESTS

for a specific geographical area, as the most relatively valuable sector to the society, which usually has the highest political and societal weight. In some cases, such entry point can be identified and used as the leading sector, around which the active participation of other sectors will revolve, with the

engagement of all stakeholders, not only administrators, but also producers' associations, civil society, and local businesses. For example, during a consultation for the [GEF-UNEP/MAP Me-dProgramme](#) implemented in Lebanon (see box below), energy was acknowledged as the entry sector for analysis and for setting the targets that will determine the overall objectives of the other nexus sectors, namely water, food and ecosystems, through a WEFE Nexus Inter-ministerial group.

Experiences of the nexus approach in the [Balkans](#), in [Lebanon](#) and in Morocco have demonstrated that integrated planning and

appropriate scale (whether local, national, regional) are necessary to build trust and common understanding among stakeholders to encourage cooperation. Implementing solutions at national level is often more complex than starting to build these processes at local or territorial level. As **the WEF Nexus requires to build a common understanding, it is relevant to start local and gradually move to bigger scale**: cities are a key “ecosystem” in this context, encompassing a wide range of stakeholders such as food consumers, land use planners, energy planners, food retailers, etc., and local dialogues are a good entry point.

In transboundary settings, not addressing trade-offs and externalities may result in friction between countries and reduced trust, at best hindering regional development and, at worst, generating conflict. Conversely, a nexus (or cross-sectoral) approach to managing common resources could greatly enhance water, energy and food security in riparian and bordering countries, including by increasing resource use efficiency, capitalizing on regional complementarities, and improving natural resource governance. It is, therefore, important to **coordinate all interventions at regional level**, with the help and collaboration of all

the relevant institutions (such as FAO, UfM, PRIMA, GWP-Med, etc.) that support and fund projects at the local and regional level, implementing solutions to better manage WEF-related resources, improving at the same time socio-economic conditions in the Mediterranean region. Building on ongoing efforts, a new decision-making support tool for WEF nexus management and governance could improve the resilience of territories and their capacity to adapt to ongoing crises and climate change. This would require mainly:

- Increased stakeholder involvement in co-creation of effective solutions underpinned by a nexus framework and enhanced by a stronger socio-economic element, while contextualized within their policy/governance frameworks;
- Capitalization on previous research and coordination of existing activities and experiences through a broad range of Mediterranean projects and case studies;
- A balanced representation of EU and non-EU Mediterranean stakeholders in order to upscale research outcomes and activities to integrated Mediterranean solutions promoting WEF-Nexus thinking in policymaking and governance.

THE MEDITERRANEAN SEA PROGRAMME: ENHANCING ENVIRONMENTAL SECURITY (MEDPROGRAMME)

EXPERIENCE /  MEDITERRANEAN

The [MedProgramme](#) is a USD 43 million assortment of seven child projects funded by the Global Environment Facility (GEF) with more than 100 coordinated actions at regional and national levels in the 2020-2024 period. The programme is also supported by the European Bank for Reconstruction and Development (EBRD) and the European Investment Bank (EIB), and beneficiary countries are: Albania, Algeria, Bosnia and Herzegovina, Egypt, Libya, Lebanon, Morocco, Montenegro, Tunisia, and Turkey. The [United Nations Environment Programme’s Mediterranean Action Plan \(UNEP/MAP\)](#) is the executing agency of the programme, alongside partners such as [UNESCO Intergovernmental Hydrological Programme \(IHP\)](#), the [International Union for Conservation of Nature’s Centre for Mediterranean Cooperation \(IUCN-Med\)](#), [GWP-Med](#), [WWF Mediterranean](#), and the UNEP/MAP Regional Activity Centres. Within this framework, [MedProgramme Child Project 2.2](#) addresses the management of the WEF Nexus in Mediterranean coastal zones and has the potential to assist countries in setting the basis for coordination among the relevant institutions, and in outlining priorities for collaboration. In Lebanon, this is envisioned by the recently approved Water Code, which aims at fostering interlinkages among the water, energy and food sectors, as well as the setup of a national water council.

PRIMA-FUNDED PROJECTS ON THE WEF NEXUS

EXPERIENCE /  MEDITERRANEAN

- [NEXUS Nature Ecosystem Society \(NEXUS-NESS\)](#): this project gathers 13 partners and aims at the co-production and co-demonstration of WEF Nexus asset plans for a fair and sustainable allocation of natural resources. NEXUS-NESS deploys trans-disciplinary methods and multi-sector scenarios by integrating large scale and river basin scale ecosystem-hydrological models for building a dedicated service to operationalize the proposed WEF Nexus approach, namely the NEXUS-NESS Service. NEXUS-NESS will implement and test this Service in four demonstration sites in Italy, Spain, Egypt and Tunisia.
- [SIGMA-Nexus](#): this project contributes to economic, social and technical (including hydrological and ecological) aspects of both theoretical and applied research on resilient and productive agro-ecosystems. In innovation, by designing and supporting the innovation digital portal, it will strengthen cross-sectoral communication, improve coordination between research and policymaking, and support scalability and technology diffusion. In action, a training program and participatory multi-stakeholder workshop will facilitate innovation adoption and uptake of best WEF Nexus practices. The project features a demonstration site in Greece (Lake Kournas, Island of Crete), and two in Egypt (El Minia and Behera Nubariya).

- *mAnaging Water, Ecosystems and food across sectors and Scales in the sOuth Mediterranean (AWESOME)*: this project aims to develop a decision-analytic platform based on a multi-level, integrated WEF model to better understand multi-sectoral WEF trade-offs and to capitalize on potential synergies, also exploring the interdependencies and feedbacks across a hierarchy of spatial scales, from the macroeconomic development of the Mediterranean region, to national scale, to regional planning at river basin scale, down to the single farm. The platform will allow simulating the impacts of alternative WEF planning portfolios composed of regional policies, river-basin strategic planning options, and innovative technological solutions demonstrated at the local scale, to generate shared economic, environmental, and societal benefits. The research within AWESOME has the potential to reinforce local food production by shortening the supply chain, bridging the gap between food sources and food demand, and reducing water waste in a water-scarce area. The case studies are being implemented near Cairo, in Egypt, a country characterised by an arid climate and high water deficit and aim to demonstrate the potential of innovative technological solutions, such as hydroponics and aquaponics, in producing more crop (and fish) with less water.
- *LEarning and action alliances for NexuS EnvironmentS in an uncertain future (LENSES)*: this project gathers 13 partners and it aims to contribute to improved water allocation, enhanced food security while preserving ecosystems and aiding climate change adaptation, by supporting the operationalization of the Nexus paradigm (from Nexus Thinking to Nexus Doing) through a collective learning process, which integrates the concepts of sustainable Nexus management (progressing SDGs) with a resilience-oriented approach, leading decision-makers in accepting uncertainty as integral part of management and decision-making. This is carried out in six demonstration sites distributed across the Mediterranean basin (in Greece, Israel, Italy, Jordan, Spain, Turkey), which cover a wide range of environmental, socio-economic and socio-technical conditions that are relevant across the whole Mediterranean area.

GoNEXUS PROJECT

EXPERIENCE /  GLOBAL

[GoNEXUS](#) is a 4-year Horizon 2020 project supported by the European Commission. Through eight in-depth case studies using river basins in Europe and Africa, the project developed an evaluation framework to design and assess innovative solutions for an efficient and sustainable coordinated governance of the water-energy-food-ecosystem nexus. As for the Mediterranean region, case studies were selected in Spain (Júcar and Tagus-Segura river basins), and Italy (Lake Como basin). These studies, which analyse the combinations of global and river basin models and nexus dialogues at different scales, provide accurate evaluations of future scenarios. The use of models and geo-spatial data and information including land use and socio-economic pathways, facilitates nexus dialogues to inform policymaking on best optimal solutions. Coherent policy framework and consultative participatory processes at all levels are, indeed, needed for successful implementation of the proposed solutions.

INTER-REGIONAL TECHNICAL PLATFORM ON WATER SCARCITY (iRTP-WS)

COLLABORATION /  GLOBAL

FAO has recently launched the [inter-Regional Technical Platform on Water Scarcity \(iRTP-WS\)](#) to support countries and regions in scaling-up relevant water-related actions, programmes, and policies to cope with water scarcity and food insecurities amid the unprecedented challenges of climate change and socio-economic vulnerabilities, due to disasters and instability. The iRTP-WS brings together various actors from different countries and regions to work together drawing on their collective knowledge and resources in an action-oriented and result-based partnership.

THE WAY FORWARD: THE WEF NEXUS COMMUNITY OF PRACTICE

The panel discussion benefitted from the views provided by:



[American University of Beirut - Faculty of Agricultural and Food Sciences \(FAFS\)](#)

represented by Rabi Mohtar, Dean.

FAFS is committed to promote and disseminate knowledge through higher education, research, and outreach in food and agriculture, nutrition and public health, agribusiness, landscape architecture, environment and natural resource management, and community and rural development. FAFS is home to Departments of Agriculture, Landscape Design and Ecosystem Management, and Nutrition and Food Sciences as well as two multidisciplinary centres: the Environment and Sustainable Development Unit (ESDU); and the Advancing Research Enabling Communities Centre (AREC). In addition, FAFS initiated the establishment of the interfaculty Nature Conservation Centre for Sustainable Futures (NCC) as an open, innovative and collaborative platform that promotes conservation and sustainable use of biodiversity for the purpose of enhancing the well-being of people and nature.

In order for a nexus approach (connecting water-energy-food as the means of synergising among the different sectors) to be adopted, improved communication is needed, allowing decision-making to move from conflict to cooperation.

As stated during the [WEFE Nexus Science Advances Conference](#), organised by the European Commission, UfM, GWP, the Cyprus Institute and PRIMA in September 2021 a WEFE Community of Practice would be a catalyst to facilitate the operationalisation of the WEFE Nexus in the region through a **more systemic and integrated way of thinking and acting**, ensuring that nexus solutions emerging from research and innovation activities can be applied broadly across the region. As an immediate follow-up to the WEFE Nexus Science Advances Conference, PRIMA supported the establishment of the **WEFE Nexus Community of Practice (NCoP)**, to be steered by a Core Group of organizations (the European Commission's Joint Research Centre (JRC), the EC's DG Research and Innovation, and UfM), led by PRIMA. This community, deployed at different demonstration sites, to achieve the widest possible coverage across the Mediterranean region, will promote knowledge sharing, as well as the deployment and replication of regional demonstrators of WEFE-related concepts and solutions in the region, and incentivise the cross-sectoral management of water, energy, food, and ecosystem resources to increase coordination across sectors.

The NCoP will hinge on the main pillars of the WEFE Nexus (policy analysis, data/tools, and stakeholder dialogue), maintaining some basic principles such as: systemic and integrative view based on inclusiveness (horizontal and vertical); trans-disciplinarity; definition and quantification of interconnectivity among WEFE sectors; multi-stakeholder engagement (including research, finance, technology). The multiple discipline of the WEFE sectors will converge into the NCoP, which will be of a multi-stakeholder and inclusive nature. Members of the NCoP will strive to understand and describe interconnectivities and trade-offs using data, in order to address and solve WEFE Nexus challenges. Moreover, the NCoP will be a key instrument for training all stakeholders in systems thinking, also in the perspective of communicating the nexus way of thinking to advocate for the NCoP with potential investors.

The community of practice will provide a space to enhance the coordination among sectors at country level, with the key involvement of regional actors, including scientists, researchers, and policymakers in order to mainstream the WEFE Nexus into regional frameworks and programmes. This Mediterranean NCoP will build on and synergize with existing networks and communities on the topic, such as the [Discussion Group](#) on the Water-Energy-Food Nexus created in the framework of the FAO project "Water efficiency, productivity and sustainability in the Near East and North Africa regions (WEPS-NENA)".

SFS-MED PLATFORM

COLLABORATION /  MEDITERRANEAN

The [SFS-MED Platform](#) is a multi-stakeholder initiative co-led by FAO, CIHEAM, UfM and PRIMA as an affiliated project of the One Planet Network's SFS Programme. The Platform is a forum for multi-stakeholder dialogue and collaboration, a network for strengthening knowledge sharing and capacity building, and a catalyst for regional cooperation on priority themes for sustainable food systems transformation in the Mediterranean. The SFS-MED Platform is open to all food systems stakeholders in the Mediterranean region and aims to create a community to leverage and share the knowledge, experience and skills of food systems actors across the Mediterranean region towards concerted action for the sustainable transformation of food systems.

Contact the [SFS-MED Platform's Coordination Desk](#) for further information about the modalities of engagement.

MEDITERRANEAN WEFE NEXUS COMMUNITY OF PRACTICE (NCoP)

COLLABORATION /  MEDITERRANEAN

The [Mediterranean WEFE Nexus Community of Practice \(NCoP\)](#) is a multi-stakeholder community that will ensure that Nexus solutions emerging from research and innovation activities can be applied broadly across the region. The NCoP is steered by a Core Group (EC JRC, EC DG Research and Innovation, and UfM) led by PRIMA. The Core Group will guide the overall activities of the NCoP and facilitate the network's vision, development and future directions through monitoring and evaluating the impact of the initiative. The daily operations of the NCoP will be managed by an Implementation Team, responsible for building the community and engaging with its members to promote discussions and projects that will be deployed at different demonstration sites, to achieve the widest possible coverage across the Mediterranean region. Contact the SFS-MED Platform's Coordination Desk for further information about the modalities of engagement.

ACKNOWLEDGEMENTS

This webinar was designed within the framework of the SFS-MED initiative. Deep appreciation is due to the SFS-MED Platform's Coordination Desk (CIHEAM, FAO, PRIMA, UfM), with a specific mention for the *ad hoc* team who curated the design of this webinar: Antonella Autino (PRIMA), Laura De Matteis (Food Systems and Food Safety Division – ESF, FAO), Ali Rhouma (PRIMA), Tommaso Mattei (ESF, FAO), Jacopo Schürch (ESF, FAO), Alessandra Sensi (UfM), Giovanni Stanghellini (PRIMA), José Valls Bedeau (ESF, FAO).

The graphic layout is by Simone Mari.

NOTES

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RESOURCES

The recording of the webinar is available at this [link](#) and the agenda of the webinar is available at this [link](#)

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The SFS-MED Platform is an affiliated project of the One Planet Network's Sustainable Food Systems Programme



This document was produced with financial assistance from the Ministry of Foreign Affairs and International Cooperation of Italy. The contents of this publication are the sole responsibility of FAO and can in no way be taken to reflect the views of the Italian Government.



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