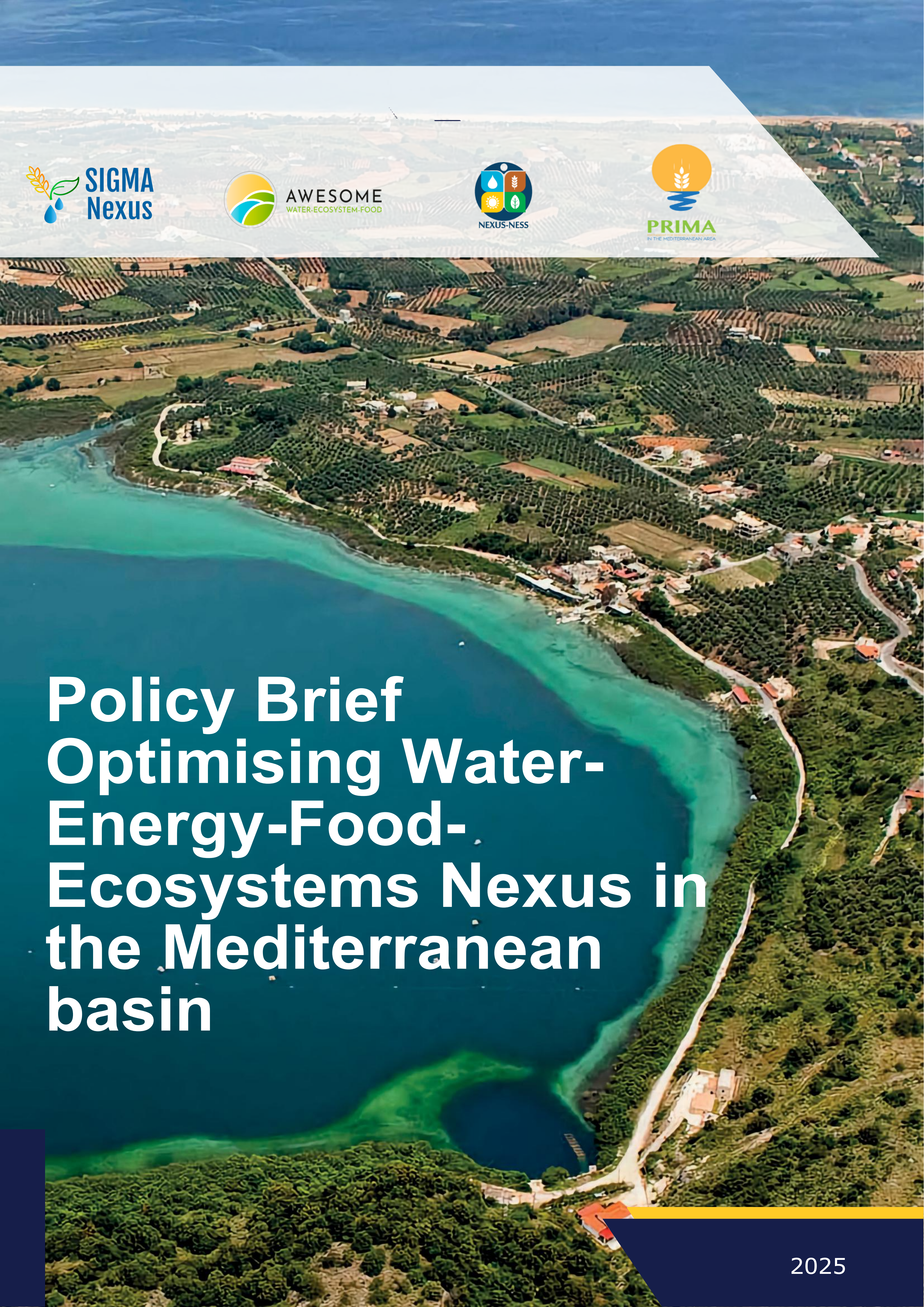

SIGMA Nexus
AWESOME WATER-ECOSYSTEM-FOOD
NEXUS-NESS
PRIMA IN THE MEDITERRANEAN AREA

Policy Brief Optimising Water-Energy-Food-Ecosystems Nexus in the Mediterranean basin

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This **Policy Brief Compilation booklet** has been developed based on information provided by the project coordinators participating in Horizon Booster and contributing to the formation of a project cluster. It brings together key insights, findings, and policy-relevant recommendations from the participating projects, with the aim of supporting knowledge exchange, strengthening collaboration, and highlighting shared priorities across the cluster.

Disclaimer

The information, views and recommendations set out in this publication are those of the projects that took part in the Horizon Results Booster and cannot be considered to reflect the views of PRIMA.

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Executive Summary

This document focuses on optimising the Water-Energy-Food-Ecosystems (WEFE) Nexus in the Mediterranean basin. It emphasises the interconnectedness of these components and the need for joint planning, international cooperation, and transparent decision-making to achieve sustainable development goals.

The WEFE Nexus approach is particularly relevant in the Mediterranean region due to socio-economic considerations, climate variability, population growth, and developmental pressures.

The document addresses challenges such as over-tourism, water pricing and its impact on local agriculture, energy production's effects on ecosystems, and suggests policy recommendations to address these issues. It highlights the importance of collaborative efforts and adopting a Nexus approach to effectively manage resources and promote sustainable development in the Mediterranean.

To enhance coordination, efficiency, and sustainability across the Water-Energy-Food-Ecosystems (WEFE) Nexus in the Mediterranean, the following recommendations are proposed:

1. Implement tourism development policies that address over-tourism, biodiversity decline, and zoning regulations.
2. Focus on the Water Node of the Nexus by improving water distribution systems, addressing water contamination and wastewater management, and promoting stakeholder collaboration.
3. Ensure policy coherence by considering the WEFE Nexus interlinkages in sectoral policies and promoting capacity building activities. Work towards meeting UN Sustainable Development Goals.
4. Mitigate energy consumption and urban pressures. Adopt nature-based solutions in urban planning, design energy-efficient buildings and infrastructures (e.g., green roofs), and embrace renewable energy technologies to boost agricultural production and preserve ecosystems.

This document is a collaborative effort between six projects: SIGMA Nexus, AWESOME, NEXUS-NESS, NEXOGENESIS, GoNEXUS, and REXUS.

1. Topic Overview

The tight interconnected nexus between the Water, Energy, Food and Ecosystem (WEFE) components clearly highlight the need for a joint planning in terms of international cooperation, in order to meet global challenges and achieve the UN Sustainable Development Goals (SDGs).

A recent position paper published in 2019 by the Joint Research Centre of the European Commission, stressed the relevance of the WEFE Nexus to policymakers and industry at the European level, requiring collaborative efforts across sectors through transparent and accountable decision-making, involving civil society in order to successfully move towards a sustainable development that takes into account the Nexus approach.

The projects in this group focus on the WEFE Nexus, including initiatives from both the PRIMA Program and the wider Horizon 2020 landscape, expanding the geographical scope also beyond the Mediterranean region.

1.1 The WEFE Nexus in the Mediterranean

The WEFE Nexus approach holds particular importance in the Mediterranean region and transboundary river basins like the Nile basin, where resources are closely connected to socio-economic considerations. The Mediterranean region is characterised by diverse socio-political, economic, and environmental conditions, where water, energy, and food policies and interventions have traditionally been managed separately. Moreover, the region faces challenges related to climate variability and change, population growth, and other developmental pressures, which make it vulnerable. These pressures include issues such as pollution, water scarcity, unequal distribution of water among different sectors, high demand for food and energy, food loss and waste, and changing dietary habits.

1.2 Policy challenges

In this document, our Project Group proposes recommendations related to several of the key challenges that affect in particular the Mediterranean basin.

- The effects of over-tourism: policies to curb environmental degradation and resource depletion;
- Water prices and the future of local agriculture and farming; and
- Solutions and changes in how policies are contrived
- Pressures from energy production and urbanisation on ecosystems degradation and water resources depletion

2. Recommendations

This section outlines actionable measures to enhance coordination, efficiency, and sustainability across water, energy, food, and ecosystems, ensuring a resilient future for the region.

2.1 Water Node of the Nexus

Key problems: Seawater infiltration, better design and maintenance of the water distribution and management system, high water pumping to meet the needs of mass tourism and the rise of more water intensive agricultural practices and other economic activities which can lead to water contamination (overexploitation of groundwater) and wastewater mismanagement, social conflicts derived from diversified use of water resources.

Solutions:

- Citizens as Researchers Networks - Strengthening ties between different stakeholders (residents that work in different sectors, directorates, policy-governance authorities, researchers, and agencies) to promote awareness of the complexities, transfer knowledge and facilitate conservation.
- New irrigation technologies are best connected to agricultural policy, including provision of incentives and support from agricultural directorates.
- Changes in subsidy policies- making subsidies more context focused, monitoring and evaluation of such programming.
- Well designed and implemented agricultural education programs.

2.2 Policy Recommendations for the WEFE Nexus

- Minding and Safeguarding the WEFE interconnections: Implementation of Communities of Practice in knowledge production, dissemination, and decision making regarding how to best find local solutions to natural resource depletion. Need collaboration between stakeholders.
- Ensure the WEFE Nexus transition is driven by bottom up approaches and focused on stakeholders needs and fair allocation of natural resources. Promote multidisciplinary approaches and participation of stakeholders from all relevant sectors (water, energy, food, and ecosystems) and their dialogue with regard to co-defining, framing and moving towards their common WEFE Nexus future.
- Considering the WEFE Nexus interlinkages in the development of sectoral policies and ensuring policy coherence.

- Promoting capacity building activities as strategy to identify actions to improve stakeholders’ knowledge, awareness and skills.
- Meeting the **UN Sustainable Development Goals**
    - **Goal 16 for Peace, Justice and Strong Institutions** addresses the threats to fundamental freedoms of people around the world by seeking to develop strong institutions that are free from corruption, promoting transparency and participatory decision-making. This goal cannot be achieved without the efforts of researchers and engaged citizens seeking to find solutions through dialogue and critical reflection leading to responsive, inclusive, participatory and representative decision-making and the enforcement of non-discriminatory policies for sustainable development.
    - **Goal 11 for Sustainable Cities and Communities** addresses the enhancement of inclusive and sustainable urbanisation and capacity for participatory, integrated and sustainable human settlement planning, strengthening efforts to protect natural heritage and land consumption, reducing environmental impact per capita, supporting positive economic, social and environmental links between urban, peri-urban and rural areas. The WEFE Nexus approach moves towards the co-definition of best practices to make our living spaces efficient and promote the efficiency in resource use…
    - **Goal 12 for Ensuring sustainable consumption and production patterns** addresses the mitigation of the most pressing global crises: climate change, biodiversity loss, pollution. WEFE Nexus implements methodologies to achieve sustainable and efficient management of natural resources based on circular economy principles, reducing human impact on environment and promoting cultural change on social mindsets and good practices for resource use.
    - **Goal 2 Zero hunger** addresses worldwide food security and sustainable agricultural productivity and food production systems. Efficient management of water resources, promoting inclusive and sustainable agricultural practices are the core of WEFE Nexus goals.
    - **Goal 5 Gender Equality** addresses equal representation of women in policy and decision making processes and resource management.

2.3 Mitigation of energy consumption

- Adopting and incentivizing Nature-based solutions (NBS) approaches in urban planning through the connection between urban-rural (peri-urban) areas by means of green infrastructures, ecological corridors and renewable energy in support of Water, Energy, Food, Ecosystems Nexus. Green Infrastructures are helpful to perform functions for water purification and retention, climate and temperature regulation and soil conservation, giving the potential to revitalise the agriculture sector.
- Designing energy efficient buildings and infrastructures (green roofs or green gardens) to reduce water and energy consumption, optimise food production systems and restore ecosystem services. Green solutions, such as green roofs, can guarantee water conservation and its re-use for climate regulation in buildings or living spaces and improving water/energy use in irrigation and agricultural systems.
- Designing and adopting technology for renewable energy (wind and solar) in order to boost agricultural production and to preserve land and ecosystem functions.

Project Group

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