

11-12 FEBRUARY 2025

RABAT, MOROCCO

Institut Agronomique et Vétérinaire Hassan II



WEFE NEXUS INTERNATIONAL CONFERENCE

**EXPLORING AND BRIDGING NEXUS FOR
A SUSTAINABLE FUTURE**



These projects are part of the
PRIMA programme supported
by the European Union.

WEFE NEXUS INTERNATIONAL CONFERENCE

Day 1 – 11th February 2025

PILLAR 1: WEFE NEXUS IN GOVERNANCE

Chair: Mr. Rachid Mrabet (INRA)



KEYNOTE SPEECH I

WEFe NEXUS COVERNANCE

Prof Mohammed Behnassi

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**Special Report on interlinking climate change
with Water-Energy-Food-Ecosystems (WEFE) nexus
in the Mediterranean Basin by MedECC**

Mohamed Behnassi
Senior Environmentalist Expert
CESE



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The Mediterranean region is particularly vulnerable because it accumulates several environmental risks, including strong warming and drying, accelerating sea-level rise, rapid urbanization, land degradation, overfishing, increasing pollution and mass tourism. These factors strongly impact water and food resources, biodiversity, energy production, human health and security.

WHAT IS MEDECC ?

The Mediterranean Experts on Climate and environmental Change (MedECC) is an independent international and interdisciplinary network gathering hundreds of volunteer scientists experts in climate and environmental change in the Mediterranean region, launched in 2015 in the context of UNFCCC COP 21 in Paris.

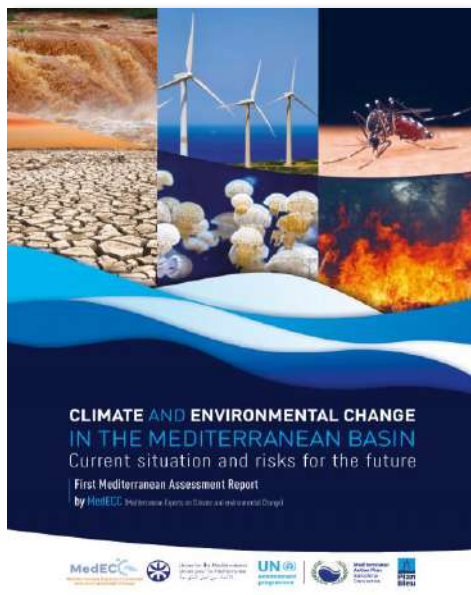
MEDECC'S ACTIVITIES

- Updates and assesses the state of scientific knowledge on the risks associated with climate and environmental change
- Provides information to political decision-makers, key stakeholders and citizens
- Contributes to the improvement of policies to assure the ecosystems and human well-being



Structure and functioning

- Four **coordinators (scientists)** and **Steering Committee** (16 persons)
- **Secretariat of MedECC in Plan Bleu** headquarters in Marseille since its creation in 2018
- **Researchers acting voluntarily on their own capacity**
- MedECC **does not have an official intergovernmental mandate** like IPCC or IPBES, but benefits from a **strong engagement of several bodies: UfM, Plan Bleu and UNEP/MAP.**
- Member of the **Mediterranean Commission on Sustainable Development (MSDD)**
- **Activities of MedECC** are integrated to the 2024 - 2025 **Plan of Work of the Barcelona Convention**, adopted by the 23rd Meeting of the Contracting Parties to the Barcelona Convention and its Protocols (COP23; Slovenia, Dec. 2023), & in line with UfM Member States' commitments expressed in the **UfM Ministerial Declaration on Environment and Climate Change** approved during the 2nd UfM Ministerial Conference on Environment and Climate Action in Cairo, Egypt, in October 2021



- ❑ **190 authors** from **25 countries** - **3800 scientific publications assessed**
- ❑ **6 Chapters:** Introduction, Drivers, Resources (Water, Food, Energy), Ecosystems, Society (Development, Health, Human Security), Managing Risks, Socio-ecological Resilience
- ❑ **Transparent review by experts and stakeholders**
- ❑ **Summary for Policymakers (SPM)** approved by policymakers - plenary session with MedECC stakeholders (Sept. 2020)
- ❑ Contribution to **IPCC AR6**: cross-chapter paper on the Med. Region (Feb. 2022)
- ❑ **Second Mediterranean Assessment Report (MAR2)** in 2028. Similar to the IPCC, which publishes its assessment reports every 7-8 years.

2020

MedECC awarded the **North-South Prize of the Council of Europe** for its contribution to the development of scientific cooperation and expertise to produce knowledge-based analyses as a sound basis for policy

2021

SPM **endorsed** during the 22nd meeting of the Contracting Parties to the Barcelona Convention COP 22 (Antalya, Türkiye) and **acknowledged** during the 2nd Ministerial Conference on Environment and Climate Action of the Union for the Mediterranean (Cairo, Egypt)

Principles of MedECC Reports

- The reports are **policy relevant but not policy prescriptive**
- **Scientific credibility:** based mainly on peer-reviewed articles
- **Knowledge assessment**, not a scientific review
- **Regional and gender balance among** authors
- **No additional research** for producing a report
- **Traceability of information:** from the Summary for Policymakers (SPM), through the full report, to the literature
- **Calibrated language** (confidence levels in the SPM)
- **Open review by scientific community**
- **Consultation with stakeholders** (online and plenary) on the SPM

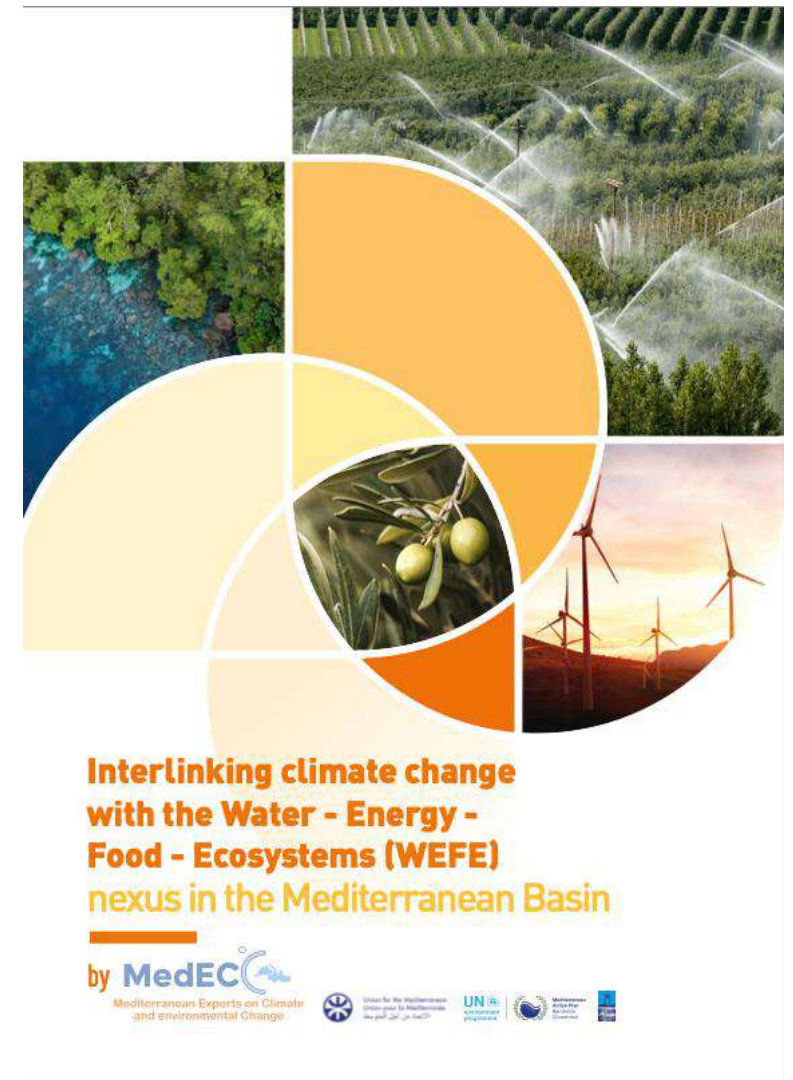


MedECC Report on the nexus

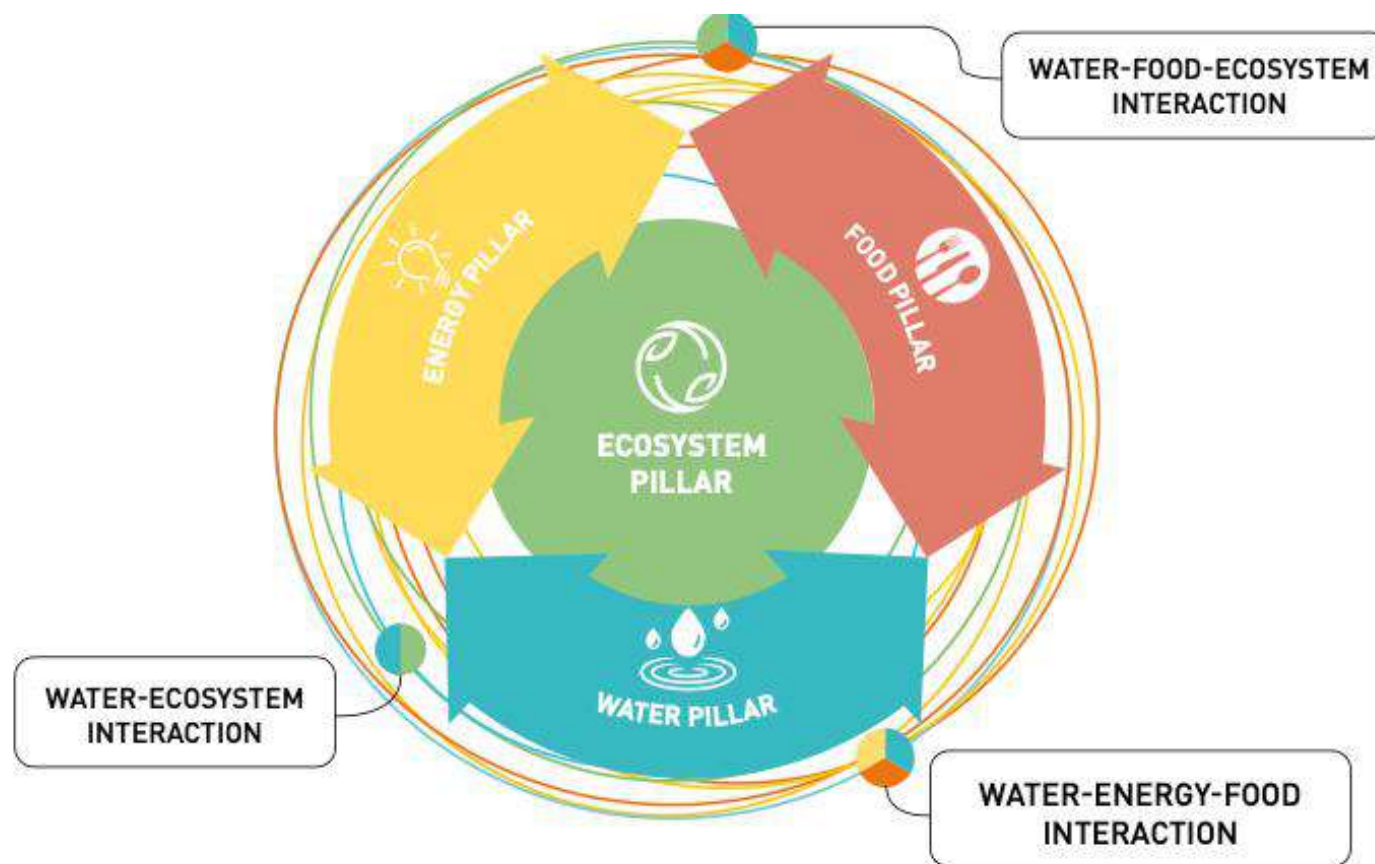
- 60 authors from 15 countries
- More than 1000 scientific publications and reports assessed
- More than 1500 review comments from 23 countries
- Available on: www.medecc.org

SR2. Interlinking climate change with Water-Food-Energy-Ecosystems (WEFE) nexus

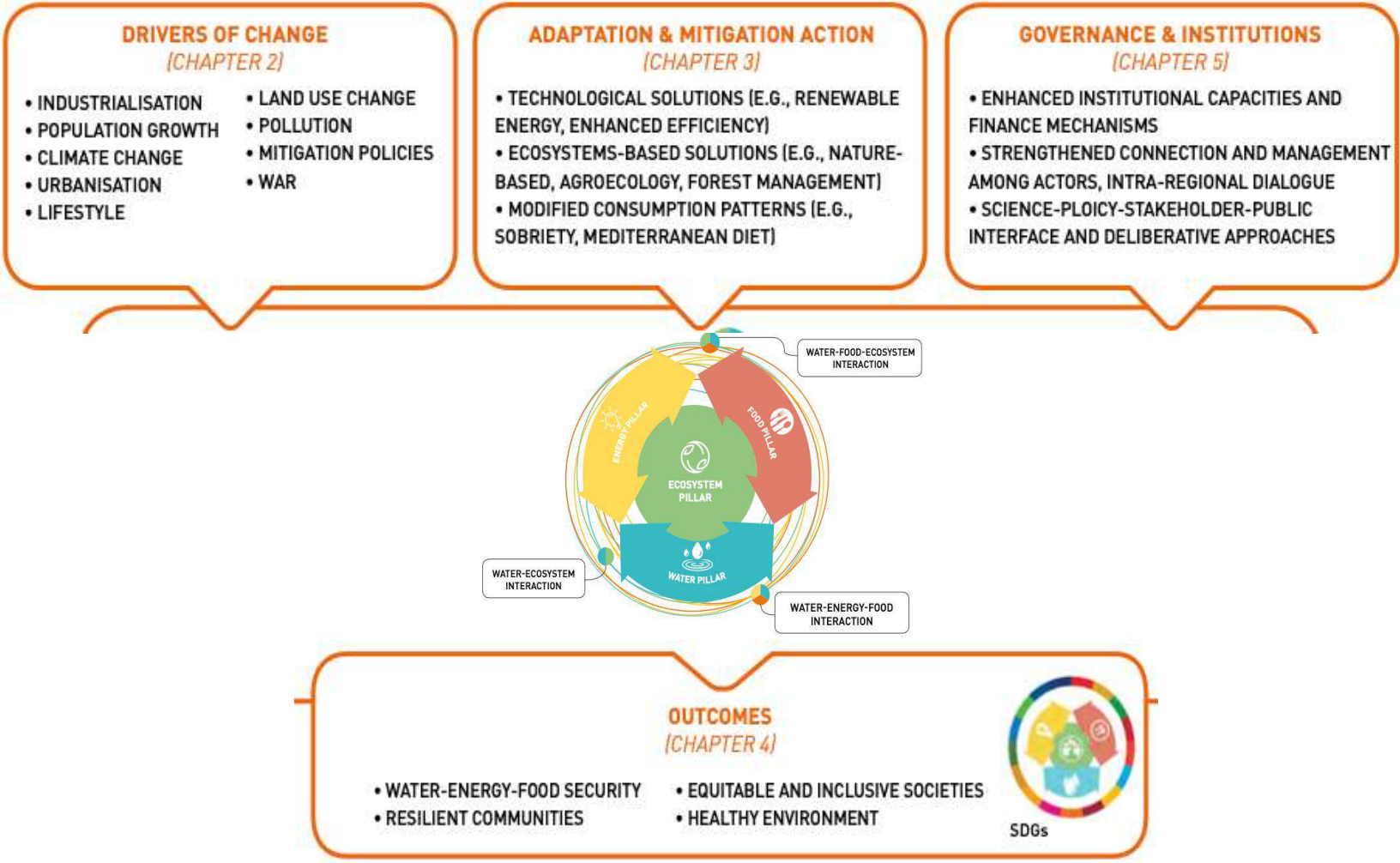
Scope: drivers of change and impacts related to WEFE in the Med region; WEFE nexus in support of adaptation and mitigation; contributions of WEFE nexus to sustainability; governance, policies (and research) options for the WEFE nexus



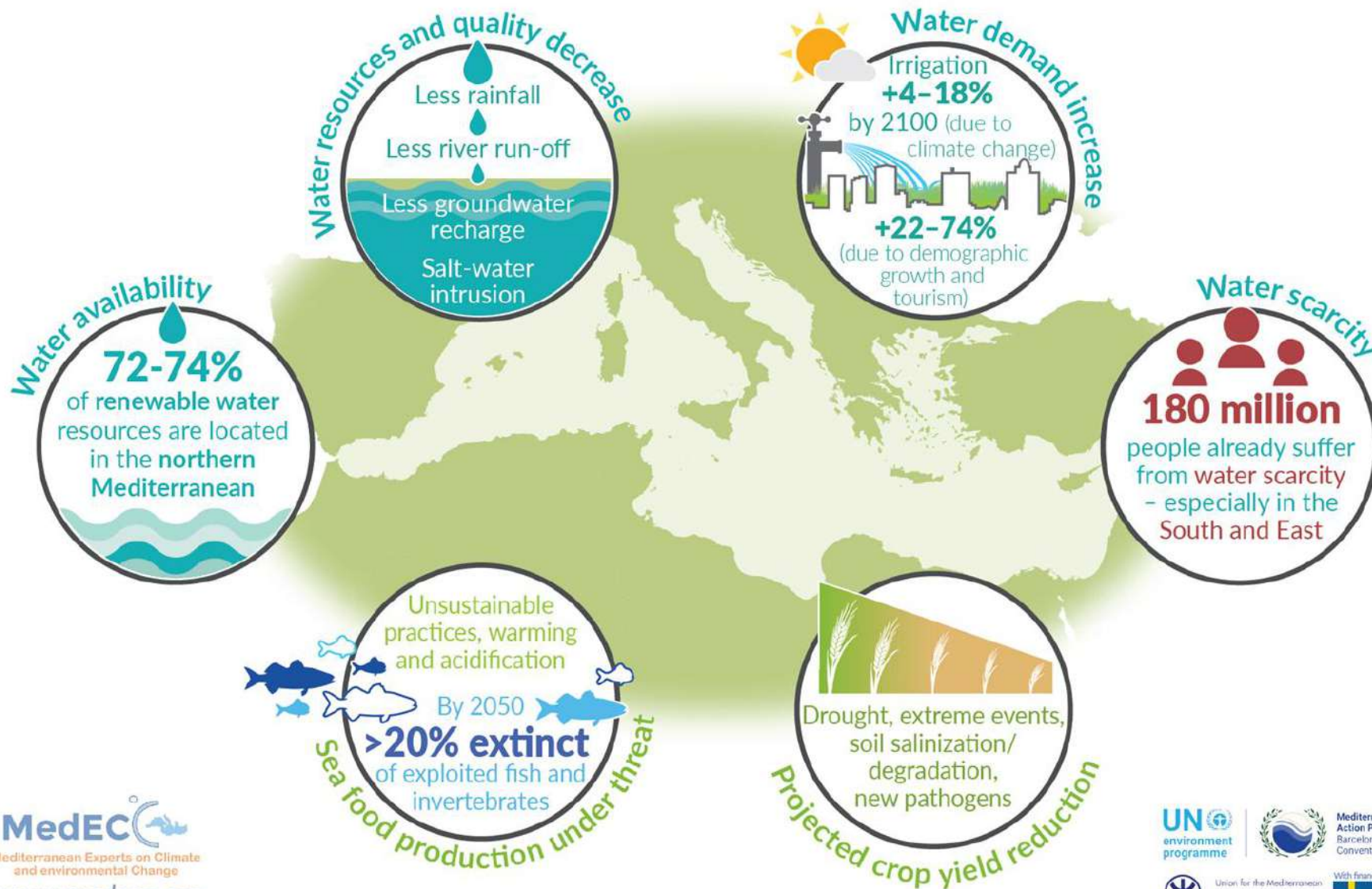
In this report **WEFE nexus** is addressed as a **key concept for a more resilient adaptation** to the climate crisis in the Mediterranean region.



ACTIONS ON THE WEFE COMPONENTS



Water and food in the Mediterranean: increasing demand & decreasing supply



- Pressures on WEFE elements due to **climate change, population growth, urbanization, and resource mismanagement**
- Mediterranean is a **hotspot** with above-average **warming, water scarcity, and ecosystem degradation**
- **Insecurity** for all elements of the nexus **is the rule** rather than the exception with **large disparities between countries**

Some numbers

Water: under a 2°C warming scenario, the frequency of **agricultural droughts is projected to be 150 to 200% more in the South.**

Food: agricultural production is impacted by water scarcity, heat stress, agricultural land loss due to coastal flooding, abandonment and soil salinization. Levels of projected changes vary ranging **from –80% for sunflowers** in Spain and **+26% for olives** across the entire Mediterranean.

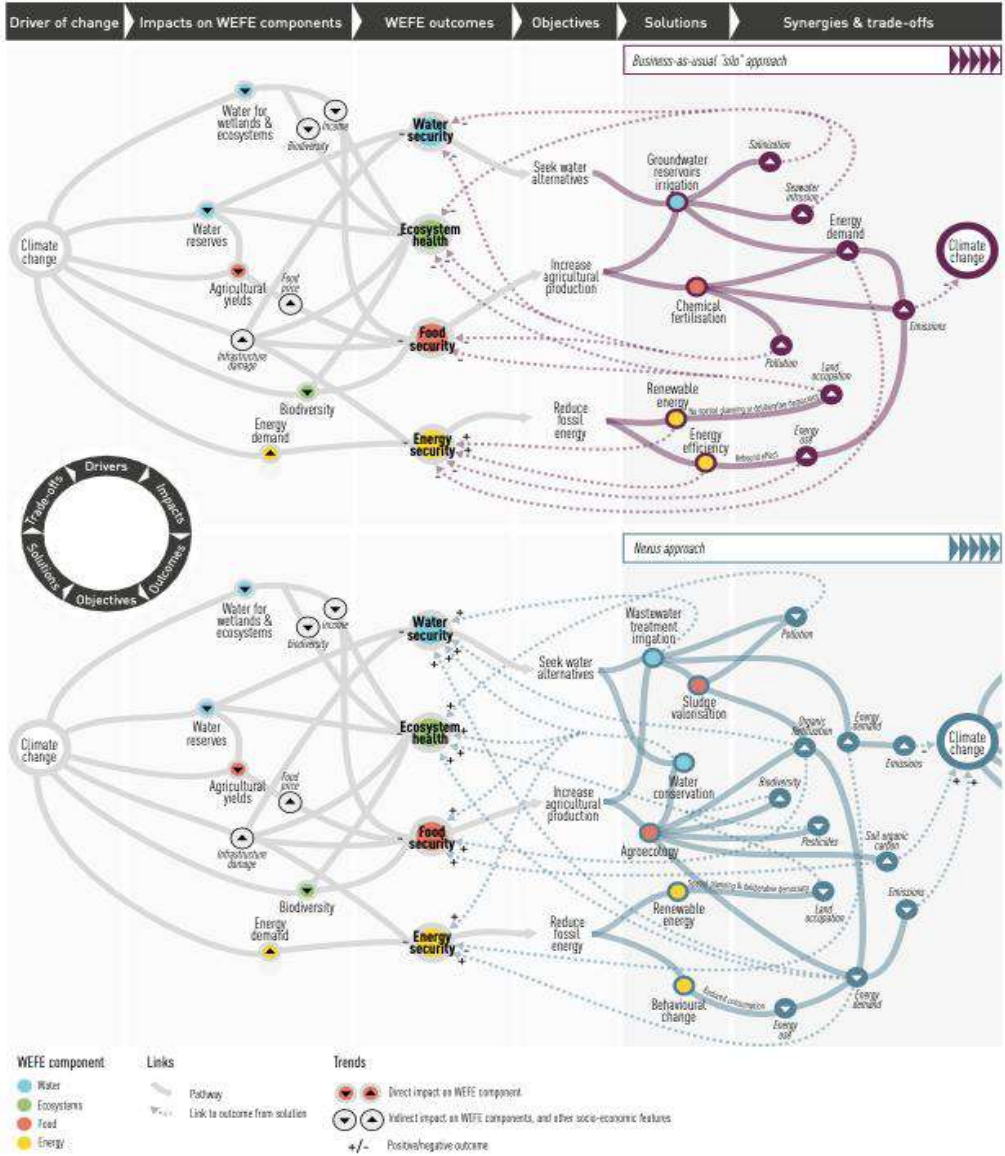
Energy: **renewables only account for 11%** of the total consumption in 2020. Projected declines in streamflow could lead to a strong **decline in hydropower and thermoelectric power in the 2050s by up to 7% and 15%,** respectively, by the 2050s .



Cascading effects

The **complex web of interactions** between WEFE components result in **cascading effects**, changes in one element result in changes in the other WEFE components, **in turn generating multiple loops and feedback paths.**

Qualitative analysis of the cascading effects of drivers of changes onto the WEFE components shows **benefit of the nexus approach.**



Holistic adaptation & mitigation

WEFE nexus approach to optimize adaptation and mitigation in the Mediterranean.

TECHNOLOGICAL SOLUTIONS

Renewable energy and enhanced efficiency (e.g., solar energy for water pumping & livestock shading)



ECOSYSTEM-BASED SOLUTIONS

Agroecology and Nature-based Solutions (NbS) such as green infrastructure and wetlands restoration



SOCIAL APPROACHES

Modification of consumption patterns, such as promoting restrained consumption and sufficiency, and adoption of the Mediterranean diet



Trade-offs and synergies

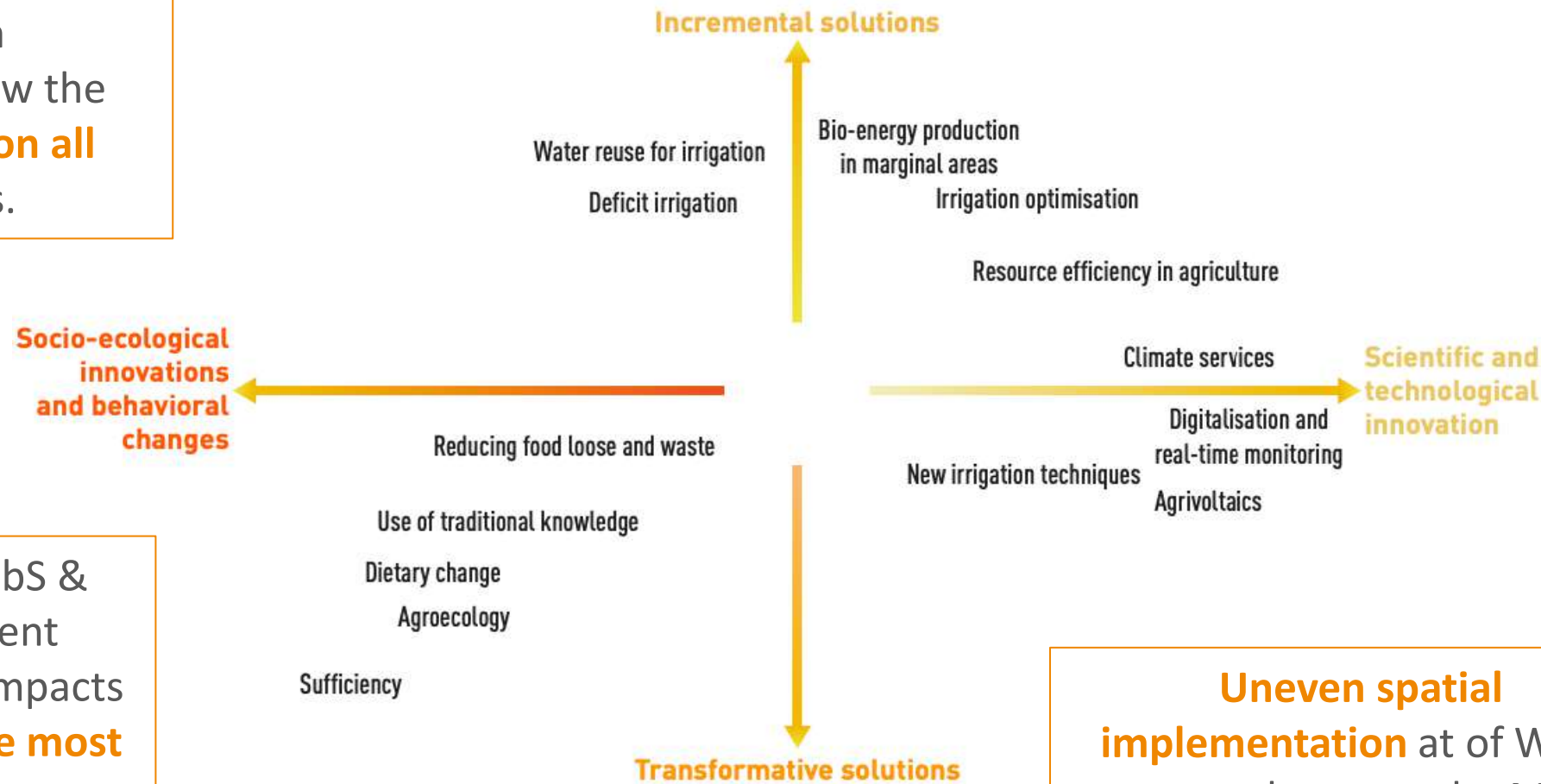
- Adaptation measures focusing on a **single societal goal and one WEF element** can result in **negative trade-offs, leading to maladaptation**.
- Need to balance **trade-offs and synergies across** the WEF,
- for example, irrigation can boost food production but might increase water and energy demand. Therefore, efficient irrigation systems are necessary to mitigate the negative impacts of increased water use.
- The **WEFE nexus approach** offers a framework to **address sector interlinkages, promoting synergies and managing trade-offs**.



Gradients of solutions

Social options based on behavioural change show the **highest positive effect on all four pillars** of the nexus.

Green options, such as NbS & agroecological management practices, have positive impacts on four pillars and are **the most transformative**.

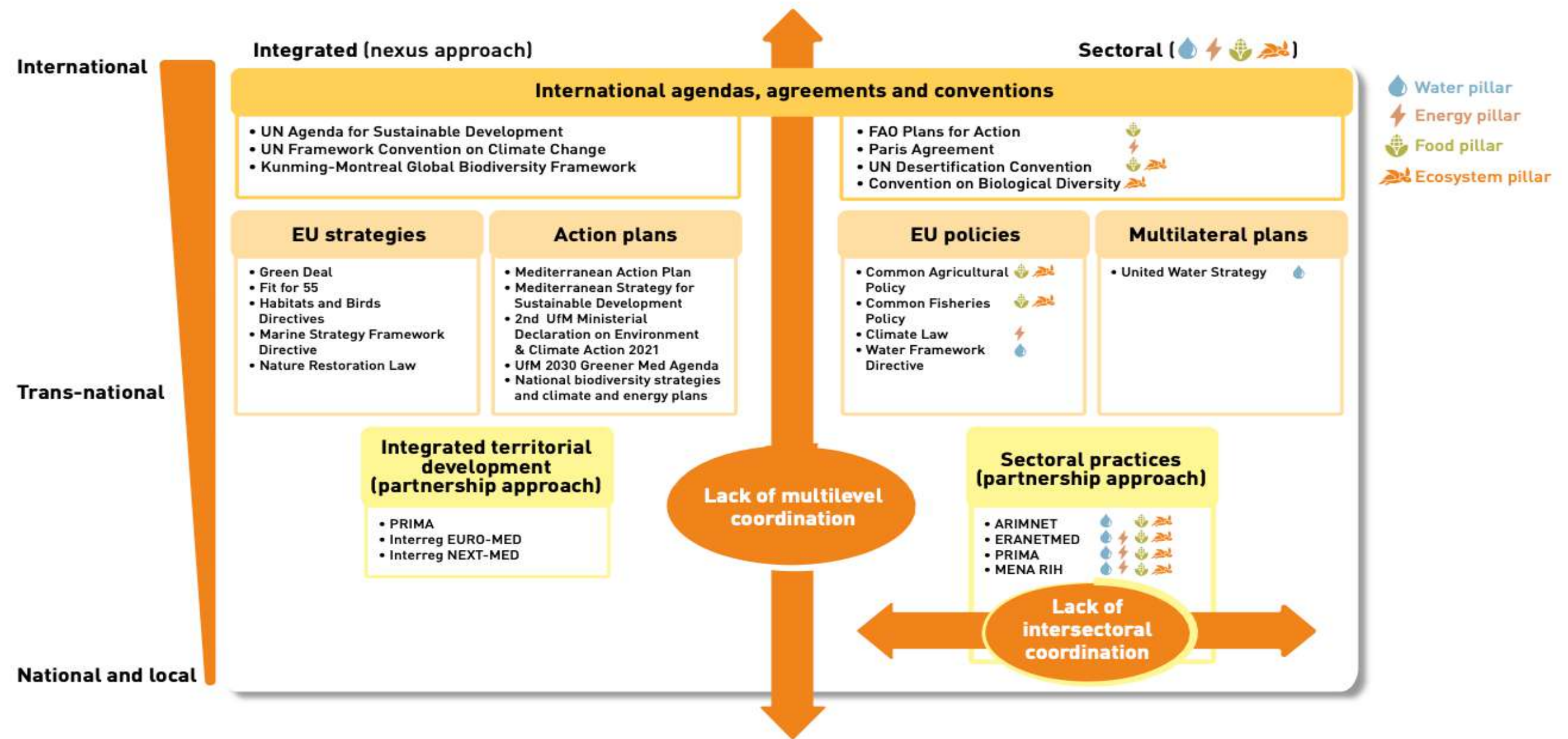


Uneven spatial implementation at of WEFEL approaches over the Med.

- **Mediterranean countries** face several challenges in their implementation of the **2030 Agenda for Sustainable Development** and are **not on track** to achieve many **Sustainable Development Goals (SDGs)**.
- This is particularly relevant for SDGs relating to WEFE components. The Mediterranean region has a general SDG Index score of 73.5 (/100), with huge differences between countries (59.3 - 81.1).
- The **integration of the WEFE nexus into policies** and development plans supports the **implementation of SDGs** given its relevance to the majority of them.



Policies on WEFE in the Med.



Governance, policies and research options for the WEF E nexus

5

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Chapter 5: Governance, policies and research options for the WEF E nexus

Understanding the WEF E Nexus

- **Definition:** The **Water-Energy-Food-Ecosystems (WEFE) Nexus** is an integrated framework addressing the interdependencies between water, energy, food production, and ecosystem conservation.
- **Significance:** It seeks to optimize resource efficiency, enhance sustainability, and mitigate climate impacts in interconnected systems.
- **Governance challenge:** Traditional governance structures remain **sector-based**, making it difficult to integrate policies across water, energy, food, and ecosystems.
- **Why it matters:** Addressing these interdependencies is crucial for **climate resilience, food security, energy transitions, and sustainable development** in the Mediterranean region.



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Institutional and policy barriers to WEF Nexus

Many measures still
designed in “silos” due to:

- insufficient understanding of nexus trade-offs and incentives
- limited vision, knowledge, development and investment
- higher costs of nexus approaches at short term
- lack of adequate governance with inter-sectoral coordination
- Concept-to-implementation gap

1. Fragmented and siloed governance

- **Issue:** Ministries, agencies, and governance structures often operate in isolation, focusing on sectoral objectives instead of holistic approaches.
- **Impact:** Conflicts over resource allocation (e.g., water for agriculture vs. hydropower production) and inefficiencies in decision-making.
- **Example:** In Mediterranean countries, national strategies often prioritize energy or food security separately, leading to competition rather than synergy in resource use.

2. Weak legal and regulatory frameworks

- **Issue:** Existing legal frameworks do not align with integrated approaches, leading to conflicting mandates between different sectors.
- **Impact:** Lack of enforcement of integrated policies and limited accountability for cross-sectoral actions.
- **Example:** The absence of legal mechanisms for managing shared water-energy projects in some regions hinders their implementation.

3. Political and administrative challenges

- **Issue:** Nexus governance requires political will and administrative restructuring, but decision-makers often prioritize short-term goals over long-term sustainability.
- **Impact:** Delays in policy implementation and weak institutional coordination.
- **Example:** Mediterranean water policies focus on agricultural productivity without considering broader ecosystem and energy trade-offs.

Financial, Data, and Social Barriers to WEF Nexus Governance

1. Limited financial and investment mechanisms

- **Issue:** Most funding is allocated to **sector-specific projects** rather than cross-sectoral initiatives.
- **Impact:** Integrated WEF projects lack financial support, and private investors hesitate due to unclear governance structures.
- **Example:** Climate adaptation funds, such as the **Green Climate Fund**, struggle to integrate WEF principles in national financing schemes.

2. Lack of reliable data and information sharing

- **Issue:** Effective nexus governance relies on **integrated datasets**, but data collection remains **sector-specific and fragmented**.
- **Impact:** Poor decision-making due to **gaps in understanding** interdependencies.
- **Example:** **Water usage data** is often not shared with energy and agricultural sectors, leading to **inefficient resource allocation**.

3. Low stakeholder participation and awareness

- **Issue:** **Farmers, businesses, and local communities** are rarely involved in policy discussions on the WEF nexus.
- **Impact:** Poor policy uptake, resistance to regulatory changes, and lack of community-driven solutions.
- **Example:** In many Mediterranean countries, **rural communities are excluded** from water management discussions despite their key role in sustainable agriculture.

Solutions for Strengthening WEFE Governance

1. Strengthening multi-sectoral coordination

- Develop **national WEFE governance bodies** that ensure collaboration across **water, energy, agriculture, and environment ministries**.
- Example: The **MENA High-Level Joint Water-Agriculture Committee** promotes sectoral integration.

2. Enhancing science-policy integration

- Create **Science-Policy Interfaces (SPIs)** to facilitate **evidence-based decision-making**.
- Example: **MedECC's WEFE reports** provide policymakers with the latest research on sustainable resource management.

3. Expanding financial and investment models

- Encourage **blended finance mechanisms** that combine **public, private, and international funding**.
- Example: **Public-private partnerships (PPPs)** have successfully financed cross-sectoral renewable energy and water projects.



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Solutions for Strengthening WEFE Governance

4. Investing in data transparency and digital tools

- Establish **open-access data platforms** for water, energy, and agriculture use.
- Example: The **EU PRIMA initiative** funds projects that integrate digital solutions for WEFE governance.

5. Encouraging participatory governance and stakeholder engagement

- Involve **farmers, businesses, NGOs, and local communities** in policy design.
- Example: **Community-led water management models** in Morocco show how local participation leads to better governance outcomes.

The Way Forward – Implementing a Transformative WEFE Governance Model

Key Actions for Policymakers and Stakeholders

1. **Institutional Reform:** Develop **cross-sectoral governance mechanisms** to break sectoral silos.
2. **Legislative Improvements:** Align laws and regulations with **WEFE principles** to enhance legal consistency.
3. **Capacity Building:** Train policymakers, businesses, and communities in **integrated resource management**.
4. **Financing Innovations:** Implement **climate bonds, water-energy trading schemes**, and WEFE-focused green funds.
5. **Technology and Innovation:** Promote the use of **remote sensing, AI-driven decision-making, and real-time monitoring tools**.



Mediterranean Experts on Climate
and environmental Change

MedECC supporting institutions



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