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WES-BCA
Water and Environment Support - Biodiversity and Climate Action
in the Neighbourhood South region

Demonstrating the WEFE Nexus Policy Advancements at national level

Activity Number: C1_HOR-1

WEFE NEXUS BACKGROUND REPORT

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WATER AND ENVIRONMENT SUPPORT – BIODIVERSITY AND CLIMATE IN THE NEIGHBOURHOOD SOUTH REGION

The regional EU funded "Water Environment Support-Biodiversity and Climate Action (WES-BCA)" project is the continuation of WES project and capitalises on the experience of three more successful predecessor regional EU funded projects SWIM-Horizon2020 SM, SWIM SM and Horizon 2020 CB/MEP. It supports the countries of the Southern Neighbourhood Region in addressing the improvement and protection of the environment, the restoration of biodiversity and the management of scarce water resources, while enhancing the resilience to climate change in the Mediterranean region, strengthening the formulation and enforcement of the relevant policies of the Partner Countries (PCs) and the two regional political frameworks, namely the Union for the Mediterranean (UfM) and the Barcelona Convention. WES-BCA will enhance the capacity of relevant stakeholders in order to support them in formulating and implementing policies in the aforementioned issues, raise awareness, increase knowledge and improve public understanding, stimulating behavioural changes needed for appropriate climate action and environmental protection. WES-BCA has two components which will run hand-in-hand:
COMPONENT I (Water, Biodiversity and Environment) with the specific objectives:

- to promote an integrated approach to biodiversity protection/restoration and pollution reduction/prevention
- to manage more efficiently scarce water resources in the Southern Neighbourhood

COMPONENT II (Communication and Outreach) with the specific objective:

- to raise awareness and better understanding by the general public (and specific segments of the population) including youth and women are promoted stimulating adoption of appropriate behaviours and attitudes towards improved climate action and effective environmental protection.

DISCLAIMER:
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ABBREVIATIONS

ADF	Agricultural Development Fund
AF	Adaptation Fund
AFD	Agence France de Development
AfDB	African Development Bank
AI	Artificial Intelligence
AR5	IPCC Fifth Assessment Report
CB/MEP	Capacity Building / Mediterranean Environment Programme
CBO	Community Based Organisations (s)
CC	Climate Change
CCA	Climate Change Adaptation
CIF	Climate Investment Funds
CSR	Corporate Social Responsibility
DFC	Development Finance Corporation
DRR	Disaster Risk Reduction
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EEA	European Environment Agency
EIAs	Environmental Impact Assessments
EIB	European Investment Bank
ENI	European Neighbourhood Instrument
ESG	Environment, Social and Governance
EU	European Union
EUR	Euro
FDI	Foreign Direct Investments
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Green House Gas
GSS	Green Social Sustainable
GW	Giga Watt
GWP-Med	Global Water Partnership – Mediterranean
ICT	information and communication technology Artificial
ICZM	Integrated Coastal Zone Management
IFC	International Finance Corporation
IoT	Internet of Things
IPCC	Intergovernmental Panel on Climate Change
NAMA	Nationally Appropriate Mitigation Action
MAD	Moroccan Dirham
MENA	Middle East and North Africa
MW	Mega Watt
NbS	Nature-based solutions
NDC	Nationally Determined Contributions
NGO	Non-Governmental Organisations
OECD	Organisation for Economic Cooperation and Development

PPP	Public-Private Partnerships
PV	Photo Voltaic
SME	Small and Medium Enterprises
SOM	Soil Organic Matter
TA	Technical Assistance
UfM	Union for the Mediterranean
UNEP-MAP	United Nations Environment Program - Mediterranean Action Plan
UNFCCC	United Nations Framework Convention on Climate Change
WB	World Bank
WEFE Nexus	Water Food Energy Ecosystems Nexus
WES	Water & Environment Support

0 SUMMARY

This study provides an assessment of the Water-Energy-Food-Ecosystem (WEFE) Nexus integration in three focus countries: Jordan, Lebanon, and Morocco. The core objective is to contribute to enhanced and interdisciplinary policy and institutional landscapes at the national level, and facilitate the implementation of the regional 'WEFE Nexus Strategy in the Mediterranean Source to Sea Continuum' (*aka* 'Strategy'). The Strategy was adopted by the 15th Meeting of the UfM Regional Platform on Water (5-6 November 2025, Barcelona) in view of the 2nd UfM Ministerial Conference on Water (24-25 March 2026, Rome), and is part of the MSSD (2026-2035) flagship initiative which was adopted at the 24th Conference of the Parties (COP24) of the Barcelona Convention (2-5 December 2025, Cairo). The report briefly introduces the WES-BCA project and its objectives as well as the partners to the assignment, describing the overall methodology of the study, emphasizing its role in informing regional dialogues and collaboration. It also highlights the significance of the WEFE Nexus to address complex interdependencies stemming from water scarcity, rising energy demand, food security, agricultural sustainability, and environmental/ecosystems degradation.

A more detailed examination of WEFE Nexus integration in a Source to Sea approach in the three focus countries, emphasizes challenges related to poor performance of sector services, siloed institutional structures, weak policies and enforcement, limited institutional provisions and capacities, lack of data and inadequate data sharing, insufficient stakeholder engagement, and political and financial constraints. It presents individual case studies highlighting integrated approaches, along with a comparative SWOT analysis to illuminate the strengths, weaknesses, opportunities, and threats associated with national WEFE policy advancements. The emphasis is on establishing a clear understanding of the current state and challenges within each country.

Taking a broader perspective, the analysis then shifts the focus on the alignment of national advancements with the Strategy. It presents a comparison of challenges and opportunities, revealing the extent to which national policies and strategies reflect the Strategy's principles. Potential priority actions are identified to stimulate new institutional arrangements, improve planning and financing mechanisms, and enhance informed decision-making processes through better data integration and stakeholder engagement.

Building on this, critical knowledge gaps and capacity-building needs are identified to inform future regional efforts. A synthesis is presented of key knowledge gaps and needs related to institutional governance and policy integration, effective planning and financing, and improved data, knowledge, and stakeholder engagement. Suggestions are made regarding capacity-building initiatives that will address these gaps, including training programs, knowledge hubs, improved data systems, and enhanced communication efforts to equip stakeholders with the necessary skills, knowledge, and tools for successful WEFE Nexus implementation.

Specific findings and recommendations to address gaps and needs are provided below.

MAIN FINDINGS

Governance and Policies

- Limited understanding and, thus, lack of impulse as well as limited know-how to develop and implement governance frameworks that can effectively coordinate across WEFE Nexus sectors and their spatial dimensions from Source-to-Sea.
- Existing multi-sector coordination mechanisms (e.g., sustainable development, climate change) often have weak WEFE mandates and are often overlooked when creating WEFE Nexus-specific frameworks, and vice-versa, thus limiting opportunities for policy coherence and institutional efficiency.
- Gaps in adapting sector-specific policies and regulatory frameworks that incorporate WEFE Nexus principles in a Source-to-Sea approach. This often leads to disjointed or conflicting strategies between sectors.
- Insufficient knowledge on decentralization processes and how to empower local authorities within the WEFE Nexus Action Framework. This results in weak local-level governance structures and limited engagement in WEFE Nexus issues.

Planning and Financing

Based on the above analysis, a number of challenges stand out with respect to planning and financing for WEFE Nexus implementation in a Source to Sea approach, including:

- Absence of coherent and cohesive frameworks that fully integrate the WEFE Nexus approach including its Source to Sea dimensions into national and sub-national planning and financing.
- Limited scaling of pilot initiatives resulting in slow mobilization of additional actors and realization of WEFE Nexus implementation on the ground at scale.
- Insufficient screening of, and guidance on, planned investments for WEFE Nexus co-benefits and climate resilience opportunities.
- Inadequate tools for assessing the economic and financial impacts of WEFE Nexus plans and projects, inhibiting investment and the implementation of market-based solutions.
- Knowledge gaps regarding the development and deployment of innovative financial instruments and incentives that can support WEFE Nexus-related projects.
- Lack of practical guidance and successful models of WEFE Nexus implementation and monitoring that truly work across sectors and scales.
- Challenges in executing multi-sectoral projects that effectively balance water, energy, food, and ecosystems needs considering also the spatial dimensions from Source to Sea.

Data, Knowledge, and Stakeholder Engagement

- Persistent challenges in accessing or obtaining reliable, consistent, and comprehensive data across WEFE sectors and synthesizing these to support evidence-based WEFE Nexus planning and decision making.
- Insufficient integrated data systems and Nexus-specific planning tools that are incorporating sector specific GIS and decision-support systems.
- Limited documented experiences or case studies demonstrating successful cross-sector collaboration, hindering the development and implementation of cross-sectoral initiatives.
- Limited dissemination, thus awareness, of related best practices and mechanisms, including their achieved benefits as well as the obstacles encountered, for fostering effective multi-sectoral communication, joint planning, and coordinated implementation.

- Limited stakeholder involvement in, and acceptance of, WEFE Nexus interventions and insufficient capacity-building initiatives undermining the understanding and implementation of the WEFE Nexus approach and leading to insufficient stakeholder coordination and empowerment.
- Lack of cross-sectoral, cross-national joint planning, execution, and monitoring of WEFE Nexus interventions.
- A scarcity of interdisciplinary research initiatives and educational programs that address WEFE issues and solutions, particularly in a Source to Sea approach.
- Insufficient emphasis on the interlinkages among WEFE challenges and solutions, hindering the acceleration of development, adoption, and use of modern technologies and innovations, including digitalisation and AI, relevant for WEFE Nexus planning and implementation.

RECOMMENDATIONS

Governance and Policies

1. **Strengthen WEFE Coordination Mechanisms**: Reinforce and institutionalize cross-sectoral coordination platforms by defining strong mandates, distributed responsibilities, and clear agendas and timetables for both their meetings and activities.
2. **Review and Update WEFE Sector Policies**: Systematically review and update existing sector policies and strategies, including those related to climate mitigation and adaptation, to incorporate WEFE Nexus interlinkages, cross sectoral synergies and shared priorities and opportunities, while ensuring alignment with national and regional processes' goals and objectives and combining top-down and bottom-up approaches to link policy design with local implementation and ensure local ownership.
3. **Align Sub-National Strategies**: Review mandates, composition, policies, and strategies on natural resources of sub-national authorities to ensure they reflect an integrated multi-sectoral WEFE Nexus approach that also improves climate resilience, including in planning, budgeting, and project implementation.
4. **Promote Integrated Governance Frameworks Training**: Provide training to policymakers, planners, and sector regulators on frameworks for WEFE cross-sectoral coordination in a Source-to-Sea approach, and build skills in designing inclusive, adaptive, participatory governance structures that enable multi-level stakeholder engagement.

Planning and Financing

5. **Undertake WEFE Multi-Sector Integrated Assessments**: Conduct integrated assessments at national and sub-national levels to support WEFE Nexus planning and cross-sectoral prioritization.
6. **Incorporate WEFE Priorities into natural resources and development Plans at appropriate levels**: Explicitly incorporate WEFE Nexus priorities into plans like for river and groundwater basin management, coastal zone management, local climate resilience, etc. including provisions for water allocation and efficiency, energy efficiency, food security, ecosystem services and, overall, multi-sector approaches to manage trade-offs among WEFE sectors fairly

and efficiently, applying a Source-to-Sea approach and using WEFE Nexus Roundtables to strengthen participatory and multi-stakeholder governance and create institutional anchors.

7. **Define Specific Scaling Mechanisms**: Define scaling mechanisms for targeted WEFE Nexus solutions that address critical interlinked issues sustainably taking into account different potential entry points such as: solar powered irrigation with enforced water abstraction limits, solar powered desalination with advanced brine management, treated wastewater reuse with crop quality controls, or multi-purpose use of reservoirs.
8. **Develop a Project Pipeline of Investment-Grade Initiatives**: Strengthening planning – financing linkages through creating a project pipeline with a focused set of WEFE Nexus interventions in a Source-to-Sea approach, utilizing screening tools for incorporating socio-economic benefits, that can attract public and private investment, including through PPPs, and align them with national financing frameworks, domestic financing partners requirements, development assistance partners' criteria, such as the EU NDICI/EFSD+ mechanism, GCF, etc.
9. **Engage Private Partners and Domestic Financial Institutions**: Explore opportunities and enhance facilitation for incorporating explicit WEFE Nexus criteria in investment screening and innovative private investment in WEFE Nexus projects, including facilitated by domestic and international financial institutions, so as to close the investment gap in Nexus related solutions, and promote private investment in WEFE Nexus-related projects, potentially using blended finance, climate finance, PPPs, support to start-ups and SMEs, public co-financing, tax breaks or subsidies.
10. **Mobilize International Support**: Seek additional financial support from international development partners, including the EU, for WEFE Nexus approach implementation, including infrastructure retrofitting, technology adoption, capacity building, etc.

Data, Knowledge, and Stakeholder Engagement

11. **Analyse Training Needs**: Conduct a thorough training needs assessment to identify gaps in WEFE Nexus in a Source-to-Sea approach knowledge and skills.
12. **Enhance WEFE Nexus Capacity Building for the range of stakeholders**: Develop and further advance capacity-building initiatives, based on the identified needs, including with support by regional partners and projects like EU WES BCA, GEF UNEP MAP MedProgramme, etc.
13. **Support WEFE Nexus Community of Practice (NCoP)** : Develop and facilitate, at appropriate levels, WEFE Nexus NCoP to share information and knowledge, assist stakeholders networking, facilitate co-creation of solutions, utilise structured results of demo projects and initiatives, identify 'champions', etc., including at Mediterranean level the WEFE Nexus CoP facilitated by the PRIMA WEFE4Med Project (www.wefe4med.org).
14. **Build Capacity to Use Digital Tools**: Building capacity in the use of digital tools (e.g., GIS, remote sensing, modelling software, big data, AI, digital twins, etc) for integrated natural resource management (planning, monitoring, and decision-making) towards advancing digital transformation[1], that can highlight synergistic solutions across water, energy, food, and

[1] A regional dialogue on 'Digital Transformation for WEFE Nexus' is ongoing, facilitated by the PRIMA projects ACQUAOUNT and TALANOA-WATER as well as the H2020 TRANSCEND projects and UfM

ecosystems. In this context, WEFE Nexus models such as Q-Nexus can be used to support scenario-based planning, helping stakeholders explore and compare trade-offs and synergies across water, energy, food and ecosystems in a structured way; such tools have already been applied in the MENA region.

15. **Support Cross-Sectoral Data Standardization**: Develop integrated and interoperable datasets, GIS and WEFE Nexus decision-support systems to enhance cross sector coordination and planning and train data collectors and managers operating in different sectors on data standardization, digital information platforms, and interoperable data and information systems across WEFE sectors that capture both trade-offs and synergies.
16. **Enhance Cross-Sectoral Communication Skills**: Developing communication and facilitation skills amongst government officials to foster inclusive stakeholder participation across WEFE sectors and regions.
17. **Adequately Inform Policy and Decision makers**: Improve skills and competencies in data analysis and visualization to demonstrate WEFE Nexus benefits, generate buy-in and create support for cross-sectoral evidence-based decisions in relation to the WEFE Nexus.
18. **Train Mediators**: Offer training in conflict resolution, negotiations, and consensus-building with a specific focus on WEFE Nexus conflicts and solutions.
19. **Promote Public Awareness**: Increase public awareness to overcome resistance on WEFE Nexus approaches, and encourage initiatives for solutions among farmers, local communities and businesses.
20. **Disseminate the WEFE Nexus Strategy** and engage in shaping and implementing its Action Framework towards shifting from WEFE Nexus thinking to WEFE Nexus doing, aligning Nexus actions with climate objectives, and creating practical opportunities to move from coordination to implementation, and from pilots to scale.

By implementing these recommendations, Jordan, Lebanon, and Morocco (and other Mediterranean countries) can work towards a more integrated and sustainable management of water, energy, food, and environmental resources in line with the Mediterranean WEFE Nexus Strategy.

1 INTRODUCTION

This section provides a brief introduction to the project "Water and Environment Support - Biodiversity and Climate Action (WES-BCA-BCA) in the ENI Neighbourhood South Region". It also provides the main purpose and objectives of this analysis as well as the methodology used.

1.1 WES-BCA OBJECTIVES AND C1_HOR-1 ACTIVITY

The "Water and Environment Support - Biodiversity and Climate Action (WES-BCA-BCA) in the ENI Neighbourhood South Region" project is a regional project funded by the European Union. Implemented in eight Countries in North Africa and the Middle East, WES-BCA aims to improve the protection of the environment, the restoration of biodiversity and the management of scarce water resources, while enhancing the resilience to climate change in the Mediterranean region, strengthening the formulation and enforcement of the relevant policies of the Partner Countries and the two regional political frameworks, namely the Union for the Mediterranean (UfM) and the Barcelona Convention.

The project will build on the experience and achievements of its predecessor projects (WES, SWIM-H2020 SM, SWIM SM, and Horizon 2020 CB/MEP) and provide continuity, further integrating new elements and institutional, scientific, and technical developments. The "integration" concept will be coupled with regional exchanges of good practices and lessons learned (regional activities) and the adapted, more focused, continuation of the WES work at the national level (country-specific activities).

The Water-Energy-Food-Ecosystem (WEFE) Nexus is vital for sustainable resource management in the Mediterranean, where water scarcity, rising energy demand, agricultural sustainability, and environmental degradation create complex interdependencies that require integrated and cross-sectoral solutions. Recognizing these challenges, the Union for the Mediterranean (UfM), the Barcelona Convention, and the European Commission have led the development of the Strategy for WEFE Nexus in the Mediterranean Source to Sea Continuum, with technical support provided by GWP-Med, WES-BSA and PRIMA.

A process of extensive consultation among stakeholders in the region, including national authorities, international organizations, and civil society, was facilitated. A key milestone in this effort was the 1st Regional WEFE Nexus Roundtable organised by GWP-Med, WES and partners, held in June 2023 in Rabat, Morocco, where participants underscored the need for a strategic framework to guide cross-sectoral integration, policy alignment, and sustainable resource management[2]. The draft Strategy has undergone further broad consultations at the 2nd Regional WEFE Nexus Roundtable in 2024 in Tunis[3], held in the margins of the 5th Mediterranean Water Forum, where regional and national players, representatives from local communities, financing institutions and academia gathered to assess the added value of the WEFE Nexus approach.

[2] https://www.gwp.org/en/GWP-Mediterranean/WE-ACT/News-List-Page/20232/Nexus-roundtable

[3] https://www.gwp.org/en/GWP-Mediterranean/WE-ACT/News-List-Page/2024/2nd-regional-roundtable-on-wefe-Nexus/

Following formal and multi-stakeholder consultations, the Strategy was adopted by the 15th Meeting of the UfM Regional Platform on Water (5-6 November 2025, Barcelona) in view of the 2nd UfM Ministerial Conference on Water (24-25 March 2026, Rome), and is part of the MSSD (2026-2035) flagship initiative which was adopted at the 24th Conference of the Parties (COP24) of the Barcelona Convention (2-5 December 2025, Cairo). A special reference and mandate for the drafting of an Action Framework for the implementation of the Strategy after its adoption has been included in the draft declaration concluded in the Ad Hoc Meeting of the Drafting Group of the UfM Ministerial Declaration on Water in the Mediterranean (Malta, 6–7 February 2025). The Action Framework, which would outline implementation measures, synergies and financing means, is expected to be elaborated in the coming months.

Although the Strategy establishes key principles and priorities, translating them into concrete actions at the national level in the Mediterranean remains a challenge, even in countries like Jordan, Lebanon, and Morocco where significant steps on WEFE Nexus have been observed. While the stated interest in the WEFE Nexus is strong across these countries, the degree of integration into national policies depends on local conditions, governance structures, and opportunities for alignment of national with regional initiatives.

1.2 PURPOSE AND OBJECTIVES OF THIS REPORT

This report is prepared within the framework of WES-BCA horizontal activity planned during 2025 titled "Demonstrating the WEFE Nexus Policy Advancements at national level", Activity Number: C1_HOR-1, which aims to assist in the advancement of policy and institutional settings for the WEFE Nexus at country level and contribute to the implementation of the Strategy on WEFE Nexus in the Mediterranean Source to Sea Continuum. It does so by assessing the state of WEFE Nexus integration in Jordan, Lebanon and Morocco and support cross-country learning on applied and anticipated solutions for advancing WEFE Nexus integration. GWP-Med synergizes in this activity through the GEF UNEP/MAP MedProgramme Child Project 2.2. on 'Mediterranean Coastal Zones: Managing the WEFE Nexus' that aims to promote WEFE Nexus and Source to Sea approaches, and the PRIMA WEFE4Med Project that aims to establish and facilitate a Mediterranean WEFE Nexus Community of Practice.

The specific objectives of the activity C1_HOR-1 are:

1. Strengthen national-level implementation of the WEFE Nexus by identifying institutional and policy challenges, including cross-sectoral governance barriers and integration gaps, in selected partner countries (Jordan, Lebanon, and Morocco). This includes assessing integration of WEFE Nexus principles into national frameworks, policy coherence, and institutional mechanisms, while exploring opportunities for cross-sectoral coordination, including in key sectors with emphasis on agriculture.
2. Enhance cross-sectoral collaboration and inter-ministerial coordination, strengthen governance and institutional mechanisms, and improve policy coherence in the WEFE sectors to facilitate coordinated planning and decision-making.
3. Enhance knowledge exchange and regional learning from successful approaches in WEFE Nexus integration also showcasing lessons learned, challenges, and solutions from different institutional models and governance approaches.

4. Foster dialogue on best practices and lessons learned to improve multi-sectoral governance, inter-agency cooperation, and stakeholder engagement.
5. Promote alignment between national strategies and regional frameworks, to ensure coherence with EU policies including the upcoming Water Resilience Strategy and the Mediterranean WEFE Nexus Strategy supported by the EU, the UfM and the Barcelona Convention/UNEP-MAP and facilitated by WES-BCA, GWP-Med, and PRIMA.
6. Generate actionable recommendations to support the broader Mediterranean WEFE Nexus implementation process, fostering continuity and sustainability in regional cooperation.
7. Identify key topics and knowledge gaps for capacity building in WEFE Nexus governance and implementation informing future regional efforts, including the planned physical event under WES-BCA regional activity titled "WEFE Nexus Best Practices in Agriculture - Learning from practical approaches of Northern Mediterranean countries" (Activity No. C1_REG/ST-5) and beyond, as applicable.
8. Strengthen the capacity of policymakers, technical experts, and relevant institutions by providing knowledge and insights that support the effective integration and governance of WEFE Nexus approaches at the national level while contributing to regional dialogue and cooperation. for the discussions to be held during the upcoming online events scheduled for September 2025.

This background document served as a foundational reference for the discussions during online events that took place in September 2025 and January 2026. Its findings will also support continuity with the physical event planned under WES BCA in 2026 (C1_REG/ST-5 "WEFE Nexus best practices in agriculture - Learning from practical approaches of Northern Mediterranean countries").

The document provides a broad assessment of WEFE Nexus integration in three focus countries: namely, Jordan, Lebanon, and Morocco focusing on national policies and governance structures. It also assesses the degree to which national WEFE Nexus policy advancements align with the priorities and principles of the Strategy, identifying areas where these could inform the future Action Framework particularly in terms of policy alignment, institutional coordination, and cross-sector collaboration. The document also identifies knowledge gaps, to be addressed during the online event while formulating key discussion points and preliminary capacity-building needs to support the development of actionable insights.

1.3 METHODOLOGY

First, based on available bibliography[4], this report examines national WEFE Nexus implementation in three focus countries (Jordan, Lebanon and Morocco), with a view to:

a. identify and summarize WEFE related national policies, strategies, and programs in the three countries,

[4] For Lebanon and Morocco, in particular, extensive assessments and studies elaborated by GWP-Med within the GEF UNEP MAP MedProgramme, was used as key bibliography. Similar, the 'Mediterranean Rapid Nexus Assessment' providing brief status reports for 12 countries, was also used as reference.

b. define key governance challenges related to cross-sectorial coordination, policy coherence and institutional alignment and implementation barriers,
c. analyse successful case studies, showcasing integrated approaches of the WEFE Nexus sectors and documenting highlight quantifiable impacts (if available), and
d. provide a comparative analysis of strengths, weaknesses, opportunities, and threats (SWOT) related to national WEFE policy advancements, and recommend related action points per country, linked to the priorities of the Strategy and as a contribution to the future Action Framework.

Second, this report reviews WEFE advances in the three focus countries against the Strategy, and:

a. assesses the degree of alignment of the national WEFE policy advancements in Jordan, Lebanon, and Morocco with the draft Strategy.
b. identifies areas where national frameworks can further reflect the Strategy's priorities and principles,
c. defines opportunities and challenges for integrating the Strategy within existing national frameworks, and
d. provides suggestions for integrating emerging national priorities and planned steps into the future Action Plan to support WEFE Nexus implementation.

Third, this report identifies critical knowledge gaps, and preliminary capacity-building needs, and to this end, it:

a. develops a structured knowledge framework to guide discussions during the online events planned under this activity, particularly in relation to institutional mechanisms, policy alignment, governance challenges, and cross-sectoral coordination,
b. consolidates key gaps related to institutional governance in support of WEFE integration, policy coherence within national frameworks, and cross-sectoral coordination among ministries and agencies and degree of alignment of national-level progress with the WEFE Strategy.
c. identifies preliminary capacity-building needs to enhance stakeholders' understanding of WEFE integration,

Fourth, this document provides recommendations on WEFE-related action points, linked to the priorities of the Strategy and informing its future Action Framework.

This Background Report has been developed through an interactive consultation and validation process under the WES-BCA project. Its preliminary findings were first presented and discussed during an online consultation meeting held on 3 September 2025 with the WES-BCA Focal Points for Water and Environment from Jordan, Lebanon, and Morocco, which served as an initial working session to review the draft analysis, gather country-specific feedback, and identify common policy and governance challenges related to WEFE Nexus integration.

Building on the outcomes of this first consultation, the revised findings and recommendations were further discussed and validated during the regional online webinar "Advancing WEFE Nexus Integration in the Mediterranean, with Emphasis on Governance, Policy and Institutional Arrangements: Towards

an Action Framework", held on 19 January 2026, with the participation of representatives from all WES-BCA Partner Countries and a broader range of regional stakeholders.

Comments, clarifications, and inputs provided by participating countries during these two regional exchanges have been taken into account and are reflected, as appropriate, in the final version of this Background Report.

The report is intended to inform the development of the forthcoming Framework for Action of the Mediterranean WEFE Nexus Strategy, by providing consolidated analytical insights and regionally validated policy and governance considerations and recommendations.

2 ASSESSMENT OF WEFE NEXUS INTEGRATION

In this chapter, national policies, strategies and programs in Jordan, Lebanon and Morocco are analysed to explore if and how they address the WEFE Nexus. Based on this, a synthesis is prepared of the main governance challenges that hinder the creation of specific benefits and addressing identified impacts between WEFE sectors. This is followed by examples of policies, strategies, or governance arrangements that showcase integrated approaches between WEFE Nexus sectors. In addition, a WEFE Nexus policies and governance common SWOT analysis of the three countries is provided.

2.1 JORDAN - NATIONAL POLICIES, STRATEGIES, AND PROGRAMS

POLICIES AND STRATEGIES

The 2023-2030 Jordan Water Strategy[5], prioritizes the WEFE Nexus and considers the water, energy, food, and ecosystems sectors to be vital for Jordan's sustainable development. Insecurities in one of these sectors is likely to have impacts on others, the overall economy of the country and the wellbeing of its citizens. A transition is needed that fosters an integrated and comprehensive planning approach which aligns the WEFE sector plans and actions. The overall goal of Jordan's approach is to institutionalize effective management of the WEFE Nexus to leverage investments, develop WEFE Nexus projects, ensure coherent policies and regulations, and conduct complementary planning across these sectors. A major proposal in the new policy is the establishment of a WEFE Nexus Council as a formal platform to manage WEFE inter-connected sectors, operationalize synergies and create a better alignment across shared and overlapping national priorities, policies, and joint projects. Initial progress is made with improved coordination across the Ministry of Water and Irrigation, Ministry of Agriculture, Ministry of Environment, and Ministry of Energy and Mineral Resources, as well as decentralized basin committees, to institutionalize synergies and reduce duplication of efforts.

The Jordan 2023 – 2030 Water Strategy also entails specific goals related to interactions with other WEFE sectors. With respect to Water-Energy, the Water Strategy acknowledges that the water sector is the country's largest energy consumer and includes a target of 15% improvement in energy efficiency by 2025, through using energy management systems, expanding the use of renewable energy for pumping and desalination, and augmenting the potential for energy storage in dams. These measures create synergies by reducing costs and emissions while improving water security.

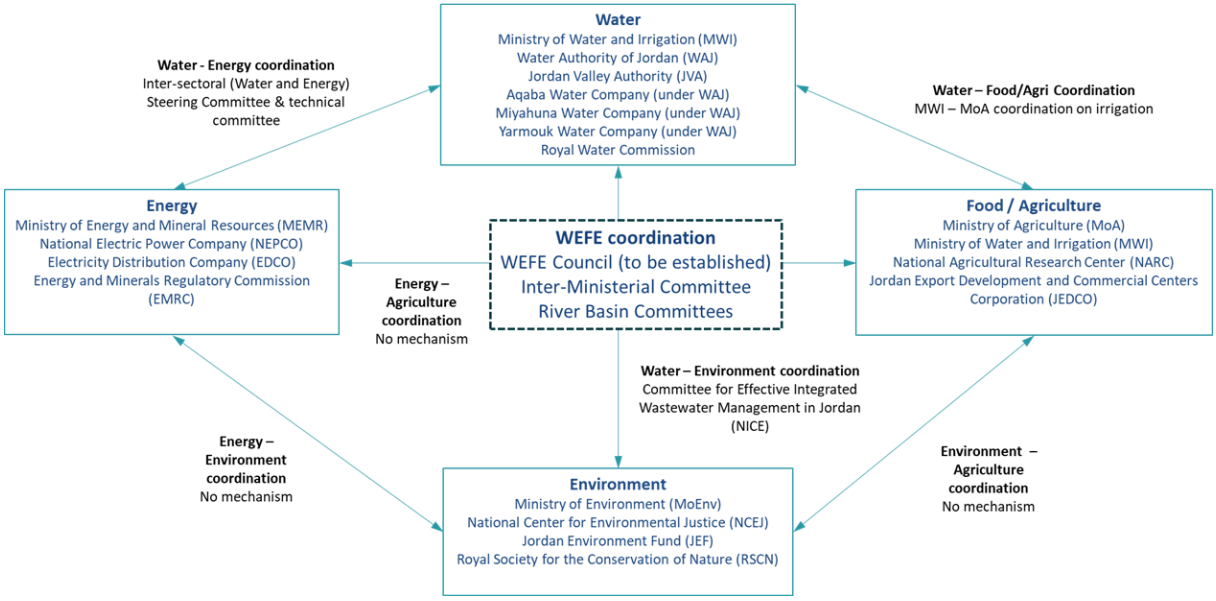
The Jordan 2023 – 2030 Water Strategy also outlines the need for close coordination with the Ministry of Agriculture when it comes to irrigation. The goals of this coordination are to reduce water losses throughout the irrigation water systems and holistically manage water for irrigation in partnership across the Ministry of Water and Irrigation, the Ministry of Agriculture, and the Ministry of Environment [6]. Also, the Green Growth National Action Plan 2021–2025: Agriculture Sector [7],

[5] MWI 2025. Jordan National Water Strategy 2023–2040. https://www.mwi.gov.jo/EBV4.0/Root_Storage/AR/EB_List_Page/national_water_strategy_2023-2040.pdf
[6] MWI 2025. Jordan National Water Strategy 2023–2040. https://www.mwi.gov.jo/EBV4.0/Root_Storage/AR/EB_List_Page/national_water_strategy_2023-2040.pdf
[7] MOENV 2021. Green Growth National Action Plan 2021–2025: Agriculture Sector, https://www.sustainability.gov/pdfs/ggi-jordan-agriculture.pdf

emphasizes the need for efficient use of irrigation water and supporting farmers to maximize the productivity and efficiency of water for current farms. In relation to water and energy, the Ministry of Energy emphasizes the need to increase the energy use efficiency in the water sector. Jordan's National Energy Strategy 2021 – 2030 projects an improvement of 15% of water sector energy efficiency by 2025 [8]. It also projects to introduce energy storage projects, including dams, to maintain grid stability, especially with an increase in renewable energy production. Overall, the strategy emphasizes the need to promote integration between the energy and water sectors to cover the water sector's needs of electric power according to the best alternatives and establish joint projects between the two sectors.

In relation to the environment, the strategy plan of the Ministry of Environment (2023-2025) [9] specifically addresses the WEFE Nexus and defines one its priority initiatives as "Integrate interdependence of water, energy and food security concept (NEXUS) to maximize green and climate-responsive output". This strategy plan also refers to prioritizing pollution control and biodiversity conservation but does not link this explicitly to sector policies or strategies. In addition, Jordan's 2015 National Biodiversity Strategy explicitly calls for biodiversity integration into key development sector strategies through undertaking a review of all relevant sectoral strategies, defining a Ministry of Environment focal point for each sector and adopting a set of biodiversity objectives and engagement action plans[10].

FIGURE 2-1: JORDAN WEFE NEXUS RELATED INSTITUTIONS AND ORGANISATIONS



In addition to these four ministries mentioned above a wide range of institutions are further involved in coordination across the WEFE Nexus (Figure 2-1). In particular:

[8] MEMR 2020. Summary of the Jordan Energy Strategy for (2020-2030) https://www.memr.gov.jo/EBV4.0/Root_Storage/EN/EB_Info_Page/Summery_of_the_Comprehensive_Strategy_of_the_Energy_Sector_2020_2030.pdf

[9] MoENV 2022. Strategy plan of the Ministry of Environment (2023-2025) https://moenv.gov.jo/ebv4.0/root_storage/en/eb_list_page/ministry_of_environment_strategy_2020-2022.pdf

[10] MoEnv 2015. National Biodiversity Strategy 2015 – 2020. https://www.cbd.int/doc/world/jo/jo-nbsap-v2-en.pdf

- **Inter-Ministerial Committee/Task Force:** As outlined in the National Water Strategy (2016–2025), this body facilitates dialogue and coordination among key ministries and agencies involved in water, energy, agriculture, and environmental management. Its primary role is to oversee the implementation of integrated resource management strategies and ensure policy coherence across sectors[11].
- **Basin-Level Committees:** These committees manage ground and/or surface water resources at the hydrologic basin level, ensuring that local considerations are integrated into national strategies. They play a crucial role in implementing WEFE Nexus principles on the ground, addressing region-specific challenges, and promoting sustainable resource use[12]. They are prioritized in Jordan's updated NDC of 2021[13].
- **Intersectoral Coordination and Governance Framework** A pivotal aspect of Jordan's WEFE Nexus implementation is the establishment of a comprehensive governance framework. Building upon the existing Water-Energy Technical Working Group—which includes high-level representatives from the MWI and the Ministry of Energy. The framework aims to facilitate intersectoral data collection, design integrated projects, align sector strategies, and harmonize policies and plans to achieve cohesive and sustainable resource management.

The development of this framework involved iterative engagement with diverse stakeholders, including multiple rounds of interviews and knowledge exchange meetings. This collaborative approach has been crucial in addressing sector-specific challenges and enhancing cross-sectoral cooperation.

PROGRAMMES AND INITIATIVES

International donors and organizations have been instrumental in supporting Jordan's WEFE Nexus related initiatives and programs. Some examples of these include:

Nexus Regional Dialogues Programme [14]: This program that was supported by GIZ has been pivotal in mainstreaming the WEFE Nexus approach within Jordan's national policies. It has facilitated policy dialogues, capacity-building activities, and the development of integrated resource management tools. The program's efforts have led to a deeper understanding of the WEFE Nexus approach among policymakers and have promoted its application in planning and implementation processes.

World Bank's Water Sector Efficiency Project [15]: Aiming to enhance the efficiency of Jordan's water sector, this initiative focuses on long-term investments and institutional strengthening. It emphasizes the need for enhanced coordination and institutional support at various levels, aligning with the principles of the WEFE Nexus by addressing the interdependencies between the water, energy, and food sectors.

[11] https://faolex.fao.org/docs/pdf/jor156264E.pdf
[12] https://uploads.water-energy-food.org/resources/230605-WP1-Report_Final.pdf
[13] https://unfccc.int/sites/default/files/NDC/2022-06/UPDATED%20SUBMISSION%20OF%20JORDANS.pdf
[14] http://uploads.water-energy-food.org/resources/Nexus_Lessons-Learned_Study_EN_WEB.pdf
[15] http://documents1.worldbank.org/curated/en/099052623124518529/pdf/BOSIB0d4798d310db097bc06922e98e0ee3.pdf

Energy Efficient Water Sector (EEWS) [16]**:** This GIZ initiative aims to support the water sector improving energy management, enhancing the energy efficiency, increasing the share of renewable energy, and reducing the energy costs. It focused on strengthening the capacities of the water sector, anchoring a standardized Energy Management System, and enhancing the WEFE Nexus dialogue having the energy sector as its entry point. The project combines energy audits with measures to optimize energy management and renewable energy deployment in the water sector.

Agriculture Sector Efficiency Programme [17]: This programme funded by the GCF aims to improve climate resilience in the agriculture sector through improving water use efficiency. It builds on Jordan's previous work to improve agricultural practices by focusing on drip irrigation expansion, climate-smart farming, and treated wastewater reuse. These practices illustrate practical synergies between water savings, energy efficiency, and agricultural productivity.

While Jordan is making progress on the WEFE nexus governance and implementation, it continues to rank low in the global WEFE Nexus Index[18]. The WEF Nexus Index value for Jordan is 42.7, placing the nation in the 152nd position out of the 173 countries assessed.

Going forward Jordan aims to have WEFE principles fully integrated into strategies and subsequently reflected in budgets. Existing coordination mechanisms will be strengthened to address their weak mandates, and efforts will focus on overcoming fragmented data and limited interoperability. Scaling of pilot initiatives will be improved while institutionalizing WEFE coordination mechanisms. Planning–financing linkages will be reinforced, WEFE project pipelines developed, and data systems, modelling, and technical capacities are to be enhanced[19]. For Jordan, the Mediterranean WEFE Action Framework represents a practical opportunity to move from coordination to implementation, and from pilots to scale.

2.2 LEBANON - NATIONAL POLICIES, STRATEGIES, AND PROGRAMS

POLICIES AND STRATEGIES

In Lebanon, there is no explicit policy or strategy to address the WEFE Nexus. However, across various sectors a range of policies and strategies highlight the need for coordination between WEFE sectors.

For example, Lebanon's Water Strategy 2024 – 2030 expresses the vision to aim at providing safe, equitable and affordable water and wastewater services to all, and to properly allocate the water resources to the different economic sectors (agriculture, industry, tourism, services, etc..) and addressing ecosystem's needs based on the priorities of the Government's recovery plan[20].

[16] https://uploads.water-energy-food.org/resources/2022-EEWS-Factsheet-EN-002.pdf
[17] https://www.greenclimate.fund/document/building-resilience-cope-climate-change-jordan-through-improving-water-use-efficiency
[18] The Water-Energy-Food (WEF) Nexus Index is a composite indicator that aggregates 21 globally available indicators. https://wefnexusindex.org/JOR
[19] Ahmad BALI, Head of Planning of Water Demand Department, Ministry of Water and Irrigation (MWI) 2026. WEFE Nexus highlights, challenges, and opportunities in Morocco. Presented at: WES-BCA On-line Regional Workshop: Advancing WEFE Nexus integration in the Mediterranean: Towards a framework for action. 19 January 2026.
[20] MEW 2024. National Water Sector Strategy 2024–2035. https://www.pseau.org/outils/ouvrages/lewap_updated_national_water_sector_strategy_2020_2035_1970.pdf

Regarding Water – Energy coordination, Lebanon's Water Strategy 2024 – 2030 proposes to develop a specific strategy to control the energy costs of water and wastewater facilities and a national plan to introduce Renewable Energy sources at water and wastewater facilities. The aim is to reduce operating costs and limit carbon emissions generated by the water sector operations [21]. Lebanon's 2022 Energy Policy Statement also emphasizes the need to coordinate with the water sector[22]. However, there the focus is especially on water sector entities paying overdue and future electricity bills. The National Energy Efficiency plan put forward the proposal to install drip irrigation, variable speed drives (VSD) and energy efficient water pumps for water and energy savings[23].

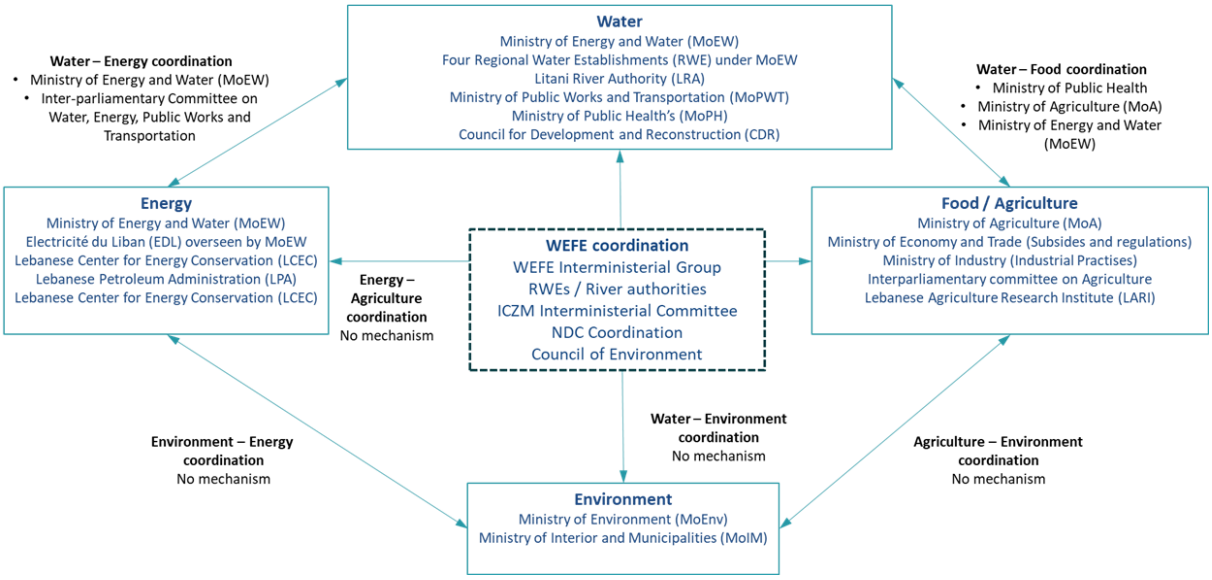
Concerning Water - Agriculture sector coordination, Lebanon's Water Strategy 2024 – 2030 focuses, on the one hand, on drought management, including through policy-settings, institutional coordination, drought management plans, and institutional capacities. On the other hand, this coordination is to target food security, with the Government of Lebanon to identify the crops it considers important for the country's food security. Based on this, the Ministry of Agriculture can identify the lands best suited for these crops, and the Ministry of Energy and Water can plan the allocation of resources and infrastructure to support selected crop production[24].

Coordination between the Water and Agriculture sector is also proposed in the National Agriculture Strategy 2020-2025 (NAS)[25]. The NAS is considered a tool to facilitate evidence-based decision-making for stakeholders involved in the agrifood sector. It primarily serves the Ministry of Agriculture (MoA) but also aims to reach out to other stakeholders involved in the agriculture, water and natural resources, food and nutrition security sectors. The fourth pilar of the strategy focuses on climate change adaptation and sustainable management of agrifood systems and natural resources. It highlights the promotion of the sustainable use of natural resources (soil, pastures, forests, and fisheries), the efficient use of irrigation water and explanation of the supply of water resources for irrigation and the support for renewable energy use in the agricultural sector.

Regarding the environment, Lebanon's National Biodiversity Strategy and Action plan defines as one of its Priority Areas (9) "Mainstreaming biodiversity into national and sub-national policies and plans" and makes specific reference to the agriculture, forestry and fisheries sectors[26].Beyond the above mentioned Ministries a number of other government entities and organisations are involved in WEFE Nexus related activities in Lebanon (Figure 2-2). One of the WEFE coordination mechanisms is the Council of Environment. This is an existing coordination body that invites participation from other ministries; it provides a platform for intersectoral environmental dialogue. Another mechanism is the Climate Nationally Determined Contribution (NDC) Coordination which include the development of a coordinated action plan among multiple WEFE sectors.

[21] MEW 2024. National Water Sector Strategy 2024–2035. https://www.pseau.org/outils/ouvrages/lewap_updated_national_water_sector_strategy_2020_2035_1970.pdf
[22] MEW 2022. Setting Lebanon's Electricity Sector on a Sustainable Growth Path https://energyandwater.gov.lb/mediafiles/articles/doc-100777-2022_03_31_10_18_39.pdf
[23] MEW 2021. National Energy Efficiency Action Plan (NEEAP) 2016–2020 https://lcec.org.lb/sites/default/files/2021-02/NEEAP%202016%202020.pdf
[24] MEW 2024. National Water Sector Strategy 2024–2035. https://www.pseau.org/outils/ouvrages/lewap_updated_national_water_sector_strategy_2020_2035_1970.pdf
[25] http://www.agriculture.gov.lb/getattachment/Ministry/Ministry-Strategy/strategy-2020-2025/NAS-web-Eng-7Sep2020.pdf
[26] MoE 2016. Lebanon's National Biodiversity Strategy and Action Plan

FIGURE 2-2: LEBANON WEFE NEXUS RELATED INSTITUTIONS AND ORGANISATIONS



A non-institutionalized mechanism established in Lebanon is the WEFE Interministerial Group which is led by the Ministry of Energy and Water (MoEW) [27]. This technical group includes representatives from the Ministry of Transport, Ministry of Industry, Ministry of Public Works and Transport, Ministry of Interior, Ministry of Environment, and Department of Meteorology. The group is facilitated by GWP-Med as part of the GEF MedProgramme - Child Project 2.2 and focus, at this stage, mostly on common issues and identification of joint projects and initiatives, rather than on policy or strategy alignment.

In addition, the WEFE Nexus Policy Dialogue in Lebanon (2022–ongoing) aims to help decision-makers and stakeholders identify coordinated governance actions and implement concrete solutions for integrated planning and management of water and other natural resources across the water–energy–food–ecosystems sectors[28]. GWP-Med provides technical support to the Ministry of Energy & Water under the GEF UNEP/MAP MedProgramme to assess trade-offs and synergies, promote inter-sectoral coordination via the WEFE Inter-Ministerial Group (established in 2023), facilitate Nexus investments, and demonstrate opportunities through pilot projects. It also involves a WEFE Nexus assessment that proceeds in two phases: Phase I (2022–2024) delivered a national scoping assessment and produced a WEFE Nexus Policy and Investment Action Framework for Lebanon. Phase II consists of an in-depth assessment and quantification of selected Nexus linkages using modelling and scenario planning.

PROGRAMMES AND INITIATIVES

In Lebanon, no articulated national programme or initiative currently exist that address the WEFE Nexus. However, a number of national as well as regional projects with Lebanon's participation, are implemented to demonstrate operational realities of implementing WEFE Nexus related activities.

Saving Water - Growing Crops Project [29]: This WES demonstration project has successfully implemented remote-controlled irrigation systems on ca. 29 hectares, using drip irrigation, soil

[27] https://www.gwp.org/en/GWP-Mediterranean/WE-ACT/News-List-Page/2024/inteministerial-meeting-lebanon/
[28] https://www.gwp.org/en/GWP-Mediterranean/WE-ACT/News-List-Page/2025/lebanon-phase-ii-nexus/
[29] https://www.gwp.org/en/GWP-Mediterranean/WE-ACT/News-List-Page/2024/lebanese-field-trip/

monitoring, smart weather stations, and humidity sensors. It also restored three lakes and developed a silt removal system that utilizes stormwater runoff. The project started with a cadastral mapping of the targeted area to reduce potential conflicts among farmers and support the optimal placement of irrigation systems. On the institutional side, the project has established a 'Water Committee', consisting of local farmers, cooperative members, and public authorities, to ensure long-term support and success of the project. Discussions with beneficiaries have included their willingness to contribute financially to the operation and maintenance of the irrigation system and create sustainability.

Water, Sanitation and Conservation Project [30]**:** This initiative focuses on establishing a wastewater treatment sludge management system to reduce the environmental impact of untreated sludge disposal from Wastewater Treatment Plants (WWTP) in the Barouk watershed. The system involves a pre-treatment / dewatering unit where wet sludge will be dried, and a composting unit where the dried sludge will be mixed with shredded organic matter and by-products of various agricultural activities in the surrounding areas to then be composted. The finished product will undergo a quality assessment to ensure its compliance with the recently issued Lebanese standards for the application of biosolids. Based on the results, the final product will be used in suitable applications.

MINARET I Project: The project installed a solar powered water pump that moves water upstream to water store tanks. Gravity irrigation supplies stored water to the agricultural fields without any additional energy use. The project will benefit more than sixty farmers and twenty-five farms, including in the Barouk watershed. Benefits to farmers include a constant access to water for farming and a lower energy bill. In addition, the project contributed to installing a PV system for water filtration, a PV system for the Jdeidet El Chouf municipality building and LED street lighting. Collaboration with the local Jdeideh Women's Organization led to developing and managing a revolving fund resulting from reduced expenditure on diesel fuel due to the decreased reliance on diesel generators. The revolving fund is to provide loans to community households interested in investing in environmentally friendly energy technologies such as solar panels, solar water heaters, and energy efficient LED bulbs.

Through various collaborative efforts, such as indicated above, UNEP/MAP and the Global Water Partnership-Mediterranean (GWP-Med), together with other partners, are facilitating the promotion of the WEFE Nexus approach in Lebanon through the **GEF MedProgreamme Child Project 2.2 on WEFE Nexus**. This includes establishing inter-ministerial groups, conducting policy dialogues, developing WEFE Nexus action plans for joint action, and developing proposals for investment projects, thereby promoting sustainable development and resilience in the region.

[30] https://www.gwp.org/en/GWP-Mediterranean/WE-ACT/News-List-Page/2024/lebanese-field-trip/

As Lebanon is attempting to improve WEFE nexus governance and implementation, it continues to rank low in the global WEFE Nexus Index. The WEF Nexus Index value for Lebanon is 41.6, ranking the country 154th of the 173 countries assessed[31].

Going forward, Lebanon is to focus on optimizing water allocation at the river-basin level to improve food security and inform policy instruments (e.g., incentives) for priority crops[32]. It targets five agricultural basins—Abou Ali, Ibrahim, Beirut/Damour, and Litani—using a source-to-sea approach that combines sectoral and spatial integration and strategic foresight tools. This work is supported by ongoing bilateral and multilateral consultations with stakeholders and Inter-Ministerial Group members.

Lebanon is also planning to be piloting the WEFE Nexus through precision agriculture demonstrations to boost farm productivity, cut production costs, and reduce water, chemical, and energy use—thereby easing groundwater/surface water depletion and pollution. The initiative will support agro-businesses to deliver affordable precision-farming services, showcase technologies (drones, smart agrometeorological stations, soil moisture sensors), and establish an innovative partnership to enable replication and scaling across Lebanon.

2.3 MOROCCO - NATIONAL POLICIES, STRATEGIES, AND PROGRAMS

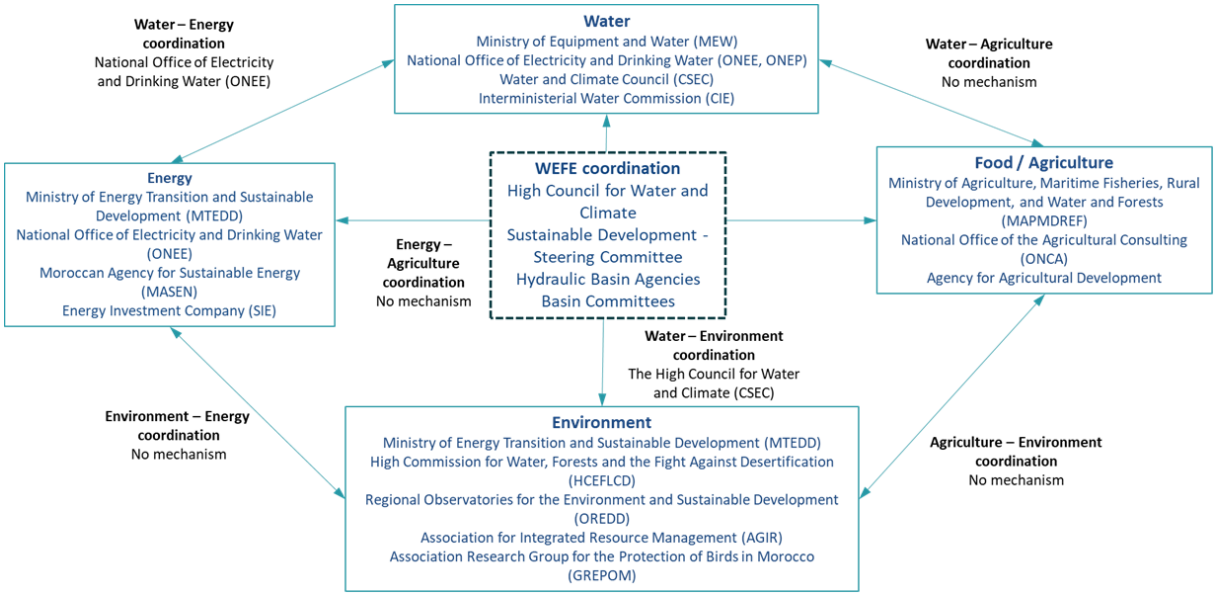
POLICIES AND STRATEGIES

In Morocco, there is no explicit policy or strategy adopted for governing and managing the WEFE Nexus. However, the National Sustainability Development Strategy provides several entry points for delineating government defined WEFE sector interlinkages and priorities for action [33]. This includes improving the valuation of water for agricultural use, rationalizing water consumption in the agriculture sector through saving water based on increased water productivity, modernizing irrigation networks, and improving irrigation techniques. These measures are also emphasized in the National Water Strategy[34] and the National Climate Plan 2030[35]. Regarding water resources, the Water Law (36-15) constitutes the foundation of water sector governance, imposing integrated and participatory management of water resources. This could be considered a legal basis that institutionalizes the part of the WEFE Nexus approach related to water. Also, the Water Law requires the regular development of planning documents such as the Integrated Water Resources Master Plans (PDAIRE) and the National Water Plan (PNE). These documents are developed in a concerted and coordinated manner with institutional and socio-economic actors at the local, regional, and national levels. Within Marocco, the River Basin Agencies (Agence Basin Hydraulique - ABH) play a key role as water authorities at regional and local levels. They have the competence to plan, regulate, and monitor water use within their basins. In addition, regional and provincial water committees ensure consultation and coordination among institutional actors, local authorities, users, and civil society. These mechanisms

[31] The Water-Energy-Food (WEF) Nexus Index is a composite indicator that aggregates 21 globally available indicators. https://wefnexusindex.org/LBN
[32] Mona FAKIH, Director of Water, General Directorate of Hydraulic and Electric Resources, Ministry of Energy and Water 2026. WEFE Nexus highlights, challenges, and opportunities in Morocco. Presented at: WES-BCA On-line Regional Workshop: Advancing WEFE Nexus integration in the Mediterranean: Towards a framework for action. 19 January 2026.
[33] Gouvernement du Maroc 2022. Stratégie Nationale de Développement Durable 2030. https://www.greenpolicyplatform.org/sites/default/files/downloads/policy-database/ENG-SNDD_RESUME%20EXECUTIF-V24-D%20(1).pdf
[34] SEEE 2009. National Water Strategy. https://www.environnement.gov.ma/PDFs/EAU/STRATEGIE_EAU.pdf
[35] MTEDD 2019. National Climate Plan 2030. https://faolex.fao.org/docs/pdf/mor209343.pdf

reinforce decentralized and participatory decision-making, reducing dependence on the central level and allowing better adaptation to local specificities.

FIGURE 2-3: MOROCCO WEFE NEXUS RELATED INSTITUTIONS AND ORGANISATIONS



The National Sustainability Development Strategy also emphasizes accelerating the energy transition and the penetration of renewable energy in the agricultural sector particularly in irrigation and pumping needs and linking desalination projects for agricultural use with the use of renewable energy. It further promotes the use of wastewater sludge for agricultural use. Furthermore, the strategy promotes improving the resilience of the agricultural sector to the impacts of change climatic through expanding the use of groundwater contracts and strengthen means for their implementation, the acceleration of the implementation of the desalination project to deal with water shortages and activating Basin-Based Drought Plans. The strengthening of the Hydraulic Basin Agencies is also foreseen in the National Water Strategy, in particular in relation to groundwater management.

Several Water – Environment linkages are specifically addressed in the National Water Strategy with an emphasis on safeguarding watersheds upstream of dams against erosion, oases in the fight against desertification, and lakes and wetlands through controlling the pumping from aquifers directly affecting these. In relation to the energy – water linkages, the National Energy Strategy 2030[36], sees a potential role for nuclear power in the generation of electricity for desalination plants and emphasizes the potential for solar photovoltaic water heating.

With respect to the environment and biodiversity, Morocco's national strategy and action plan for biodiversity 2016 - 2020 prioritizes amongst other, the updating of policies, legislation, and regulation to incorporate biodiversity conservation in various sector approaches (operational objective D2)[37].

[36] MEMEE 2009. National Energy Strategy – Vision 2030, https://fesmeknesinvest.ma/wp-content/uploads/2021/09/strategie_energetique_nationale_maroc_2030.pdf
[37] MoE 2015. Stratégie et Plan d'Actions National pour la Diversité Biologique du Maroc, 2016-2020. https://www.environnement.gov.ma/images/Biodiversit%C3%A9/Strategie%20Nationale%20de%20la%20Bioidversite%202016-2020%20Version%20Finale-min.pdf

In addition to the above-mentioned ministries, several other government entities and organisations are involved in WEFE Nexus related activities in Morocco (Figure 2-3). One of the WEFE coordination mechanisms is the High Council for Water and Climate which is responsible for examining and giving its opinion on a) the general orientations of the national water and climate policy, b) improving related knowledge, and the National Water Plan. The High Council for Water and Climate is chaired by the Head of Government and includes directors of hydraulic basin agencies, the Director ONEE, directors of regional agricultural development boards, presidents of the regional councils and water basin councils, and representatives from water user associations and Moroccan experts.

Going forward, Morocco is to operationalize the Water-Energy-Food Nexus approach outlined in the Sector Plans, by integrating this in transversal and explicit manner into the policies, planning documents, and investment programs[38]. Also, it is focusing on strengthening intersectoral coordination among water, energy, and agriculture stakeholders through co-planning mechanisms to optimize synergies and maximize benefits across all sectors. Furthermore, Morocco is committed to ensuring continuity and capitalization on successful Nexus projects, such as replicating the dialogue and coordination framework established in Tanger-Tétouan-Al Hoceima (TTA) region (See Section 2.3.2) and generalizing the installation of floating photovoltaic parks. Additionally, it realizes the importance of enhancing the capacities of stakeholders through targeted training, technical assistance, and the development of decision-support tools tailored to the Nexus approach.

PROGRAMMES AND INITIATIVES

In Morocco, no articulated national programme or initiative currently exist that explicitly address the WEFE Nexus. However, several projects have been executed that include elements of a WEFE nexus approach. This includes, for example, multipurpose dam with water storage designed for agricultural irrigation and hydroelectricity production, and sea-water desalination with renewable energy (wind, solar). It is exploring floating solar panels on reservoirs, demonstrating a practical integration of the Nexus. At the same time, several national as well as regional projects with Morocco's participation are implemented to demonstrate operational realities of implementing WEFE Nexus related activities.

WEFE Policy Dialogue - Tanger-Tétouan-Al Hoceima (TTA): In the framework of the Mediterranean Sea Programme (GEF, UNEP/MAP MedProgramme), GWP-Med initiated a Policy Dialogue on the WEFE Nexus - including an analytical and a participatory component in the TTA Region of the Kingdom of Morocco[39]. The analytical part evaluated WEFE sector mutual interactions, focusing on both synergies and solutions to conflicting uses. The participatory part focused on assisting decision-makers and stakeholders in anticipating and better managing conflicts between resource uses. The consultation process resulted in the shortlisting of 21 priority WEFE Nexus solutions, targeting key areas: (i) strengthening governance, (ii) ecosystem conservation for quality water production and productive and sustainable agriculture, (iii) smart and resilient agriculture based on rational uses of water and

[38] Rachid RAJEL, Head of the Water Pacification Division General Directorate of Hydraulics, Ministry of Water and Equipment (MEE) 2026. WEFE Nexus highlights, challenges, and opportunities in Morocco. Presented at: WES-BCA On-line Regional Workshop: Advancing WEFE Nexus integration in the Mediterranean: Towards a framework for action. 19 January 2026.
[39] https://www.gwp.org/globalassets/global/gwp-med-files/calls-2025/162025cp2.2/tor-phase-ii-tta-morocco.pdf

energy, and (iv) a less polluting socio-economic development of the TTA region. Development of proposals for investment projects is ongoing.

Floating Photovoltaic Park Installations: A first project involves the installation of a floating photovoltaic (PV) park on the reservoir of the Tanger Med Dam, which supplies drinking water to the port[40]. The primary objective is to harness solar energy while minimizing land use in the surrounding area and reducing water evaporation from the dam's reserve. The selected surface area is suitable for the installation of approximately 25 MW of floating solar photovoltaic capacity. The energy generated by this photovoltaic park will be used to power the Tanger Med port, contributing to a more sustainable and efficient energy supply.

The floating photovoltaic park installation at Oued El Makhazine Dam is a similar project under development that aims to optimize the use of solar resources while also addressing concerns related to land utilization and water evaporation from the dam's reserve[41].

Dakhla Seawater Desalination Plant with Renewable Energy for Drinking Water and Irrigation: The Dakhla seawater desalination plant is designed with a capacity of 37 million cubic meters (Mm^3) per year[42]. Of this capacity, 7 Mm^3 per year will be allocated for drinking water supply, while 30 Mm^3 per year will be dedicated to irrigation. Currently, the station is under construction and is 78% complete, with commissioning anticipated in 2026. The plant will operate entirely on renewable energy, sourced from a wind farm in Dakhla with an installed capacity of 40 MW, which can be expanded to 60 MW in the future. Key benefits of the project include a competitive cost of water production, a reduction of direct energy-related CO_2 emissions, and alignment with the national energy transition strategy. Additionally, all planned seawater desalination plants are planned to be integrated with renewable energy production initiatives, further enhancing their sustainability and efficiency.

As Morocco is furthering its WEFE nexus governance and implementation efforts, it continues to rank low in the global WEFE Nexus Index. The WEF Nexus Index value for Morocco is 48.9 ranking the country 126th of the 173 countries assessed[43].

2.4 KEY GOVERNANCE CHALLENGES

Jordan, Lebanon, and Morocco hold several key WEFE Nexus governance challenges in common. Challenges in governance hinder addressing broader challenges in the three countries.

Jordan, is one of the most water-scarce countries in the world, making the Nexus particularly critical. The country is faced with extreme water scarcity that significantly affects its energy, agricultural, and environmental sectors. It also relies heavily on imported energy, which increases its vulnerability to price fluctuations and supply disruptions. On top of that, Jordan is facing a refugee crisis which has put additional strain on Jordan's limited water and energy resources.

[40] https://www.tangermedport.com/en/tanger-med-launches-a-floating-solar-park/
[41] https://solarperspective.com/systemes-flotovoltaiques-premiere-au-maroc/
[42] https://www.dakhlainvest.com/projet-dessalement.html
[43] The Water-Energy-Food (WEF) Nexus Index is a composite indicator that aggregates 21 globally available indicators. https://wefnexusindex.org/MAR

Lebanon is faced with political Instability and weak overall governance. The political instability and lack of transparency undermine the effectiveness of government institutions and hinders progress on integrated resource management. Water resources in Lebanon are heavily polluted, which reduces their availability for agriculture and other uses. Also, Lebanon is facing a severe energy crisis, with frequent power outages and reliance on expensive private generators. Considering the ongoing crisis in Lebanon, it is critical to address the WEFE Nexus to be able to alleviate the significant strain on its natural and physical assets.

Morocco is already experiencing the impacts of climate changes to which it is highly vulnerable. These impacts are expected to further exacerbate water scarcity and impact agricultural productivity. Morocco also faces major disparities across the country, including in access to water and energy resources, with some areas experiencing more severe challenges. In addition, the country struggles to balance agricultural development with sustainable water use. Morocco's agricultural sector is a major contributor to national GDP but is also a major consumer of water, highlighting the urgent need to promote more water-efficient irrigation practices and move towards higher value crops.

The water, energy, agriculture, and ecosystems sectors in Jordan, Lebanon, and Morocco share common challenges that contribute to their deficient performance. These often hinder the countries' abilities to realize integrated benefits and intersectoral impacts. Below an overview is provided of these key challenges.

POOR PERFORMANCE OF SECTOR SERVICES AND FACILITIES

In Jordan, Lebanon, and Morocco, the delivery and performance of services in the water, energy, and agriculture sectors are hindered by several sector specific issues.

All three countries grapple with water scarcity, exacerbated by climate change, over-extraction of water resources, inefficient irrigation practices, and outdated infrastructure. These issues lead to the depletion of water resources. Inadequate regulatory frameworks and lack of enforcement further complicate water management efforts. Service providers are faced with outdated infrastructure causing losses and inefficiencies in both urban and rural areas. Over-extraction and pollution are worsened by inadequate monitoring and a lack of enforcement of existing laws and regulations on water abstraction and water quality. Additionally, many water utilities face financial difficulties, leading to underinvestment in infrastructure maintenance and upgrades, resulting in frequent service interruptions and poor water quality.

With respect to the energy sector, all three countries rely heavily on imported fossil fuels making these countries vulnerable to global oil and gas price fluctuations and supply disruptions, leading to energy insecurity and excessive costs for consumers. In addition, inefficient energy use and aging infrastructure contribute to high energy costs and environmental pollution. The countries also face a mismatch between supply and demand: energy production and distribution systems often struggle to meet growing demand due to outdated infrastructure and inefficient resource allocation. Despite initial efforts, particularly in Morocco, the integration of renewable energy sources has been slow and is often hampered by regulatory and technical challenges.

In the agriculture sector, major inefficiencies continue to exist across the three countries. This is partly due to the continued reliance on traditional farming methods without sufficient adoption of modern

technologies to improve yields and to use resources (water, land, and soil) more efficiently. Water, arable land, and healthy soils are scarce, which is compounded by land degradation, desertification, and climate change. In addition, farmers often lack access to markets, receive low prices for their produce and do not benefit from financial services. These constrains hinder investments in modern agricultural technologies and practices, thus contributing to continued low productivity, food insecurity, and unsustainable practices.

The environment sector is faced with significant environmental degradation driven by resource over abstraction, pollution, deforestation, and poor water and waste management. This is leading to the destruction of critical habitats and a loss of biodiversity. A major cause of this environmental decline is insufficient comprehensive environmental policies, laws and regulation and a weak implementation and enforcement of existing laws and regulation.

SILOED INSTITUTIONAL STRUCTURES

Effective WEFE Nexus governance requires mechanisms for cross-sectoral collaboration. However, government agencies responsible for water, energy, food-agriculture, and ecosystems have limited coordination and often operate independently and in isolation. Where inter-sectoral coordination mechanisms exist, they often have weak mandates, hindering an effective use of their potential to drive sectoral integration forward. Jordan has made some initial progress with pursuing a WEFE Nexus approach by developing national strategies and creating intersectoral committees. In Lebanon, the WEFE Nexus Interministerial Group, led by the Ministry of Energy and Water, brings together seven more government institutions to advance the agenda. Some institutions have established bilateral cooperation on specific WEFE Nexus issues, particularly in Morocco and Jordan. For example, institutions in the energy and water sectors establishing cooperation to improve energy efficiency in the water sector. The limited cooperation often leads to fragmented policies, duplicated efforts, and missed opportunities for synergies in WEFE Nexus management.

WEAK POLICIES, REGULATIONS AND ENFORCEMENT

Existing policies, laws, and regulations may not adequately address the interdependencies within and interconnectedness of the WEFE Nexus. Additionally, there is a need to align the regulatory framework across all sectors to ensure coherence for the effective management of interlinkages. Indeed, in all three countries, additional governance reforms are needed to create a supportive policy and regulatory environment for integrated WEFE Nexus planning and management.

As indicated above, some sector-specific national strategies have identified WEFE Nexus related issues and have proposed actions to address these. Often these only address one part of the WEF Nexus with limited consideration of interconnections, leading to conflicting mandates, unclear lines of authority, and a lack of incentives to strive for and achieve resource use efficiency. In addition, the lack of political interest and financial resources often limits the implementation of these policy reforms.

All three countries are faced with bureaucratic inefficiencies with complex and often fragmented bureaucratic processes that significantly delay decision-making and implementation. Also, a weak enforcement of environmental regulations has contributed to unsustainable resource abstraction and use.

LIMITED INSTITUTIONAL CAPACITY FOR INTEGRATED PLANNING

In all three countries, traditional centralized decision-making processes and top-down planning have limited the flexibility and responsiveness required for effective cross-sectoral planning and implementation. At the inter-sectoral level, there is often a lack of or slow progress on mechanisms to coordinate and review institutional roles and responsibilities. This is especially so when it comes to aspects of planning and implementation that touch upon the competencies of different sector institutions, such as irrigation water management for agriculture production and water quality control.

All three countries have made progress in decentralizing the planning and management of natural resources abstraction and use, for example through hydraulic / river basin management. But challenges remain in terms of transferring authority and resources to non-central governments and enhancing local autonomy and responsiveness to local needs and conditions. This is demonstrated with the challenge to define the right mechanisms, including more decentralized and participatory approaches, to balance national development priorities with local needs and interests in relation to the WFE Nexus.

Often there is a need for ongoing training to equip stakeholders with the knowledge and skills required to jointly plan and implement integrated resource management effectively. In many instances, government agencies often lack the technical expertise, tools, and resources needed for multi-sector resource use optimization and stakeholder engagement. They also often lack the know-how for effective integrated planning and management of WEFE Nexus approaches. This includes a shortage of trained personnel in areas like data analysis (incl. using AI), natural resource monitoring (incl. using remote sensing, GIS, etc), Nexus modelling and integrated planning.

INADEQUATE DATA SHARING AND TRANSPARENCY

Access to reliable data on resource availability, demand, and interdependencies is essential for informed decision-making. However, data is often scarce, unreliable, and scattered across different agencies, poorly documented, or not readily accessible to stakeholders. This results in major data gaps, both in space and in time, undermining the ability to gain insight and foresight at the sectoral level and even more so capture both trade-offs and synergies across the WEFE Nexus.

All three countries thus face challenges in collecting, sharing, and analysing data across the WEFE sectors. Often, they lack the data management systems to effectively do so. An example is the recent energy monitoring and management system that the Ministry of Water and Irrigation in Jordan is developing to gain insight in the actual energy use and opportunities for achieving energy efficiency. In the case of Morocco, the Ministry of Equipment and Water implements various transparency tools: digital portals, interactive platforms, bulletins, and public access to water-related data. Morocco is also finalizing a National Water Information System (SNIE), which will serve as the national reference platform for sharing, visualizing, and disseminating water information. These initiatives reflect a commitment to transparency and access to information.

While progress is made regarding information sharing, making data available across sectors remains a daunting task. Data incompatibilities and the lack of information management systems that operate across sectors strongly limit the ability to effectively analyse interdependencies and model the WFE

Nexus. Without such information systems and modelling, it is exceedingly difficult to gain the required insight and foresight needed to make informed decisions across the government.

INSUFFICIENT STAKEHOLDER ENGAGEMENT AND PARTICIPATION

The WEFE Nexus is characterised by a truly diverse set of stakeholders, at national and sub-national levels, which cover a wide range of interests such as farmers, energy producers, water users, local communities, environmentalists, etc. The engagement of all these stakeholders in decision-making processes is crucial for ensuring equitable and sustainable outcomes.

However, in all three countries, there has been limited stakeholder engagement and public participation when it comes to WEFE Nexus sectoral and cross-sectoral governance. Weak stakeholder engagement can lead to resistance to change and undermine the legitimacy of WEFE Nexus policies and plans put forward. Also, insufficient involvement of local communities, farmers, environmentalists and private sector actors in planning and decision-making processes can lead to outcomes that do not align with on-the-ground realities.

Engaging the widely diverse range of stakeholders involved the WEFE Nexus, requires a professional approach. Often there are insufficient human and financial resources made available to seriously involve all stakeholders resulting in reduced transparency and accountability.

POLITICAL INFLUENCE AND LACK OF TRANSPARENCY

Lack of transparency and political influence can distort natural resources allocation, undermine the rule of law, and hinder the effective implementation of WEFE Nexus policies and plans. Weak governance, characterized by insufficient transparency, lack of accountability, and inadequate information sharing, further impairs WEFE Nexus sector performance and cross-sectoral cooperation. The absence of systematic monitoring and transparent government reporting and evaluation exacerbates these issues.

Political instability and sectarian divisions, especially in Lebanon, weaken institutions and hinder progress towards integrated resource management[44]. While Jordan and Morocco benefit from relative stability, broader political conflicts in all three countries can spill over into technical discussions disrupting cross sectoral WEFE Nexus planning. In particular, Jordan and Morocco have clear policies and a roadmap for water sector development and management, as difficult climatic conditions drive both countries to enhance planning and investments. Yet when it comes to WEFE Nexus planning and management, all three countries will have to further build institutional capacity and ensure transparent decision-making processes that are crucial for establishing WEFE Nexus cooperation.

LIMITED FINANCIAL MEANS AND INVESTMENT GAPS

Implementing WEFE Nexus-based solutions typically requires substantial investments in infrastructure, technology, and capacity building. Securing adequate funding from domestic and international sources is often challenging, especially when initiatives involve multiple government agencies. While WEFE might be reflected in some sectoral strategies, it is often not further reflected in budget allocations.In addition, limited financial recovery in water and energy services, along with gaps in investment,

[44] https://www.transparency.org/en/blog/cleaning-up-corruption-along-lebanons-longest-river

constrains the development and maintenance of essential infrastructure and the adoption of new technologies. Difficulties in accessing international aid and investment further hinder progress. Addressing these financial constraints is crucial for optimizing resource use across the WEFE Nexus, promoting sustainable development, and building resilience to climate change across sectors.

In summary, while national contexts differ, Jordan, Lebanon, and Morocco face a shared set of governance challenges that constrain the effective implementation of the WEFE Nexus. These cross-cutting issues include institutional fragmentation, weak policy coherence, limited decentralization, and underdeveloped stakeholder engagement. Inadequate data integration and persistent capacity and financing gaps further undermine efforts to design and execute integrated approaches across water, energy, food, and environment sectors. Addressing these challenges through coordinated capacity-building and policy support is essential to advancing national WEFE governance and aligning with the Mediterranean WEFE Strategy.

TABLE 2-1: SUMMARY OF COMMON GOVERNANCE CHALLENGES IN RELATION TO THE WEFE APPROACH

Theme	Description
Institutional fragmentation	Ministries and agencies operate in silos; limited inter-ministerial coordination; overlapping mandates; lack of intersectoral planning frameworks.
Weak policy coherence and regulatory misalignment	Policies often address individual WEFE sectors in isolation; laws do not support integration; unclear responsibilities.
Limited local-level implementation capacity	Centralised governance dominates; basin-level or decentralized mechanisms exist but are under-resourced or disempowered.
Data fragmentation and lack of interoperability	Poor-quality, outdated, or inaccessible data across sectors; no integrated systems for WEFE decision-making.
Stakeholder exclusion and low participation	Local communities, private sector, and civil society are underrepresented in planning processes; limited transparency.
Political instability and governance weakness	Institutional fragility, lack of transparency, and ad hoc planning undermine strategic coherence (Especially acute in Lebanon).
Chronic underinvestment and financing constraints	Budget limitations, poor cost recovery, limited access to international finance; few incentives for integrated projects.
Capacity gaps in integrated planning and technology use	Lack of technical skills, planning tools, and know-how to design or implement WEFE Nexus strategies across sectors.

TABLE 2-2: RECOMMENDATIONS AND CAPACITY-BUILDING NEEDS

Governance Challenge	Recommendation	Capacity Needs
Institutional fragmentation	Establish or strengthen cross-sectoral coordination platforms (e.g., WEFE Nexus councils, inter-ministerial task forces). Clarify mandates and promote joint planning mechanisms.	Training in inter-ministerial coordination, shared planning frameworks, and facilitation of multi-agency collaboration.
Weak policy coherence and regulatory misalignment	Review and align sectoral policies and regulations to incorporate WEFE principles. Develop legal provisions supporting integrated resource management.	Policy review skills, legislative drafting for WEFE alignment, and stakeholder consultation methods.
Limited local-level implementation capacity	Empower decentralized governance structures, such as basin agencies and local councils, with resources and authority to implement WEFE strategies.	Decentralized planning, participatory governance, and adaptive management training.
Data fragmentation and lack of interoperability	Develop interoperable data platforms and promote cross-sector data sharing protocols. Standardize indicators across WEFE sectors.	Training in data systems integration, GIS, remote sensing, and digital WEFE monitoring tools.
Stakeholder exclusion and low participation	Institutionalize inclusive planning processes. Ensure representation of farmers, communities, NGOs, and the private sector in decision-making.	Stakeholder engagement methods, participatory planning tools, and inclusive facilitation techniques.
Political instability and governance weakness	Focus on building institutional resilience, transparency, and continuity in WEFE Nexus initiatives. Anchor policies in stable legal and financial frameworks.	Crisis-responsive planning, conflict-sensitive policy design, and accountability mechanisms.
Chronic underinvestment and financing constraints	Promote blended finance models and strengthen access to climate and development finance. Improve cost recovery frameworks in WEFE sectors.	Financial planning for WEFE Nexus projects, proposal writing for donors, and training in economic valuation.
Capacity gaps in integrated planning and technology use	Build technical capacity in integrated modelling, Nexus impact assessments, and planning tools that reflect interlinkages.	Integrated resource planning, WEFE Nexus modelling, systems thinking, and training on WEFE Nexus assessment tools.

2.5 CASE STUDIES

Selected cases studies of WEFE Nexus applications are presented in this Section. Further cases are available in the web site of the Mediterranean WEFE Nexus Community of Practice facilitated by the PRIMA WEF4Med project (www.wefe4med.eu).

JORDAN

WEFE POLICY AND INSTITUTIONAL COORDINATION[45]

Since 2019, Jordan has actively integrated the Nexus approach into its policymaking processes. Supported by GIZ, the Water-Energy NEXUS (WEN) dialogue was established, followed by the initiation of the Renewable Energies in the Water Sector (REW) project and the Energy Efficient Water Sector (EEWS) project. These efforts fostered collaboration among ministries and experts, leading to the formation of committees and working groups focused on strengthening the Nexus dialogue and implementing joint initiatives that benefit both water and energy sectors. This coordination framework

[45] https://www.water-energy-food.org/stories/the-water-energy-food-and-environment-wefe-Nexus-in-jordan-governance-building-resilience-and-securing-wef-in-the-present-and-the-long-run

successfully incorporated Nexus principles into existing sectoral plans and facilitated the development of shared strategic projects.

Building on these successes, Jordan launched the "Development of Framework for the Governance of the Water, Energy, Food, and Environment (WEFE) Nexus" project. This initiative aims to enhance cross-sectoral governance, promote knowledge exchange among experts from various fields. By doing so it contributes to supporting sustainable management practices that consider sectoral needs, environmental sustainability, and resource interdependencies.

TREATED WASTEWATER REUSE IN THE JORDAN VALLEY: INTEGRATING WATER, FOOD, ENERGY, AND ENVIRONMENTAL MANAGEMENT

Jordan is among the world's most water-scarce countries, facing acute resource constraints that demand integrated resource management. In the Jordan Valley, approximately 15,000 hectares—about 25–30% of the total irrigated area—are irrigated using treated effluent, making TWWR a cornerstone of the country's WEFE Nexus strategy[46]. At the centre of this is the As-Samra Wastewater Treatment Plant (Khirbet As-Samra), located northeast of Amman. It is the largest and most advanced WWTP in Jordan and among the largest in the region. As-Samra WWTP Collects over 370,000 m^3/day of municipal wastewater, primarily from Amman and Zarqa Governorates, representing over 60% of Jordan's sewage[47]. After treatment, the effluent is discharged via gravity-fed infrastructure into the King Talal Reservoir (KTR) or directly to irrigation canals[48,31]. Treated WW is blended with surface runoff at KTR and used for irrigating crops in the middle and lower Jordan Valley[49].

As-Samra is designed to recover biogas and hydro energy, covering up to 90% of its own energy demand, making it one of the most energy-efficient WWTPs in the region[50]. A flagship WEFE Nexus initiative has been the large-scale reuse of treated wastewater (TWWR) in agriculture, mostly in the Jordan Valley, where more than 90% of treated wastewater is reused, primarily for irrigating crops.

WEFE Sectors Involved:

1. Water: Wastewater is collected, treated, and reused, easing pressure on freshwater resources.
2. Food: TWWR supports the irrigation of approximately 15,000 hectares, contributing to national food security and farmer livelihoods.
3. Energy: Treating and pumping wastewater is energy-intensive; Jordan has initiated efforts to reduce the energy footprint of TWWR (e.g. under the GIZ EEWS and REW programs).
4. Environment: Reduces discharge of untreated sewage into natural water bodies and preserves ecological flows.

[46] MCC (2021). As Samra Wastewater Treatment Plant Project Summary. https://www.mcc.gov/resources/story/section-jor-ccr-as-samra-project

[47] Al-Tal & Abu-Sharar (1996). Effect of Khirbet As-Samra treated effluent on irrigation quality. https://www.sciencedirect.com/science/article/pii/S0043135496001765

[48] Sarraf et al. (2020). Reuse of Treated Wastewater and Biosolids in Jordan. https://www.ufz.de/export/data/460/238737_REUSE%20STUDY_2020.pdf

[49] Wikipedia (2024). King Talal Dam. https://en.wikipedia.org/wiki/King_Talal_Dam

[50] CGIAR (2020). Viability Gap Funding in As Samra WWTP. https://cgspace.cgiar.org/handle/10568/108989

What Worked:

- Policy & Institutional Alignment: Coordination between the Ministry of Water and Irrigation (MWI), Water Authority of Jordan (WAJ), and Ministry of Agriculture (MoA) has improved reuse standards and allocation planning. This alignment has been consistently supported by national water strategies since 1998 including the most recent strategy (2023–2030) which prioritizes TWWR as a core component of non-conventional water resource management.
- Infrastructure Investment: The As-Samra Wastewater Treatment Plant, Jordan's largest, treats around 370,000 m^3/day of wastewater, with high efficiency and energy recovery (operates at about 90% energy self-sufficiency through biogas generation and hydropower).
- Regulatory Standards: Jordan was one of the first MENA countries to adopt strict reuse standards (JS893/2006 which was updated in 2021 (JS/893/2021)) for treated effluent in agriculture, aligning water quality with crop selection and irrigation method.

Challenges and Lessons:

- Energy costs for wastewater treatment and pumping remain high, prompting interest in solar PV integration (piloted in As-Samra and East Jerash).
- Farmers need ongoing support and trust-building around the safe use of treated water, particularly for high-value crops.
- Groundwater substitution with TWWR use may not fully offset over-abstraction unless **monitored** closely.

WEFE Nexus Relevance:

This case exemplifies how non-conventional water resources can be leveraged to balance food production, energy use, and ecosystem protection. It reflects growing coordination among ministries and the shift toward circular resource use in Jordan's arid context.

LEBANON

INTEGRATED ASSESSMENT OF FIVE RIVER BASINS[51]

This initiative exemplifies a comprehensive, data-driven WEFE Nexus analysis that links water governance with agriculture, energy, and climate resilience at the basin level. During the ongoing Phase 2 of Lebanon's WEFE Nexus Assessment under the GEF MedProgramme – Child Project 2.2 (GWP-Med), an integrated assessment is being carried out across five river basins. The goals are to:

- Assess water availability for agriculture, incorporating climate data and scenario modelling.
- Provide guidance for food security planning.
- Incorporate ecological flow requirements and energy needs for irrigation water transport.

The initiative aims to strengthen coordinated governance and joint planning among WEFE decision-makers. For instance, while the Ministry of Agriculture seeks to expand cultivated areas, this may

[51] https://www.gwp.org/en/GWP-Mediterranean/About-GWP/more/calls-for-tenders/call-for-offers-372023cp2.2--preparation-of-phase-ii-wefe-Nexus-assessment-for-lebanon/

conflict with water availability or ecological constraints, highlighting the need for cross-sectoral planning.

Such disconnects underscore the importance of establishing coordinated mechanisms—such as those envisioned in Lebanon's National Water Law through the future National Water Council—and support the development of more effective WEFE Nexus governance structures.

"SAVING WATER – GROWING CROPS" PROJECT: A WEFE DEMONSTRATION IN WEST BEKAA

Implemented under the EU-funded Water and Environment Support (WES) project, this pilot initiative in West Bekaa showcases how smart irrigation technologies, community-led governance, and stormwater harvesting can support sustainable water–energy–food–ecosystem (WEFE) integration. The project covered approximately 29 hectares of irrigated farmland and served as a testbed for combining technological innovation with participatory water management in a rural, agriculture-dependent region.

WEFE Sectors Integration:

- **Water**: The project improved irrigation efficiency through remote-controlled drip systems, rehabilitated three lakes, and harnessed stormwater runoff, enhancing local water availability and reducing waste.
- **Food**: By enabling more precise and reliable irrigation, the project supported improved crop productivity and reduced irrigation-related conflicts among farmers.
- **Energy**: Although not solar-powered, the initiative introduced more efficient water delivery systems, reducing energy consumption in pumping operations.
- **Environment**: Restoring lakes and reducing siltation through stormwater capture contributed to land stabilization, reduced erosion, and improved local ecosystem health.

What Worked and Why:

1. **Use of smart irrigation and weather-based controls:** The project introduced remote-controlled drip irrigation systems, linked to soil moisture sensors and weather stations. These enabled farmers to optimize irrigation schedules, reduce water losses, and improve crop yields by aligning inputs with real-time climate and soil data[52].
2. **Integration of stormwater reuse and lake rehabilitation:** Three agricultural lakes were restored and connected to irrigation systems through a low-cost silt-trapping mechanism that harnessed stormwater runoff. This circular approach improved water availability while reducing sedimentation and flood risks[34].
3. **Community-led governance via Water Committee:** A Water Committee was established, comprising local farmers, cooperatives, and public authorities. This local body managed irrigation scheduling, resolved disputes, and ensured ownership of the infrastructure. It also initiated discussions on financial contributions for operation and maintenance, increasing the project's sustainability[34].

[52] WES Project (2023). Demonstration Project Summary – West Bekaa Smart Irrigation Initiative. https://www.wes-med.eu/activities_type/pilot-projects

Quantifiable Impact:

- 29 hectares equipped with sensor-controlled irrigation[53]
- 3 lakes rehabilitated, improving local storage capacity
- Participatory mapping helped reduce land-use conflict and optimize system layout.
- Farmers reported increased willingness to pay for irrigation services after seeing results[34.]

Challenges and Lessons:

1. **Need for sustained funding and scaling mechanisms:** While successful at pilot scale, the project's impact depends on replication. Institutionalization and integration into regional agricultural or water strategies is needed to scale up the benefits.
2. **Skills gap in technology use:** The introduction of digital tools (sensors, weather-linked systems) required **training and technical backstopping**. Some farmers needed ongoing support to fully adopt the tools.
3. **Inter-sectoral links remain informal:** Although the project addressed water, energy (via pump efficiency), food, and environment dimensions, its connection to national-level WEFE coordination mechanisms (e.g., Climate NDC Coordination, Ministry-level strategies) remains limited.

WEFE Nexus Relevance:

"Saving Water – Growing Crops" provides a strong example of how localized WEFE action can deliver both resource efficiency and community empowerment. Its emphasis on smart irrigation, nature-based water storage, and participatory governance aligns well with WEFE principles and offers a practical model for replication across Lebanon's agriculture-intensive areas.

MOROCCO

SOLAR PUMPING FOR AGRICULTURE[54]

In Morocco, the adoption of solar pumps has enabled farmers to access water more cheaply and to operate during the day, which was previously restricted due to excessive costs of electricity, gas, or oil limiting when and how much they could irrigate. This has the potential to boost agricultural productivity by enabling more efficient drip irrigation. Recent policy reforms have promoted the use of solar pumping technologies to reduce reliance on fossil fuels like gas, oil, and butane, thereby enhancing energy efficiency. This new policy, however, only addresses one aspect of the WEFE Nexus with limited consideration of its interconnections with broader system impacts, especially on water sustainability and ecosystems, which can lead to unintended consequences. In the case of solar pumping, the increased availability of cheap energy brings a major risk in increasing water resource depletion, even of deeper aquifers. Although groundwater abstraction from deeper than forty meters is legally restricted, enforcement of this regulation is often weak or non-existent.

[53] WES Workshop Materials (2023). Saving Water – Growing Crops Technical Briefs and Field Reports. https://www.wes-med.eu/activities_type/trainings

[54] https://www.mem.gov.ma/Pages/secteur.aspx?e=3&prj=39

This example demonstrates that without proper regulation and authorization for groundwater use, subsidies for solar water pumping can lead to overextraction of water resources. This can threaten long-term water availability, pose serious food security risks, and endanger human well-being.

REGIONAL WEFE POLICY DIALOGUE IN TANGER–TÉTOUAN–AL HOCEIMA (TTA): BRIDGING NEXUS GOVERNANCE AND ECOSYSTEM RESILIENCE

As part of the GEF MedProgramme – Child Project 2.2, Morocco piloted a comprehensive WEFE Nexus policy dialogue in the Tanger–Tétouan–Al Hoceima (TTA) region[55]. This initiative—implemented by GWP-Med in partnership with national and regional stakeholders—sought to identify practical solutions to competing resource demands across water, energy, food, and ecosystems. It is one of the few nationally anchored efforts in Morocco that operationalizes the WEFE Nexus through both analytical and participatory methods.

Project Components and Focus Areas

- **Analytical Component**:
  - Mapped WEFE sector interdependencies, trade-offs, and synergies[35].
  - Applied participatory scenario development and conflict-mapping tools.
  - Integrated environmental considerations, particularly ecosystem services and water quality impacts[56].
- **Participatory Component**:
  - Engaged local authorities, basin agencies, farmers, and technical experts.
  - Facilitated stakeholder consensus on resource priorities and constraints.
  - Developed a shared vision and set of actionable Nexus solutions[35].

The process led to the identification and prioritization of 21 WEFE Nexus solutions, clustered under four thematic areas:

1. Strengthening cross-sectoral governance and institutions
2. Conservation of ecosystems for sustainable water and food production
3. Smart and resilient agriculture, focusing on water and energy efficiency
4. Reducing pollution through circular economy and wastewater reuse[1]

These proposals were consolidated into a draft Regional WEFE Nexus Action Plan, offering a replicable framework for other regions in Morocco[35].

WEFE Nexus Integration:

1. **Water**: Targeted groundwater sustainability, watershed protection, and improved irrigation efficiency[35].
2. **Energy:** Explored energy use in pumping, irrigation, and pollution reduction systems[35].

[55] GWP-Med (2023). WEFE Nexus Policy Dialogue – Final Report, TTA Region (Morocco). Retrieved from: https://www.gwp.org/globalassets/global/gwp-med-files/list-of-programmes/medprogramme/Nexus-policy-dialogue-in-moroccoen_fr.pdf
[56] GWP-Med (2022). Terms of Reference: Phase II – WEFE Nexus Assessment, TTA Region, Morocco. https://www.gwp.org/globalassets/global/gwp-med-files/calls-2025/162025cp2.2/tor-phase-ii-tta-morocco.pdf

3. **Food:** Focused on smart agriculture and strategic crop selection under water constraints[35].
4. **Environment** Ecosystem health and services were central to solution design (e.g., reforestation, aquifer recharge) [36].

What Worked and Why:

1. **Participatory governance at the regional level**
   The WEFE Nexus Policy Dialogue, implemented by GWP-Med in the TTA region, successfully brought together, water, energy, agriculture, and environmental stakeholders from national and local institutions[35]. This inclusive approach enabled alignment between basin-level resource management and regional development planning. A structured series of multi-stakeholder workshops and technical assessments helped build consensus across sectors.
2. **Integrated problem analysis with environmental focus**
   The project conducted cross-sectoral assessments of resource interlinkages, including scenario planning and identification of trade-offs. Notably, it emphasized ecosystem services and water quality impacts — areas often underrepresented in sector strategies[36]. This helped frame sustainability as a shared cross-sector goal rather than a constraint.

Action-oriented outcomes:

The process led to the prioritization of 21 Nexus-based solutions clustered under four themes:

- Strengthening governance
- Conserving ecosystems for sustainable agriculture and clean water
- Promoting smart, resource-efficient agriculture
- Reducing pollution through circular practices (e.g., wastewater reuse)[35]
  These were consolidated in a draft WEFE Nexus Action Plan tailored for the TTA region — a format that may be replicated elsewhere.

Quantifiable Impact:

- 21 actionable Nexus interventions identified through stakeholder consultations[35]
- Engagement of over 30 institutions, including Hydraulic Basin Agencies, provincial councils, technical ministries, and civil society groups[35]
- Structured multi-sector workshops held across 2 governorates with documented outputs

  While concrete resource savings or investment figures were not publicly disclosed, the action plan forms the basis for regional WEFE integration in water planning, agricultural extension, and land use.

Challenges and Lessons:

1. Institutional fragmentation remains a barrier

Despite strong engagement at the dialogue level, institutional mandates and regulatory frameworks remain sector-specific, limiting follow-through on integrated actions[36].

2. Need for sustained implementation support

The Action Plan and other results need to be officially adopted, funded, and integrated into institutions. Without national support and investment, progress remain limited

3. Nexus tools are still new at the subnational level

Local technical staff and planners often lack familiarity with cross-sectoral planning tools, highlighting the need for capacity-building in integrated resource assessment, scenario modelling, and systems thinking.

WEFE Nexus Relevance:

The TTA WEFE Nexus Dialogue represents a strong example of subnational, evidence-based Nexus governance. It shows that with structured facilitation, cross-sector coordination is possible and that ecosystems and governance can be central to resource planning. The approach offers a replicable model for Morocco's other regions and supports national commitments to integrated water and land management under SDG 6.5.

2.6 COMPARATIVE SWOT ANALYSIS

The WEFE Nexus approach recognizes the interdependence of the four sectors and promotes integrated policies and governance to manage resources more sustainably. In Jordan, Lebanon, and Morocco, efforts to implement WEFE Nexus policies and governance present various strengths, weaknesses, opportunities, and threats.

STRENGTHS

- **Awareness of Integrated Policy Frameworks**: There is increasing awareness and effort to develop integrated policy frameworks that recognize the interdependencies between water, energy, agriculture, and ecosystems, in the spatial dimensions of the Source-to-Sea approach, including at transboundary level, aiming for a more holistic management approach. These frameworks can be labelled as 'WEFE Nexus' *per se* and can also be developed under other labels such as improving environmental governance, 'sustainable development - SDGs' or 'climate resilience - NDCs'. The Strategy and, upon approval, its Action Framework will assist in further establishing the WEFE Nexus agenda.
- **Commitment to Sustainable Development and Climate Resilience**: All three countries have shown their commitment to sustainable development and climate resilience goals. They also have initiated projects that reflect elements of a WEFE Nexus approach, either addressing concurrently all four sectors or some of them, such as renewable energy use in agricultural practices, or renewable energy use and brine management in desalination, or water sector energy efficiency initiatives, etc.
- **Mediterranean Regional Cooperation**: The three countries are all UfM Member States and are part of Mediterranean-wide initiatives aimed at addressing shared challenges in natural resource management, fostering knowledge exchange, and promoting best practices. They also foster strong relationships with regional institutions enabling the exchange of information, knowledge, and know-how across the region.

WEAKNESSES

- **Institutional Silos**: Despite efforts to integrate policies, institutional silos persist with WEFE sectors operating mostly independently. Some bilateral coordination between specific sectors

is being implemented, but the limited coordination undermines the implementation of a comprehensive WEFE Nexus approach and delays the establishment of a more efficient and sustainable resource use. These apply also in relation to the spatial dimensions of the Source-to-Sea approach, including at transboundary level.

- **Lack of Capacities**: Many institutions lack specialists trained in integrated resource management and WEFE Nexus approaches. Furthermore, while the watershed/basin management is already advanced through IWRM application, the Source-to Sea approach that, for example, includes the specificities of the coastal and the marine areas, is not yet well considered. There is insufficient training for government officials, technical staff, entrepreneurs, and local citizens to gain the knowledge, know-how and skills for implementing and managing Nexus initiatives effectively.
- **Limited Data Sharing, Systems and Monitoring**: Lack of data, information systems and actual data sharing limit the ability to synthesize data and information within and across WEFE sectors. This undermines the development of evidence-based decision-making to implement WEFE Nexus policies and optimize resource allocation.
- **Financial Constraints**: Insufficient financial resources and limited investments in WEFE Nexus-related initiatives, technologies and infrastructure impede progress and scalability of WEFE Nexus initiatives, including demo applications with replication and upscaling potential.

OPPORTUNITIES

- **Technological Advancements**: Adoption of innovative technologies focusing on realizing efficiencies within each WEFE sector, and across the WEFE Nexus, can optimize resource use and enhance efficiency across the entire WEFE Nexus.
- **International Support and Partnerships**: Access to international funding and partnering, like with the EU including its development assistance (like NDICI/EFSD+, etc.) and research (like H2020, PRIMA, etc.) lines, multilateral funding instruments like GCF, GEF, etc., multilateral banks like EBRD, EIB, AfDB, IsDB, etc., bilateral donors, Mediterranean institutions and the private sector, provide opportunities for resource mobilization and capacity building, aiding in the implementation of WEFE Nexus.
- **Public Awareness and Stakeholder Engagement**: Increasing public awareness and engaging stakeholders on sustainable practices through integrated approaches can support policy implementation and foster initiatives among stakeholders, including with the engagement of the private sector, and with communities, to size WEFE Nexus related opportunities. Regional projects, like the EU WES BCA, GEF UNEP MAP MedProgramme, PRIMA WEFE4Med, etc. may assist for such objectives.

THREATS

- **Over-abstraction and Pollution of Natural Resources:** All three countries are faced with a dramatic over-abstraction of water resources (Jordan, Morocco) or pollution (Lebanon), undermining the resource base of their economies and citizen's livelihoods, while energy costs, for example for water abstraction and distribution or desalination, remain high.

- **Impacts from Climate Change**: Ongoing climate change threatens water availability, agricultural productivity, and energy supply, exacerbating existing challenges and necessitating adaptive strategies within the Nexus.
- **Political Instability**: Political instability and regional conflicts can disrupt governance processes, policy implementation, and international cooperation, affecting WEFE Nexus outcomes, including related to transboundary cooperation. For Jordan and Lebanon, it is particularly the refugee crises that puts an extra threat to WEFE sector's sustainable management and resource use.
- **Competing Priorities**: Economic pressures and immediate socio-economic needs may lead to prioritization of short-term gains over long-term, sustainable WEFE Nexus approaches, risking unsustainable resource use.

3 ALIGNMENT WITH THE WEFE MEDITERRANEAN STRATEGY

In this section, national approaches are analysed against the Mediterranean WEFE Strategy through defining challenges and opportunities for further alignment of national WEFE policies and strategies with the Strategy. Potential priority WEFE Nexus actions are provided as well as an initial indicator framework for the Strategy.

3.1 COMPARISON: CHALLENGES AND OPPORTUNITIES

The Mediterranean Strategy for the WEFE Nexus in the Source to Sea Continuum includes the following priorities[57,58] (see also Annex 1):

Goal 1: Appropriate institutional arrangements, policies, and cooperation frameworks are established at country and regional levels.

Objective 1.1: Develop and/or accordingly adapt appropriate governance structures at all levels to implement the WEFE Nexus approach in the Source-to-Sea (S2S) continuum.

Objective 1.2: Mainstreaming WEFE Nexus approach in the S2S continuum into policies and strategies.

Goal 2: Efficient and effective planning, financing and implementation of management and technical solutions.

Objective 2.1: Upscaling demonstration WEFE Nexus applications to mainstreamed implementation, through appropriate investments and market mechanisms.

Objective 2.2: Attracting and coordinating increased financing for implementation of WEFE Nexus interventions.

Goal 3: Informed decision making based on enhanced science-based knowledge, engagement of capacitated stakeholders, and increased public awareness.

Objective 3.1: Promoting science and education on WEFE Nexus and S2S aspects.

Objective 3.2: Ensuring data availability, harmonisation and sharing across sectors and borders.

Objective 3.3: Developing capacities of stakeholders and related tools to implement WEFE Nexus at the S2S continuum.

Objective 3.4: Raising awareness and improving understanding concerning the WEFE Nexus at the S2S continuum, stimulating stakeholder's engagement and empowering them for their implementation.

Below an analysis is provided of the challenges of national approaches of Jordan, Lebanon and Morocco compared to the Mediterranean WEFE Nexus Strategy. In addition, opportunities for better alignment of national WEFE Nexus policies and strategies are identified for each country.

[57] https://www.gwp.org/globalassets/global/gwp-med-files/news-and-activities/5-mediterranean-water-forum/draft-med-wefe-Nexus-strategy---outline.pdf
[58] An overview of the Mediterranean WEFE Nexus strategy that includes 'directions for action' is provided in Annex 1.

JORDAN

3.1.1.1 Institutional arrangements and policies

Regarding developing and adapting governance structures, Jordan has initiated and advanced a cross-sectoral WEFE coordination platform and dialogues. There has been progress to incorporate WEFE Nexus elements into some sectoral plans and to develop legal and institutional arrangements supporting WEFE Nexus interventions, particularly in the water sector. However, full decentralization and empowerment of local actors are not yet widespread, and institutional frameworks governing multi-sectoral resource management still require strengthening. Moreover, effective institutional mechanisms for scaling-up WEFE Nexus interventions and impact monitoring remain underdeveloped.

Jordan has the opportunity to enhance WEFE Nexus coordination across local, regional, and sectoral levels. Regarding mainstreaming WEFE Nexus into policies and strategies, Jordan has begun incorporating related considerations into key strategies. There is now the opportunity to further develop and operationalize elements of a WEFE Nexus approach available in various sector strategies and policies. For instance, Jordan's 2023–2030 Water Sector Strategy refers to integrated planning with the Ministry of Agriculture and the Ministry of Energy for managing irrigation efficiency and reducing energy use — yet this coordination remains at a strategic level and needs to be translated into joint implementation mechanisms. Jordan can also further develop comprehensive regional and (sub)national strategies explicitly that bring an alignment with a WEFE Nexus approach. Also, existing, and new sectoral initiatives should be signed to systematically assess and harmonize interdependencies across the WEFE sectors.

3.1.1.2 Effective and efficient planning and financing

Jordan faces significant difficulties in scaling up WEFE Nexus projects due to limited financial resources and insufficient market mechanisms. Despite efforts to promote demonstration applications, there is limited public and private investments and related incentives that encourage private sector engagement. The country also faces challenges in public financing for WEFE Nexus projects, as domestic funding streams are constrained by economic pressures. Additionally, the absence of well-established financial instruments tailored to WEFE Nexus solutions hampers the transition from pilot projects to mainstream implementation. Institutional capacity gaps further inhibit the scaling of WEFE Nexus interventions across sectors.

Jordan could leverage international development cooperation like EU NDICI/EFSD+, access climate finance like GCF, and utilize innovative financial instruments such as blended finance, green bonds, and ecosystem service payments to support WEFE Nexus projects. Strengthening regulatory frameworks and creating conducive market environments can attract private investments and encourage public-private partnerships. This can be done where clear revenue streams can be identified from WEFE Nexus related activities, such as energy efficiency measures in the water and agriculture sectors. Additional demonstration projects, particularly those that demonstrate scaling models and potential, can serve to showcase WEFE Nexus benefits that can reach scale. These can help gain political and stakeholder support for scaling efforts. Additionally, further integrating Nexus considerations into national development plans and sector strategies provides a pathway to mainstream investments and foster sustainable resource management across sectors.

3.1.1.3 Informed decision making

Jordan is challenged by significant barriers in advancing science-based decision making, including research capacity, data scarcity, and challenges in data harmonization across sectors and borders. There is a need for improved coordination mechanisms to facilitate data sharing and interoperability. Public awareness and stakeholder engagement remain limited, partly due to lack of outreach efforts, which hampers country-wide stakeholder participation and empowerment in WEFE Nexus governance, management, and initiatives. Furthermore, capacity gaps among stakeholders—especially at local levels—reduce the effectiveness of implementing WEFE Nexus approaches. Currently, educational programs that incorporate WEFE Nexus principles are either scarce or not yet integrated into formal curricula.

Jordan can capitalize on international partnerships and technical assistance, including H2020 and PRIMA, to enhance research capabilities and establish integrated data platforms and information systems, promoting transparency and cross-sectoral data sharing. High is also the potential related to advancing digitalisation for WEFE Nexus. Developing national WEFE knowledge hubs can facilitate better information exchange and harmonization. Building capacity through targeted training programs, workshops, and the integration of the WEFE Nexus concepts into university curricula can strengthen stakeholder expertise. Public awareness campaigns and stakeholder engagement initiatives—leveraging media, community participation, and educational programs—can foster increased understanding, ownership, and active participation in Nexus-related interventions.

LEBANON

3.1.1.4 Institutional arrangements and policies

Lebanon faces considerable hurdles in establishing effective institutional arrangements for the WEFE Nexus. The country's complex political landscape, fragmentation, and weak institutional capacity hinder the development and adaptation of governance structures necessary for implementing a comprehensive Nexus approach across sectors. Mainstreaming the WEFE Nexus into national policies is further complicated by a lack of coordination among various sectors, overlapping mandates, and limited political stability. Additionally, overlapping responsibilities and the absence of a coherent coordination framework across governance levels (local, basin, and national) hinder efforts to establish an integrated WEFE Nexus governance system aligned with the Source-to-Sea Continuum.

Lebanon can mobilize partnerships in the Mediterranean region to strengthen its institutional capacity and develop WEFE Nexus governance frameworks. Efforts to establish multi-stakeholder platforms and cross-sectoral committees could improve coordination and facilitate policy mainstreaming. Existing mechanisms such as the Inter-Ministerial Committee technically facilitated by the GEF UNEP MAP MedProgramme, river basin authorities and the NDC coordination can be used to actively pursue a WEFE Nexus mainstreaming and integration. This would assist in further expanding WEFE Nexus principles more explicitly into policies, and strategies. Building on regional Mediterranean initiatives, Lebanon can mobilize international support to bridge institutional gaps and advance integrated governance aligned with the WEFE Nexus approach.

3.1.1.5 Effective and efficient planning and financing

Lebanon faces significant barriers to scaling up WEFE Nexus applications, due to financial constraints, political instability, and economic crises. There is limited access to both domestic and international funding, and a lack of well-developed market mechanisms to promote investments in WEFE Nexus solutions at scale. The country's weak institutional capacity and ongoing political conflicts hinder the ability to expand successful pilot projects into mainstream applications. Additionally, coordinated financing efforts are hampered by fragmented governance, insufficient policy frameworks, and a high dependence on crisis management rather than strategic planning, which impedes the attraction of sustainable and large-scale investments.

Lebanon has the potential to attract international aid, development finance, and domestic private sector investments by emphasizing the economic, financial, and environmental benefits of WEFE Nexus solutions. Strengthening policy frameworks and establishing innovative market mechanisms—such as green bonds or public-private partnerships—can facilitate the mobilization of private investments. Demonstration projects, such as solar pumping reducing fossil fuel dependency while avoiding groundwater over-abstraction, can showcase WEFE Nexus benefits (Ex: MINARET I in Barouk) and attract further funding to scale. Furthermore, harnessing Mediterranean regional cooperation can mobilize expertise and help Lebanon transition from crisis-driven approaches to sustainable and integrated management solutions.

3.1.1.6 Informed decision making

Lebanon encounters several obstacles in advancing informed decision-making in relation to the WEFE Nexus. A major challenge is the limited availability and reliability of data, and the harmonization and sharing of data and information across sectors and borders. Additionally, stakeholder capacity in relation to the WEFE Nexus is underdeveloped, with few training opportunities and insufficient tools to effectively understand and implement WEFE Nexus approaches. Stakeholder awareness on the WEFE Nexus remains low, compounded by limited outreach and education initiatives. The effect of this is a lack of broad stakeholder engagement, which impedes the building of consensus and community and private sector support for WEFE Nexus interventions.

Lebanon can leverage Mediterranean regional collaborations and international assistance to develop the information systems and modelling capacities required for incorporating the WEFE Nexus approach across sectors. High is also the potential related to advancing digitalisation for WEFE Nexus. It also can make a deliberate effort to incorporate WEFE Nexus concepts into university and engineering curricula and professional training programs. To mobilize a broader societal support for WEFE Nexus-based approaches, Lebanon could initiate media campaigns, educational initiatives and user-friendly tools that truly engage stakeholders. Together this type of efforts can transform Lebanon's WEFE Nexus limitations into opportunities for building a more integrated, knowledge-driven integrated natural resources management approach.

MOROCCO

3.1.1.7 Institutional arrangements and policies

Morocco faces significant challenges in establishing effective institutional arrangements for the WEFE Nexus, including institutional silos, overlapping mandates, and fragmented WEFE Nexus governance across sectors. Policy frameworks often remain strictly sector-specific, with limited integration of WEFE Nexus principles into national strategies. Furthermore, institutional capacity varies across regions, and delays in political or administrative decentralization hinder the development of unified sub-national WEFE Nexus coordination and cooperation frameworks.

Morocco could strengthen WEFE Nexus governance by establishing new or adapting existing cross-sectoral coordination bodies that integrate water, energy, agriculture, and environmental policies. Existing decentralized reforms can be leveraged to embed WEFE Nexus principles into sub-national strategies and promote a more cohesive Source to Sea approach. Mediterranean regional cooperation and European financial support, including through NDICI/EFSD+, can be mobilized to assist in policy reforms and create and operationalize tailored WEFE implementation strategies. Morocco also has the opportunity to pilot integrated WEFE governance models, particularly at the sub-national or water shed level, which can serve as scalable examples that can mobilize additional political support and donor engagement. Harnessing these opportunities can enable Morocco to develop more resilient, adaptable, and integrated natural resources governance structures aligned with the WEFE Nexus approach.

3.1.1.8 Effective and efficient planning and financing

Morocco faces challenges in scaling up WEFE Nexus applications due to limited access to dedicated funding and underdeveloped market mechanisms. There are insufficient financial incentives to attract private investment in WEFE Nexus related activities at scale. Political and economic uncertainties, along with competing priorities, make it difficult to secure long-term funding and replicate successful pilot projects on a larger scale. Additionally, institutional capacity gaps and fragmented oversight hinder coordinated efforts to integrate WEFE Nexus related solutions more broadly into national development plans and programmes.

Morocco has the potential to leverage climate finance, green bonds, and sector specific public–private partnerships to finance larger WEFE Nexus related infrastructure projects, including for advancing resource-efficient and environmentally sensitive desalination. Small and medium-size WEFE Nexus demonstration initiatives that deliver clear financial benefits could attract both domestic and international private investments. Developing effective market-based mechanisms, such as water banking, renewable energy surplus buy-back or payment for ecosystem services, can incentivise private sector engagement and investments. Furthermore, fostering collaboration with the EU and actively establishing bilateral WEFE Nexus projects could unlock new funding channels that can accelerate the adoption of WEFE Nexus approaches.

3.1.1.9 Informed decision making

Advancing science-based decision-making related to the WEFE Nexus remains challenging for Morocco. Data availability and quality can be improved, with fragmentation across sectors and regions.

This hinders comprehensive WEFE Nexus modelling and analysis to support informed policy and decision making. Harmonizing and sharing data across borders and sectors is complicated by institutional silos and insufficient data-sharing infrastructure. Stakeholder mostly lack the know-how, technical tools and capacities needed to implement WEFE Nexus related activities effectively. Public awareness of the interconnections between water, energy, food, and ecosystems sector issues remains low, reducing stakeholder engagement and community participation in WEFE Nexus initiatives.

Morocco can leverage its strategic position and Mediterranean and European Union cooperation frameworks to strengthen its data and information systems related to WEFE Nexus management across sectors. Developing such integrated data platforms and information systems, operable at the national and sub-national level, can help educate and engage a wide range of stakeholders. Investing in education and capacity-building programs—diploma courses, technical training, and knowledge exchanges—can also enhance stakeholder expertise in WEFE Nexus approaches and their implementation. Morocco also could promote WEFE-related innovations, including digitalisation, by building on and expanding its strong foundation in science and engineering know-how, particularly in fields like renewable energy, irrigation, and water treatment. Additionally, awareness campaigns, media engagement, and stakeholder dialogues can elevate public understanding and foster active a more active participation. These initiatives can catalyse a shift towards more informed and inclusive management of water, energy, food, and environmental resources within a Source to Sea perspective in Morocco.

3.2 POTENTIAL PRIORITY CROSS-COUNTRY ACTIONS ALIGNED WITH THE MEDITERRANEAN WEFE NEXUS STRATEGY

The WEFE Mediterranean Strategy includes a comprehensive list of objectives and corresponding, ‘directions for action’. Based on these, a number of shared priority actions can be envisaged for the three countries that will help accelerate the operationalization of the WEFE Nexus in the S2S continuum approach. These actions, which have been structured around the main goals and objectives of the Mediterranean WEFE Strategy are presented below.

INSTITUTIONAL ARRANGEMENS AND POLICIES

To stimulate the appropriate institutional arrangements, policies, and cooperation frameworks at country level, the Strategy is proposing to develop WEFE Nexus governance structures and mainstream the WEFE Nexus approach within the Source to Sea continuum into policies and strategies. The following actions could be envisaged:

- Accelerating the establishment and strengthening the operation of WEFE Nexus related coordination mechanisms at the national level, including with a view of enhancing transboundary cooperation, defining a strong mandate, distributed responsibilities, and a clear agenda and timetable for progress.
- Reviewing and updating sector policies and strategies to incorporate additional WEFE Nexus related priorities and opportunities (Table 3-1).

- Assessing the need to update or create new laws or regulations to operationalize aspects of sector policies and strategies related to the WEFE Nexus.
- Developing "WEFE champions" within different sectors and institutions, and at various levels, creating a cross-sectoral national level (informal) network to mainstream WEFE Nexus policy efforts and foster sector integration.
- Reviewing the mandate, composition, policies, and strategies of sub-national river, water, and hydraulic basin authorities to ensure these reflect a WEFE Nexus approach in the Source to Sea continuum.

By advancing these proposed priority action the development of good WEFE Nexus governance can be accelerated and a broader group of policy makers, legislators and regulatory authorities could become involved in addressing WEFE Nexus challenges.

TABLE 3-1 CHECK-LIST: SELECTION OF POTENTIAL OPPORTUNITIES FOR UPDATING SECTOR POLICY AND STRATEGIES WITH WEFE NEXUS RELATED ELEMENTS[59] IN THE THREE COUNTRIES

		WEFE related issue			
		Water security	**Energy security**	**Food security**	**Environmental sustainability**
WEFE Sector	**Water**		– reduce energy demand, – energy efficiency, – use of renewable energy (RE)	– sustainable crop production, – treated wastewater for irrigation,	– multi-purpose reservoirs as habitats and recreational areas, – environmental flows, – groundwater restoration for wetland conservation
	Energy	increase reservoir storage as batteries (for RE management)		– Stimulate electric vehicles (EV)- for agri-transport, – solar-powered pumping for energy efficient irrigation	– promote renewable energy to reduce GHG emissions
	Agri-Food	– irrigation water efficiency, – terracing and contour ploughing to control runoff and reduce erosion, – increase soil water storage through SOM (soil organic	– reduce energy demand in agri-sector (energy efficient pumping, processing & transport), – switch to renewable energy use		– reduce agro chemicals use to preserve pollinators, – promote small scale traditional farming in Mediterranean landscapes to support biodiversity conservation,

[59] Note: specific sector-based issues to be addressed within the specific sector are not elaborated

		matter) management, – reduce agri-chemical use to lower water pollution			
	Environment	– Protect upstream ecosystems as sources of water, – Restore wetlands for natural water purification	reforestation upstream and around reservoirs to reduce erosion and siltation	pollinators for crops, healthy soils, natural pest control	

EFFECTIVE AND EFFICIENT PLANNING AND FINANCING

The Mediterranean WEFE Strategy proposes to upscale and mainstream WEFE Nexus applications and attract financing for their implementation. This should lay the basis for efficient and effective planning, financing, and implementation of integrated WEFE management and technical solutions. To do so, the following actions could be considered:

- Undertaking a multi-sector WEFE Nexus assessments and sector-specific WEFE assessments at national and sub-national levels, including with a transboundary cooperation perspective, to underpin WEFE Nexus planning.
- Incorporating into river and groundwater basin plans WEFE Nexus specific priorities (e.g. water allocation and use quota for each sector, environmental flow regimes, reservoir quality, and multi-purpose management).
- Defining specific scaling mechanisms for targeted WEFE Nexus solutions demonstrated to address critical WEFE Nexus-related issues in a sustainable way (e.g. for transitioning to solar pumping combined with enforcement of water abstraction limits, or for energy efficient and environmentally sensitive desalination, or for wastewater re-use coupled with water and crop quality monitoring).
- Developing a project pipeline of investment-grade level WEFE Nexus interventions that can attract private investments (and public co-investments) (e.g. Photovoltaic (PV) use in agriculture / irrigation, water utilities energy efficiency improvements, desalination driven by renewable energy).
- Entertaining discussions with domestic financial institutions to define potential opportunities for private investment in WEFE Nexus related projects and initiatives, including using public co-financing mechanisms and incentives.
- Mobilizing additional financial support from international donors and the European Union for WEFE Nexus related activities, including for the retrofitting of existing infrastructure, building of new infrastructure, accelerating adoption of modern technology and digitalisation, promotion of research and innovation, etc.

INFORMED DECISION MAKING

The WEFE Strategy aims to create a more informed and science-based decision making that builds on engagement of stakeholders and an increased public awareness. To that end, the strategy proposes to

improve data availability and sharing, develop stakeholder capacities, raise awareness, and promote science and education on WEFE Nexus and Source to Sea aspects. A number of actions could be prioritized to accelerate progress in these areas, including:

- Assessing training needs and developing opportunities for sector actors to address their specific gaps in WEFE Nexus knowledge, know-how and capacities (e.g. up-skilling courses, exchange programs, peer-to-peer support, and coaching initiatives).
- Developing a national WEFE Nexus information sharing platform with open access for stakeholders to sector-based information, past and on-going studies, assessments, and projections for all WEFE sectors.
- Preparing funding proposals for WEFE Nexus-related information systems and capacity building initiatives and mobilizing financing for these from international and bilateral development finance institutions, philanthropic entities, and the European Union.
- Creating specific initiatives to promote the use of digital tools such as basin digital twins, remote sensing, GIS, Artificial Intelligence and innovative monitoring and data technologies, to accelerate science-based decision making on WEFE Nexus issues and opportunities.
- Developing standardized local WEFE Nexus analysis to support awareness raising, stakeholder engagement and actions by farmers, cooperatives, citizens, and the private sector, considering the specific needs and roles of vulnerable groups, women and youth.
- Supporting the Mediterranean Community of Practice on the WEFE Nexus within the Source to Sea continuum facilitated by PRIMA WEFE4Med to share insights and foresights, develop best practice guidance and tools, enable peer-to-peer learning and assist shifting from WEFE Nexus thinking to WEFE Nexus doing.

4 CRITICAL KNOWLEDGE GAPS AND CAPACITY BUILDING NEEDS

This chapter synthesizes key knowledge and know-how gaps in relation to institutional governance and cross-sectoral coordination, policy coherence, planning and finance, and informed decision making. The respective findings are presented according to the same framework used to assess the alignment of national approaches with the Mediterranean WEFE Strategy.

4.1 CONSOLIDATED KEY KNOWLEDGE AND KNOW-HOW GAPS

INSTITUTIONAL ARRANGEMENTS AND POLICIES

The following gaps related to the development of appropriate WEFE governance structures and the mainstreaming of the WEFE Nexus approach into policies and strategies have been identified in the three focus countries:

- **Integrated Governance:** Limited understanding and capacity to develop and implement integrated governance frameworks that effectively coordinate across water, energy, food, and environmental sectors at national and sub-national levels, considering existing multi-sector coordination mechanisms (e.g. those on sustainable development, climate change).
- **Sector Policies:** Gaps in understanding and know-how to adapt existing sector-specific policies and regulatory frameworks to incorporate WEFE Nexus principles, often resulting in disjointed or conflicting strategies across sectors.
- **Empowering Local Authorities:** Insufficient knowledge of decentralization processes and limited capacity to empower local authorities within a WEFE Nexus framework, leading to weak local-level governance structures and engagement in integrated resources management.
- **Regional Harmonization:** There is currently limited awareness and guidance on how to operationalize national policies and strategies in line with its goals and objectives. Until capacity-building and coordination efforts are strengthened, there remains a risk of region-wide inconsistencies in WEFE implementation and outcomes.
- **Regional Guidance:** There is currently limited availability of frameworks, tools, and expertise to support countries in aligning their national policies and strategies with the Strategy to ensure coherent policy and practice across the region.

Bridging these knowledge gaps would require targeted capacity-building, regional knowledge exchange, development of practical tools and operationalisation guidance for policy and institutional reform, and strengthen frameworks for cross-sector, cross-country and cross-regional WEFE Nexus cooperation.

EFFECTIVE AND EFFICIENT PLANNING AND FINANCING

In relation to the Strategy's 2nd goal -upscaling and mainstreaming of WEFE Nexus applications through effective planning, financing and implementation of related management and technical solutions, the following gaps have been identified:

- **Integrated Planning Frameworks:** Lack of coherent and cohesive frameworks that fully integrate the WEFE Nexus approach into national and sub-national planning.
- **Multi-sectoral Planning Practices:** Inadequate awareness of best practices and mechanisms for fostering effective multi-sectoral communication, joint planning, and implementation processes.
- **Cross-sectoral Collaboration:** Limited experiences or documented case studies demonstrating successful cross-sector collaboration that could inform integrated planning, and the development and implementation of cross-sectoral initiatives.
- **Economic and Financial Assessment Tools:** Lack of adequate tools for assessing the economic and financial impacts of WEFE Nexus plans and projects, which hinders the ability to attract investments and implement market-based solutions.
- **Implementation of Integrated Solutions:** Challenges in executing multi-sectoral projects that effectively balance water, energy, food, and ecosystems needs due to a lack of practical guidance and successful models.
- **Innovative Financing Mechanisms:** Limited knowledge and experience with the development and deployment of innovative financial instruments and incentives that can support WEFE Nexus-related projects.

Addressing these gaps requires initiatives that enhance national and sub-national capacities in integrated planning, financing and project development and implementation.

INFORMED DECISION MAKING

The following gaps have been identified in relation to the third goal of the Mediterranean WEFE Strategy, which focuses on improving data availability and sharing, developing stakeholder capacities, raising awareness, and promoting science and education on WEFE Nexus:

- **Data Availability and Quality:** All three countries face challenges in obtaining accessible, reliable, and comprehensive data across the water, energy, food, and environmental sectors. Data is often fragmented, outdated, inconsistent, or incompatible hindering effective analysis and decision-making on critical WEFE Nexus issues.
- **Stakeholder Engagement and Capacity Building:** Limited stakeholder involvement and insufficient capacity-building initiatives hinder the broader understanding, ownership, and implementation of the Nexus. There is a need for more effective engagement strategies tailored outreach activities, and training programs.
- **Stakeholder Coordination:** Efficient coordination mechanisms among stakeholders are often underdeveloped, leading to difficulties in joint planning, execution, and monitoring of WEFE Nexus interventions.
- **Interdisciplinary Research and Education:** There is a scarcity of interdisciplinary research initiatives and educational programs that focus on the interconnectedness of water, energy, food, and ecosystems, which are crucial for fostering innovation and sustainable solutions to integrated WEFE planning and decision-making. For example, in Morocco's Souss-Massa

region[60], an interdisciplinary research initiative led by GIZ and national agencies assessed the combined impacts of solar pumping, groundwater levels, and crop water productivity. The findings informed new guidelines linking renewable energy use in agriculture with groundwater monitoring and licensing reforms to prevent over-abstraction.

- **Technical Expertise:** There is limited expertise in applying integrated WEFE Nexus approaches, particularly in using innovative technologies and analytical tools for cross-sectoral management and assessment. In Jordan, a Nexus study integrated WEAP–LEAP modelling with GIS-based energy demand analysis to assess irrigation expansion's impacts on water availability and energy use, informing cross-sector planning tools and policy alignment[61].

Addressing these gaps requires enhanced data collection and integration, development of interdisciplinary frameworks and academic programs, and strengthening of stakeholder capacities through collaborative approaches and regional cooperation.

4.2 IDENTIFIED CAPACITY-BUILDING NEEDS

To address the significant gaps identified across institutional governance, planning and financing, informed decision-making, a comprehensive capacity-building strategy is essential. This strategy should focus on equipping key stakeholders—government officials, local authorities, sectoral experts, and civil society—with the skills, knowledge, and tools needed to implement a sustainable and integrated WEFE Nexus approach effectively. The comprehensive assessment of the identified gaps highlights several critical capacity building needs, grouped under the core dimensions of the Strategy - namely institutional governance, planning and financing, and informed decision-making.

INSTITUTIONAL ARRANGEMENTS AND POLICIES

Capacity-building efforts are needed to deepen understanding and practical skills in developing and implementing integrated governance frameworks that facilitate cross-sectoral coordination at national and sub-national levels. This includes training policymakers, regulators, and local authorities on how to adapt sector-specific policies to incorporate WEFE Nexus principles, and on fostering regional harmonization in alignment with the broader Mediterranean WEFE Nexus strategy. Empowering local authorities with decentralization knowledge and tools is essential for strengthening local governance structures and engagement. Building expertise on operationalizing regional cooperation frameworks and aligning national policies with regional objectives is necessary to ensure coherent and effective implementation. The following priority capacity building needs are identified:

Developing and Implementing Integrated Governance Frameworks:

- Training policymakers, planners, and sector regulators on frameworks and institutional models for cross-sectoral coordination across water, energy, food, and environment sectors.

[60] Albrecht, T.R. et al. (2018). *From Participatory Process to Robust Decision Making: An Agriculture-Water-Energy Nexus Analysis for the Souss-Massa Basin in Morocco.* https://www.water-energy-food.org/resources/research-article-from-participatory-process-to-robust-decision-making-an-agriculture-water-energy-Nexus-analysis-for-the-souss-massa-basin-in-morocco

[61] Ramirez, C. et al. (2022). An assessment of strategies for sustainability priority challenges in Jordan using a water–energy–food Nexus approach. https://link.springer.com/article/10.1007/s43621-022-00091-w

- Building skills in designing adaptive, participatory governance structures that facilitate multi-level and multi-stakeholder cooperation.

Policy Mainstreaming and Institutional Adaptation:

- Enhancing the capacity of decision-makers to modify existing sectoral policies and regulations, embedding WEFE Nexus principles for coherence and synergy.
- Developing expertise in integrated policy reviews, assessments, and alignment processes at national and regional levels.

Empowering Local Authorities and Decentralization:

- Strengthening local governance capacities to oversee and manage Nexus projects at sub-national and community levels.
- Providing training on decentralization processes, local stakeholder engagement, and natural resource planning and management.

Operationalizing Regional and Cross-Border Cooperation:

- Training officials on regional cooperation frameworks, negotiation techniques, and alignment of national policies with the Mediterranean WEFE strategy.
- Enhancing skills in regional and cross-border data sharing, information exchange, joint planning, and conflict resolution mechanisms.

By developing targeted capacity-building initiatives that address the above needs, progress on WEFE Nexus governance aspects could be accelerated both nationally and across the Mediterranean region.

EFFECTIVE AND EFFICIENT PLANNING AND FINANCING

Strengthening capacities in integrated planning is crucial for designing cohesive frameworks that incorporate the WEFE Nexus approach into national, and sub-national development strategies. Training in best practices for multi-sectoral communication, joint planning, and implementation will foster effective collaboration. Technical skills in applying economic and financial assessment tools are vital for quantifying the impacts of WEFE Nexus projects, guiding investments, and promoting market-based solutions. Developing expertise in innovative financing mechanisms, including the design and deployment of financial instruments such as green bonds or public-private partnerships, is essential for mobilizing resources and scaling Nexus interventions. The following specific training needs could be considered:

Building Skills in Integrated Planning:

- Training planners and sectoral agencies on methodologies for comprehensive, cross-sectoral planning that fully integrates water, energy, food, and environmental considerations.
- Promoting the use of tools for scenario analysis, stakeholder mapping and analysis, and impact assessment within the Nexus Action Framework.

Strengthening Economic and Financial Management Capacities:

- Equipping financial managers and project developers with skills to use economic and financial assessment tools adapted to Nexus-related projects.
- Training on evaluating the multi-sectoral impacts, trade-offs, and co-benefits of Nexus interventions to attract investments and promote sustainable market-based solutions.

Developing and Deploying Innovative Financing Mechanisms:

- Building expertise in designing and using financial instruments such as green bonds, climate finance, and public-private partnerships.
- Offering workshops on mobilizing domestic and international funding sources, including regional pooled funds and climate adaptation finance.
- Designing and implementing continuous professional development courses on innovative financing mechanisms for WEFE Nexus projects.

Supporting Implementation of Cross-Sectoral Projects:

- Enhancing technical skills to manage multi-sectoral projects, with emphasis on coordination, adaptive management strategies, and results-based monitoring.

Tailored capacity-building initiatives that address the above priorities will be critical to operationalizing the WEFE Nexus and achieving sustainable resource management in Jordan, Lebanon, and Morocco.

INFORMED DECISION MAKING

Building capacity in data collection, management, and sharing is a priority, focusing on improving the availability, quality, reliability, and interoperability of sectoral datasets. Training stakeholders on data analysis and evidence-based decision-making will enhance policy and project design.

Developing skills in stakeholder engagement and coordination—employing effective communication, participatory processes, and training programs—will foster inclusive planning and implementation. Furthermore, expanding interdisciplinary research and educational programs will cultivate a new generation of experts equipped with holistic understanding and innovative problem-solving skills. Increasing technical proficiency in applying digital tools and technologies for cross-sectoral management will support more effective Nexus implementation.

The following capacity building efforts are considered a priority:

Improving Data Collection, Management, and Sharing:

- Training stakeholders and technical staff on data standardization, the use of digital data and information platforms, and interoperable cross-sector information systems.
- Building skills in data processing, analysis, visualization, and evidence-based decision-making to support integrated WEFE Nexus planning monitoring, and evaluation
- Promoting data sharing protocols and open-data policies to enhance collaboration across sectors and institutions.

Strengthening Stakeholder Engagement and Participatory Processes:

- Developing communication and facilitation skills amongst government officials and practitioners to foster inclusive stakeholder participation across sectors and regions.
- Training on conflict resolution, negotiation techniques, and consensus-building in multi-stakeholder settings focused on the WEFE Nexus.
- Designing participatory frameworks that enable meaningful involvement of civil society, farmers, private sector actors, and vulnerable groups.

Fostering Interdisciplinary Research and Education:

- Supporting the development of cross-sectoral academic and engineering curricula, research initiatives, and regional and national centres of excellence focused on the WEFE Nexus.
- Encouraging joint Mediterranean region research projects, workshops, and knowledge exchange programs and platforms that promote peer learning and innovation.
- Establishing or strengthening regional and national centres of excellence to anchor long-term WEFE capacity development and innovation

Enhancing Technical and Digital Skills:

- Building capacity in the use of digital tools (e.g., GIS, remote sensing, modelling software, AI, digital twins) to support integrated resource management.
- Promoting innovative and cost-effective technological solutions for improving operational efficiency, data-driven governance, and adaptive decision-making across WEFE sectors.
- Training on the use of analytical platforms [62] that support scenario planning, impact assessments, and monitoring of WEFE-related interventions.

Addressing these capacity-building needs will be critical to operationalize the WEFE Nexus, promote sustainable resource use, and support resilience in Jordan, Lebanon, and Morocco. Developing these competencies will require coordinated efforts at regional, national, and local levels, backed by investments in human capital, institutional reform, and technological innovation.

[62] e.g. WEAP, LEAP, FAO AquaCrop widely used for WEFE-related assessments

5 FINDINGS AND RECOMMENDATIONS

5.1 MAIN FINDINGS

The current WEFE Nexus analysis identifies major needs for governance reforms, improving planning and implementation capacities, and addressing gaps in data, information, knowledge, and know-how. Specific findings are provided below.

5.1.1 GOVERNANCE AND POLICIES

- Limited understanding and, thus, lack of impulse as well as limited know-how to develop and implement governance frameworks that can effectively coordinate across WEFE sectors and their spatial dimensions from Source-to-Sea.
- Existing multi-sector coordination mechanisms (e.g., sustainable development, climate change) often have weak WEFE mandates and are often overlooked when creating WEFE Nexus-specific frameworks, and vice-versa, thus limiting opportunities for policy coherence and institutional efficiency.
- Gaps in adapting sector-specific policies and regulatory frameworks that incorporate WEFE Nexus principles in a Source-to-Sea approach. This often leads to disjointed or conflicting strategies between sectors.
- Insufficient knowledge on decentralization processes and how to empower local authorities within a WEFE Nexus Action Framework. This results in weak local-level governance structures and limited engagement in WEFE Nexus issues.

5.1.2 PLANNING AND FINANCING

Based on the above analysis, a number of findings stand out with respect to planning and financing for WEFE Nexus implementation, including:

- Absence of coherent and cohesive frameworks that fully integrate the WEFE Nexus approach including its Source to Sea dimensions into national and sub-national planning and financing.
- Limited scaling of pilot initiatives resulting in slow mobilization of additional actors and realization of WEFE Nexus implementation on the ground at scale.
- Insufficient screening of planned investments for WEFE Nexus co-benefits and climate resilience opportunities.
- Inadequate tools for assessing the economic and financial impacts of WEFE Nexus plans and projects, inhibiting investment and the implementation of market-based solutions.
- Knowledge gaps regarding the development and deployment of innovative financial instruments and incentives that can support WEFE Nexus-related projects.
- Lack of practical guidance and successful models of WEFE Nexus implementation and monitoring that truly work across sectors and scales.
- Challenges in executing multi-sectoral projects that effectively balance water, energy, food, and ecosystems needs considering also the spatial dimensions from Source to Sea.

5.1.3 DATA, KNOWLEDGE, AND STAKEHOLDER ENGAGEMENT

- Persistent challenges in accessing or obtaining reliable, consistent, and comprehensive data across WEFE sectors and synthesizing these to support evidence-based WEFE Nexus planning and decision making.
- Insufficient integrated data systems and Nexus-specific planning tools that are incorporating sector specific GIS and decision-support systems.
- Limited documented experiences or case studies demonstrating successful cross-sector collaboration, hindering the development and implementation of cross-sectoral initiatives.
- Limited dissemination, thus awareness, of related best practices and mechanisms, including their achieved benefits as well as the obstacles encountered, for fostering effective multi-sectoral communication, joint planning, and coordinated implementation.
- Limited stakeholder involvement and insufficient capacity-building initiatives undermining the understanding and implementation of the WEFE Nexus approach and leading to insufficient stakeholder coordination and empowerment.
- Lack of cross-sectoral, cross-national joint planning, execution, and monitoring of WEFE Nexus interventions.
- A scarcity of interdisciplinary research initiatives and educational programs that address WEFE issues and solutions, particularly in a Source to Sea approach.
- Insufficient emphasis on the interlinkages among WEFE challenges and solutions, leading to a lack of accelerating the development, adoption, and use of modern technologies and innovations, including digitalisation and AI, relevant for WEFE Nexus planning and implementation.

5.2 RECOMMENDATIONS

5.2.1 GOVERNANCE AND POLICIES

1. **Strengthen WEFE Coordination Mechanisms**: Reinforce and institutionalize cross-sectoral coordination platforms by defining strong mandates, distributed responsibilities, and clear agendas and timetables for both their meetings and activities.
2. **Review and Update Sector Policies**: Systematically review and update existing sector policies and strategies, including those related to climate mitigation and adaptation, to incorporate WEFE Nexus interlinkages, cross sectoral synergies and shared- priorities and opportunities, while ensuring alignment with national and regional processes' goals and objectives and combining top-down and bottom-up approaches to link policy design with local implementation and ensure local ownership.
3. **Align Sub-National Strategies**: Review mandates, composition, policies, and strategies on natural resources of sub-national authorities to ensure they reflect an integrated multi-sectoral WEFE Nexus approach that also improves climate resilience, including in planning, budgeting, and project implementation.
4. **Promote Integrated Governance Frameworks Training**: Provide training to policymakers, planners, and sector regulators on frameworks for WEFE cross-sectoral coordination in a

Source-to-Sea approach, and build skills in designing inclusive, adaptive, participatory governance structures that enable multi-level stakeholder engagement.

5.2.2 PLANNING AND FINANCING

5. **Undertake WEFE Multi-Sector Integrated Assessments**: Conduct integrated assessments at national and sub-national levels to support WEFE Nexus planning and cross-sectoral prioritization.
6. **Incorporate WEFE Priorities into natural resources and development Plans at appropriate levels**: Explicitly incorporate WEFE Nexus priorities into plans like for river and groundwater basin management, coastal zone management, local climate resilience, etc. including provisions for water allocation and efficiency, energy efficiency, food security, ecosystem services and, overall, multi-sector approaches to manage trade-offs among WEFE sectors fairly and efficiently, applying a Source-to-Sea approach and using WEFE Nexus Roundtables to strengthen participatory and multi-stakeholder governance and create institutional anchors.
7. **Define Specific Scaling Mechanisms**: Define scaling mechanisms for targeted WEFE Nexus solutions that address critical interlinked issues sustainably taking into account different potential entry points (such as: solar powered irrigation with enforced water abstraction limits, solar powered desalination with advanced brine management, treated wastewater reuse with crop quality controls, or multi-purpose use of reservoirs).
8. **Develop a Project Pipeline of Investment-Grade Initiatives**: Strengthen planning and financing linkages through creating a project pipeline with a focused set of WEFE Nexus interventions in a Source-to-Sea approach, utilizing r screening tools for incorporating socio-economic benefits, that can attract public and private investment and align them with national financing frameworks, domestic financing partners requirements, development assistance partners' criteria, such as the EU NDICI/EFSD+ mechanism, GCF, etc.
9. **Engage Private Partners and Domestic Financial Institutions**: Explore opportunities for incorporating explicit WEFE Nexus criteria in investment screening and innovative private investment in WEFE Nexus projects, including facilitated by domestic and international financial institutions, so as to close the investment gap in Nexus related solutions, and promote private investment in WEFE Nexus-related projects, potentially using blended finance, climate finance, PPPs, support to start-ups and SMEs, public co-financing, tax breaks or subsidies.
10. **Mobilize International Support**: Seek additional financial support from international donors/development partners, including the EU, for WEFE Nexus approach implementation, including infrastructure retrofitting, technology adoption, capacity building, etc.

5.2.3 DATA, KNOWLEDGE, AND STAKEHOLDER ENGAGEMENT

11. **Analyse Training Needs**: Conduct a thorough training needs assessment to identify gaps in WEFE Nexus in a Source-to-Sea approach knowledge and skills.

12. **Enhance WEFE Nexus Capacity Building for the range of stakeholders**: Develop and further advance capacity-building initiatives, based on the identified needs, including with support by regional partners and projects like EU WES BCA, GEF UNEP MAP MedProgramme, etc.
13. **Support WEFE Nexus Community of Practice (NCoP)** : Develop and facilitate, at appropriate levels, WEFE Nexus NCoP to share information and knowledge, assist stakeholders networking, facilitate co-creation of solutions, utilise structured results of demo projects and initiatives, identify 'champions', etc., including at Mediterranean level the WEFE Nexus CoP facilitated by the PRIMA WEFE4Med Project (www.wefe4med.org).
14. **Build Capacity to Use Digital Tools**: Building capacity in the use of digital tools (e.g., GIS, remote sensing, modelling software, big data, AI, digital twins, etc) for integrated natural resource management (planning, monitoring, and decision-making) towards advancing digital transformation[63], that can highlight synergistic solutions across water, energy, food, and ecosystems. In this context, WEFE Nexus models such as Q-Nexus can be used to support scenario-based planning, helping stakeholders explore and compare trade-offs and synergies across water, energy, food and ecosystems in a structured way; such tools have already been applied in the MENA region.
15. **Support Cross-Sectoral Data Standardization**: Develop integrated and interoperable datasets, GIS and WEFE Nexus decision-support systems to enhance cross sector coordination and planning and train data collectors and managers operating in different sectors on data standardization, digital information platforms and interoperable data and information systems across WEFE sectors that capture both trade-offs and synergies.
16. **Enhance Cross-Sectoral Communication Skills**: Developing communication and facilitation skills amongst government officials to foster inclusive stakeholder participation across WEFE sectors and regions.
17. **Adequately Inform Policy and Decision makers**: Improve skills in data analysis and visualization to demonstrate WEFE Nexus benefits, generate buy-in and create support for cross-sectoral evidence-based decisions in relation to the WEFE Nexus.
18. **Train Mediators**: Offer training in conflict resolution, negotiations, and consensus-building with a specific focus on WEFE Nexus conflicts and solutions.
19. **Promote Public Awareness**: Increase public awareness of WEFE Nexus issues, approaches, and solutions to overcome resistance and encourage initiatives with farmers, local communities, and businesses.
20. **Disseminate the WEFE Nexus Strategy** and engage in shaping and implementing its Action Framework towards shifting from WEFE Nexus thinking to WEFE Nexus doing, aligning WEFE Nexus actions with climate objectives and creating practical opportunities to move from coordination to implementation, and from pilots to scale.

[63] A regional dialogue on 'Digital Transformation for WEFE Nexus' is ongoing, facilitated by the PRIMA projects ACQUAOUNT and TALANOA-WATER as well as the H2020 TRANSCEND projects and UfM

By implementing these recommendations, Jordan, Lebanon, and Morocco (and other Mediterranean countries) can work towards a more integrated and sustainable management of water, energy, food, and environmental resources in line with the Mediterranean WEFE Nexus Strategy.

6 ANNEX 1. MEDITERRANEAN WEFE NEXUS STRATEGY

At the regional level, there is a growing recognition that system-thinking using the combined WEFE Nexus and S2S management approach, enables sectoral and spatial integration for policy development and implementation, and management of natural resources and socio-economic activities, away from the "silo" sectoral approach in an innovative and effective way. This has the potential to provide multiple benefits to societies.

The Strategy aims to enable the mainstreaming of system-thinking and the application of the WEFE Nexus approach in the Mediterranean Source to Sea continuum within improved and integrated governance structures at various levels.

To catalyse the shift from 'Nexus thinking' to 'Nexus doing', the Strategy is addressed to countries and stakeholders providing a broad framework in their assistance for improving the integration of policy and management frameworks and instruments across WEFE sectors and spatial components, thereby increasing capacity to minimise risks and maximise benefits related to human livelihoods and socio-economic development in the Mediterranean S2S continuum.

The intention is that the Mediterranean WEFE strategy is to be further developed with elaborate involvement of national focal points and to be endorsed at upcoming Ministerial meetings at the end 2025 and in early 2026.

Goal 1: Appropriate institutional arrangements, policies, and cooperation frameworks are established at country and regional levels.	
Objective 1.1: Develop and/or accordingly adapt appropriate governance structures at all levels to implement the WEFE Nexus approach in the S2S continuum.	1.1.1. Encouraging regional as well as transboundary cooperation governance settings in implementing the WEFE Nexus approach in the S2S continuum.
	1.1.2. Establishing and/or enhancing country-level cross-sectoral and inter-spatial coordination mechanisms or structures.
	1.1.3. Enhancing the capacities of relevant bodies, for implementing the WEFE Nexus approach in the S2S continuum.
	1.1.4. Ensuring effective decentralization in decision-making and that sub-regional and/or cultural distinctive features are taken into account, engaging and empowering local actors and ensuring a fair transition that leaves no-one behind.
	1.1.5. Creating the necessary institutional and legal framework and processes for planning, financing and implementing WEFE Nexus interventions at scale and monitoring their impact.
	1.1.6. Facilitate regional dialogue processes and forums for exchange of knowledge and experience.
Objective 1.2: Mainstreaming WEFE Nexus approach in the S2S continuum into policies and strategies.	1.2.1. Developing new, or updating existing, regional strategic documents and action plans for implementing the WEFE Nexus approach in the S2S continuum, including as contribution to achieving agreed regional and global policy goals (e.g. SDGs, climate action).
	1.2.2. Screening major regional sectoral initiatives from a WEFE Nexus perspective and ensuring that they do not affect in a negative way the key needs and considerations of the other (three) sectors.
	1.2.3. Ensuring harmonization across sectoral and spatial “chapters” of national strategies and plans to avoid inconsistencies with sectoral and spatial planning, assisted by WEFE Nexus assessments including governance analysis, scenarios development and modelling supported by multi-stakeholder dialogue.
	1.2.4. Developing or adjusting existing instruments, processes, requirements, guidelines for increasing horizontal and vertical integration in policy making, implementation and monitoring.
	1.2.5. Benefiting from the use of integrated management approaches (IWRM, Integrated Coastal Zone Management (ICZM), Ecosystem Based Adaptation (EBA), etc.) to speed up implementation of WEFE Nexus across sectors and spaces within the S2S continuum.
Goal 2: Efficient and effective planning, financing and implementation of management and technical solutions.	

Objective 2.1: Upscaling demonstration WEFE Nexus applications to mainstreamed implementation, through appropriate investments and market mechanisms.	2.1.1. Mapping and brokering opportunities for multipurpose, integrated, and innovative WEFE Nexus interventions and investments.
	2.1.2. Developing standardized methods to assess the feasibility, cost-efficiency and effectiveness of WEFE Nexus solutions, including their business models, and evaluate their results and benefits potentially through indicators for a benchmark of successful experiences.
	2.1.3. Piloting and mainstreaming no-regret and cost-efficient solutions and innovative technologies, including Nature-based Solutions and those related to digital transformation, artificial intelligence, space technologies, etc., engaging all appropriate partners, including research partners and the private sector and addressing the digital divide by ensuring that the benefits of digital technology are equitably distributed.
	2.1.4. Replicating and upscaling of cost-efficient and effective solutions, including by developing an appropriate incentives and financing frameworks, creating enabling legislation, and engaging the private sector, and SMEs in particular, through market approaches.
	2.1.5. Improving cross-sectoral investment planning to progressively move to cross-sectoral portfolios of large investment projects.
Objective 2.2: Attracting and coordinating increased financing for implementation of WEFE Nexus interventions.	2.2.1. Developing a strategic finance framework for WEFE Nexus implementation – including targets for public and private contributions, cost recovery models, available and emerging financing instruments, role of international development partners, use of blended finance.
	2.2.2. Prioritizing public spending and mobilizing national sources of finance for WEFE Nexus interventions; reforming harmful subsidies and providing incentives to promote such interventions.
	2.2.3. Mainstreaming the funding for WEFE Nexus projects through existing cross-sectoral international funding sources, such as climate finance.
	2.2.4. Using blended finance (including guarantees) to help de-risk WEFE projects in order to attract private sector investment.
	2.2.5. Strengthen Public-Private Partnerships by integrating financial mechanisms specifically dedicated to biodiversity conservation (e.g. Green Funds).
	2.2.6. Supporting national, local and regional capacities to prepare schemes and proposals to effectively access and manage domestic and international funding for WEFE Nexus implementation.
Goal 3: Informed decision making based on enhanced science-based knowledge, engagement of capacitated stakeholders, and increased public awareness.	
Objective 3.1: Promoting Science and Education on	3.1.1. Incorporating WEFE related topics in university curricula

WEFE Nexus and S2S aspects.	
	3.1.2. Encouraging related cooperation across academic institutes, and linking them with market economy to increase understanding of the interlinkages across the various WEFE components
	3.1.3. Supporting R&D on emerging and innovative technologies such as Artificial Intelligence and space monitoring. Encourage the use of digital twins in WEFE Nexus
	3.1.4. Promote cross-sectoral research collaborations on climate-related challenges in the Mediterranean region.
Objective 3.2: Ensuring data availability, harmonisation and sharing across sectors and borders.	3.2.1 Modernizing, standardizing and harmonizing monitoring systems and databases across the WEFE Nexus sectors including for systematic integration of ecological monitoring and biodiversity indicators.
	3.2.2 Promoting synergies for the application of new technologies for cost-efficient, advanced monitoring systems.
	3.2.3 Increasing the engagement and responsibilities of stakeholders in gathering reliable data.
Objective 3.3: Developing capacities of stakeholders and related tools to implement WEFE Nexus at the S2S continuum.	3.3.1 Identifying capacity building needs for government officials and other national and local authorities, agencies and other stakeholders including private/economic sector, CSOs, NGOs, etc., and prepare capacity building strategies for the aforementioned.
	3.3.2 Organizing capacity building and training programs including e-learning and massive open online courses, mentoring and peer-to-peer learning, vocational training, etc., for government officials and all stakeholders on priority aspects of the WEFE Nexus at the S2S continuum.
	3.3.3 Promoting sharing of WEFE Nexus-related knowledge, experience, skill development and expertise among stakeholders to strengthen evidence-based decision-making and policy formulation.
	3.3.4 Supporting authorities and other stakeholders by development of competencies, building capacities to identify WEFE Nexus interventions, prepare proposals to access and manage international and regional funding to implement these.
	3.3.5 Developing localized WEFE Nexus Assessments and related tools that identify interlinkages and quantify the benefits of joint cross-sectoral actions that reduce trade-offs and enhance synergies.
Objective 3.4: Raising awareness and improving understanding concerning the WEFE Nexus at the S2S continuum, stimulating stakeholder's	3.4.1. Developing and conducting awareness campaigns for targeted groups and on tailored made priority elements of the WEFE Nexus at the S2S continuum.

engagement and empowering them for their implementation.	
	3.4.2. Supporting engagement, empowerment and decision-making roles of women and youth in WEFE Nexus implementation, enhancing the opportunities for their involvement, employment and entrepreneurship.
	3.4.3. Ensuring that gender considerations and the needs of vulnerable communities are fully taken into account in policymaking and implementation of interventions.
	3.4.4. Identifying, developing and communicating successful cases of practice into regional, national and local planning processes.
	3.4.5. Establishing regional Communities of Practice on the WEFE Nexus at the S2S continuum.
	3.4.6. Support behavioural change in consumption patterns, including also in terms of shifting to healthier diets and reducing food loss and waste.