

**Sustainable Innovation and Governance in the Mediterranean Area for the WEF Nexus**

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**FSD7 International Workshop for Farming Systems Design**

**30 October to 3 November 2022**

# SIGMA Nexus Partners

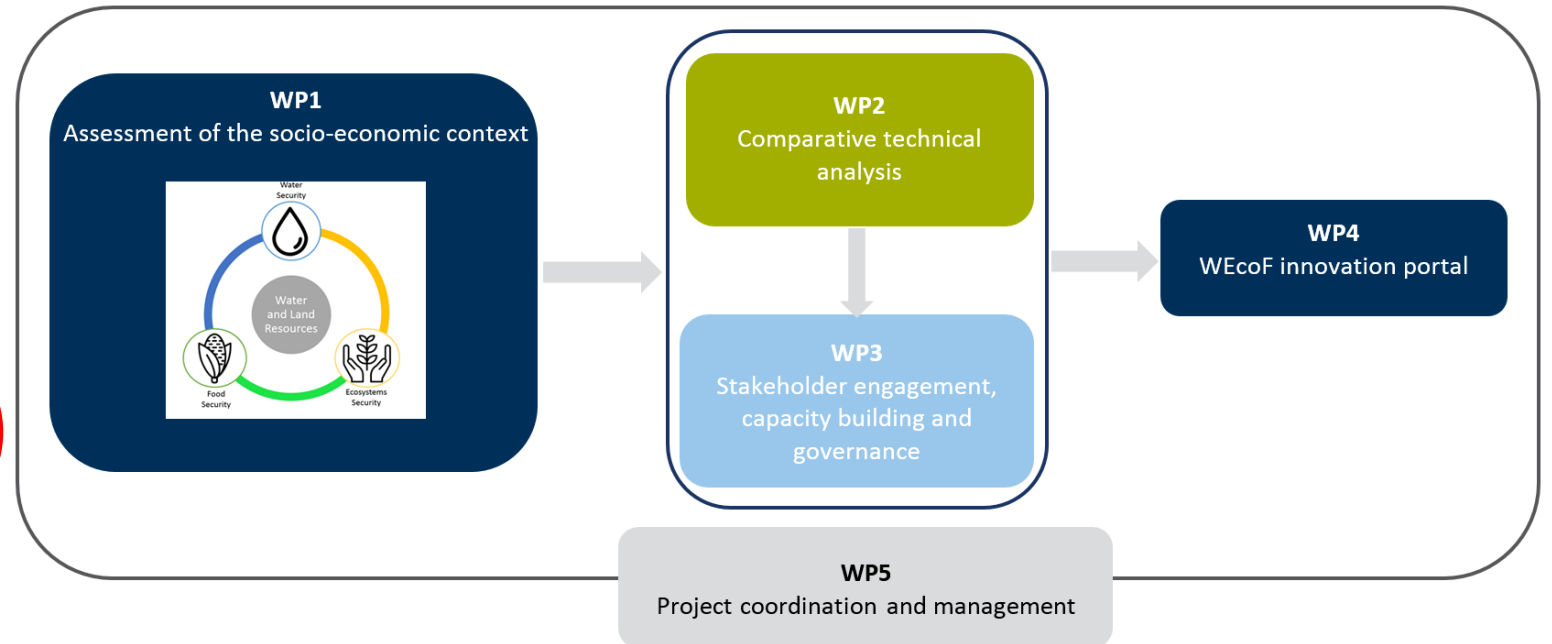


# Overarching objective of SIGMA-Nexus

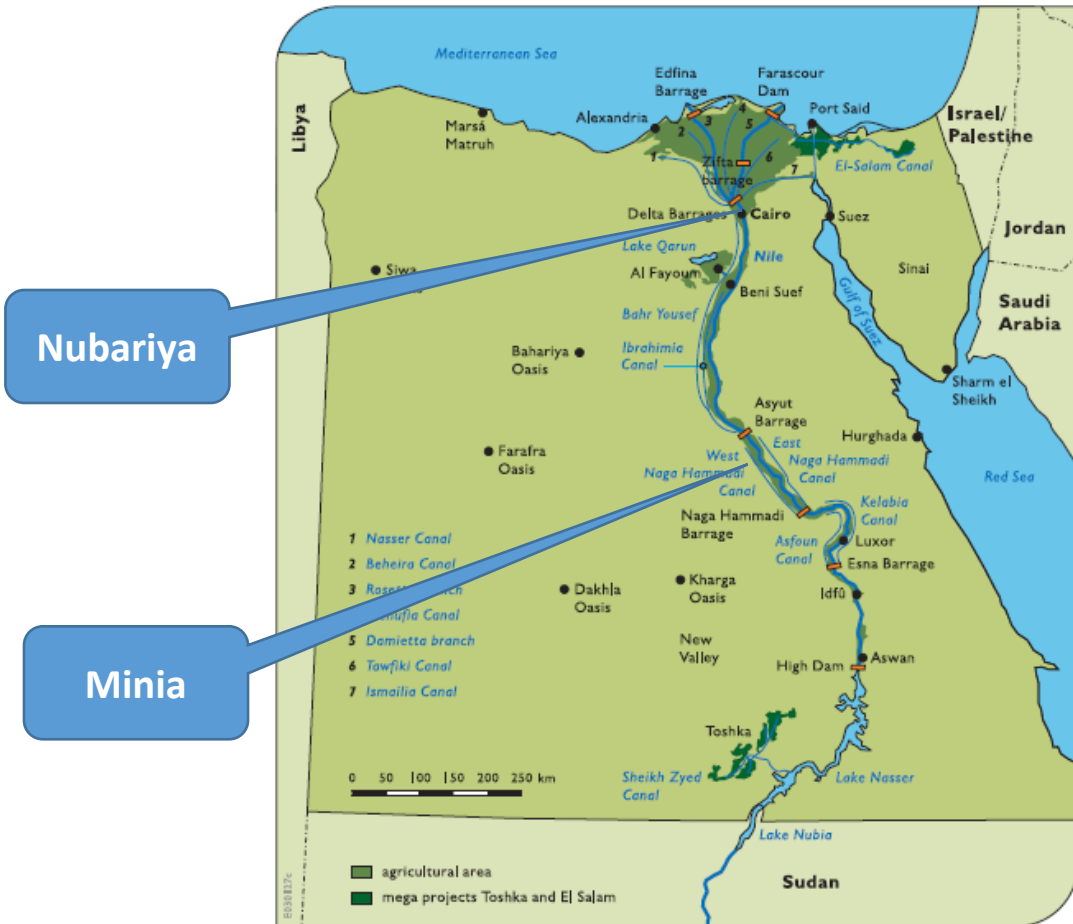
Develop climate resilience in the Mediterranean region by proposing sustainability pathways within the **WEFE Nexus framework**.



3 case studies  
**Egypt**  
**Greece**

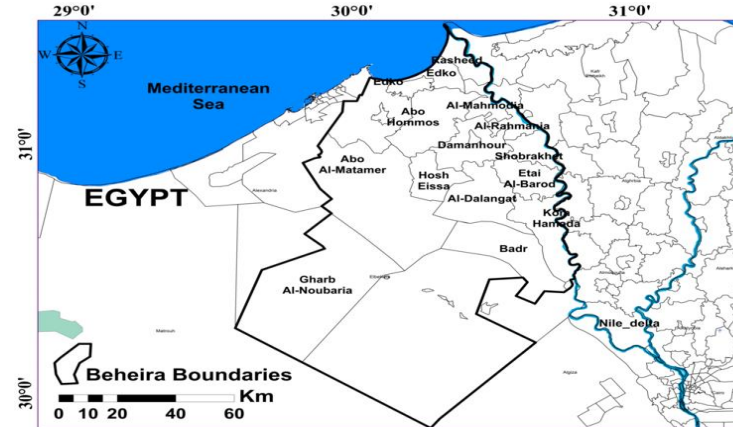


# Case study areas 2 and 3\_Minia and Nubariya, Egypt



## Case study 1

### Beheira - Nubariya Region



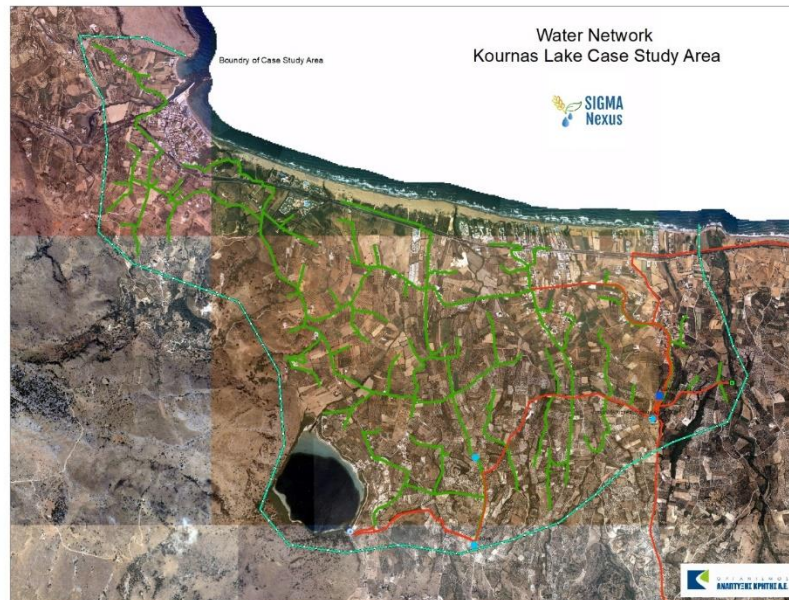
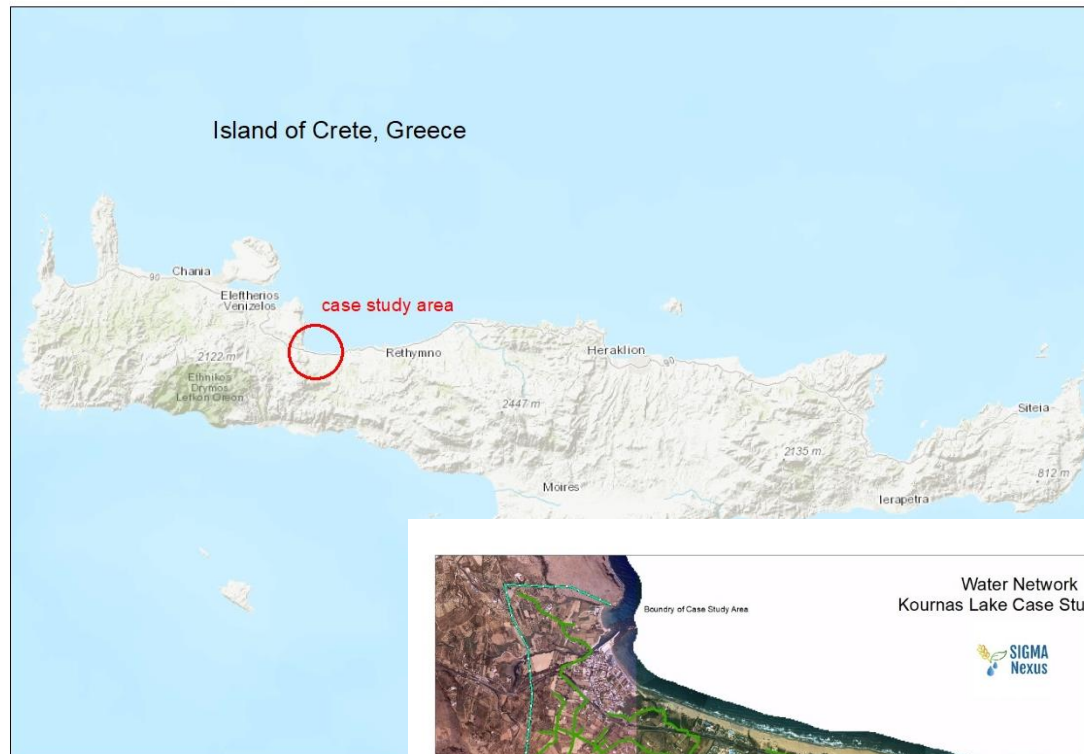
### Main pressures

- Agriculture
- Climate change
- Water quantity (upstream/downstream)

## Case study 2 Minia Governorate



# Case study area 1\_Kournas Lake, Greece



## *Water*

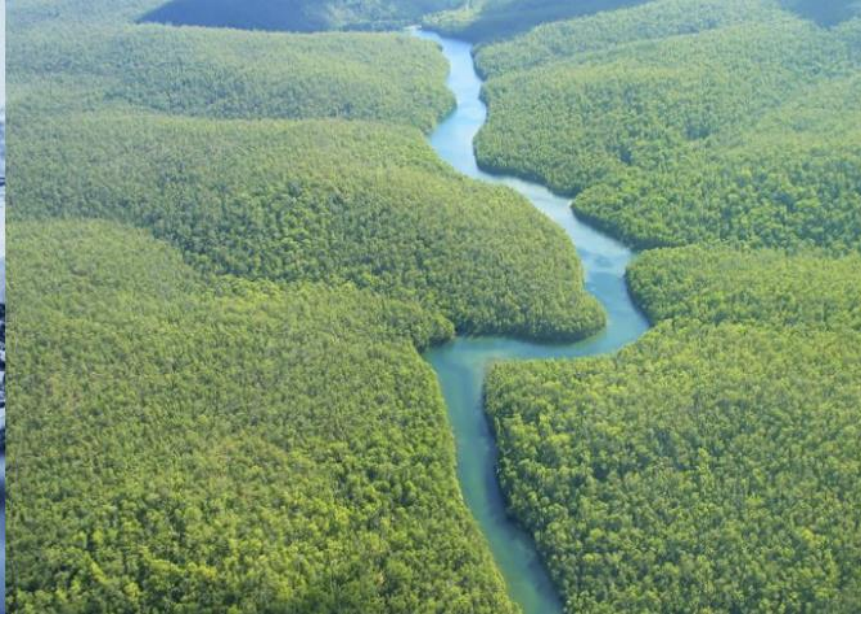
- The only natural freshwater lake on island
- Irrigation network covers 1000 ha
- Drinking water

## *Environment*

- Natura 2000
- Important for breeding, migrant and wintering birds
- Vegetation – hydrophilic

## *Main pressures*

- Agriculture: traditional crops to water intensive avocado
- Tourism
- Agro-industry: dairy companies & oil mills



## **WP1: Assessment of the socio-economic context**

# WP1 Description

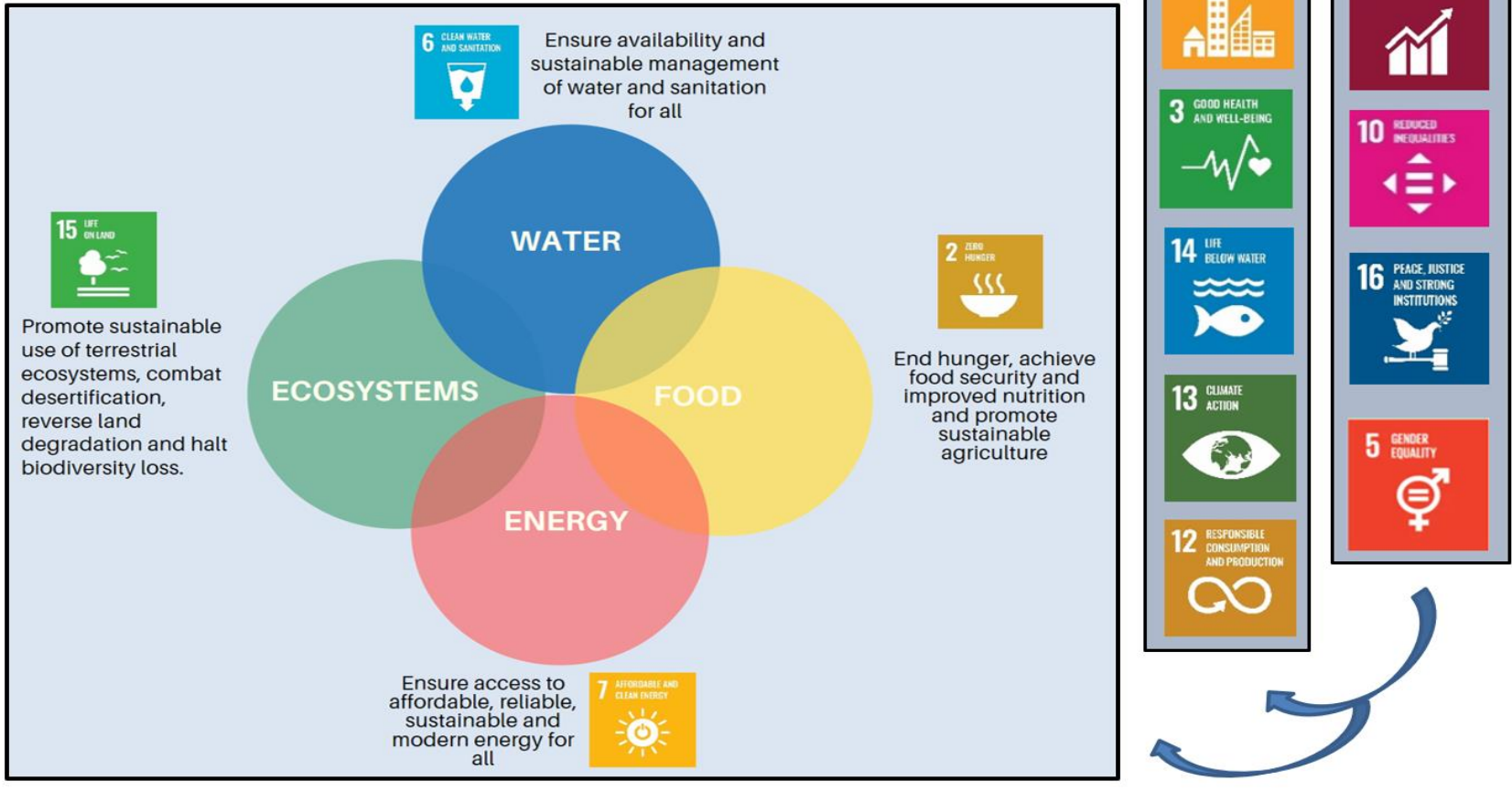
The objective of WP1 is to understand how different sectors use natural resources (including water and land) and analyze the socio-economic context in the study sites.

The socioeconomic analysis will identify the primary economic activities (e.g. energy production, agricultural crops of interest, etc.) and social considerations (demographic characteristics) at each case study site.

The existing local and national policy framework, goals and challenges will also be identified to determine the impact of water-saving irrigation technologies on food security and ecosystems resilience.

# SIGMA Nexus and the Agenda 2030

## SIGMA Nexus and the Sustainable Development Agenda





# Social considerations in SIGMA Nexus



Social considerations	SDGs	Europe	Egypt
Conflicts over land uses	SDG2 SDG15	- Roadmap to a Resource Efficient Europe (COM(2011) 571) - Habitats Directive (92/43/EEC)	- Egyptian Biodiversity Strategy and Action Plan 2015-2030
Conflicts over water uses	SDG6	- EU Water Framework Directive (2000/60/EC) - Nitrates Directive (91/676/EEC)	- National Water Resources Plan 2017 – 2037
Socio-economic vulnerability of rural population (employment and income opportunities)	SGD1 SDG2 SDG8	- Common Agricultural Policy - EU Regulation 1305/2013 - EU Adaptation Strategy (COM/2013/0216)	- Sustainable Agricultural Development Strategy towards 2030
Risks of hazards from extreme weather events and ecosystems degradation	SDG1 SDG13 SDG15	- Addressing the challenge of water scarcity and droughts in the European Union (EC COM(2007)414) - Directive on the assessment and management of flood risks (2007/60/EC) - EU Adaptation Strategy (COM/2013/0216)	- Water resources strategy towards 2050 Sustainable Development Strategy: Egypt vision 2030
Changes in water, food and energy demand affect water and food security	SDG12 SDG2 SDG6 SDG7	- Groundwater Directive (2006/118/EC) - A Blueprint to Safeguard Europe's Water Resources - Roadmap to a Resource Efficient Europe (COM(2011) 571)	- National Water Resources Plan 2017 – 2037

# Economic considerations in SIGMA Nexus

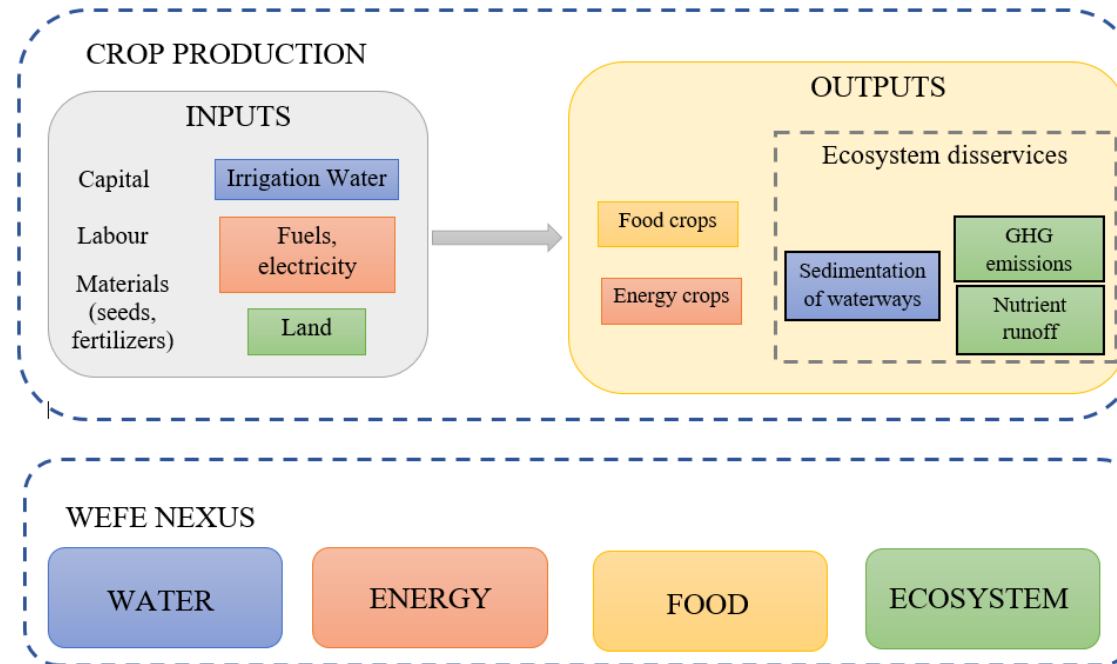


Economic considerations	SDGs	Europe	Egypt
Reduced agricultural productivity as a result of ecosystem degradation	SDG2 SDG8	- Common Agricultural Policy (CAP) - EU Regulation 1305/2013, and amendments	- Sustainable Agricultural Development Strategy towards 2030
Reduced agricultural productivity as a result of the implementation of agri-environmental measures	SDG2	- CAP - EU Regulation 1307/2013 - Action Plan for the future of Organic Production in the EU (EC COM(2014) 179)	- Sustainable Agricultural Development Strategy towards 2030
Production losses and decline of food industry	SDG2 SDG8	- CAP - EU Regulation 1308/2013	- Sustainable Agricultural Development Strategy towards 2030
Changes in water prices	SDG6	- Costing and pricing of water services in its various uses (Government Gazette B 1751 - 22.05.2017)	- National Water Resources Plan 2017 – 2037 - Sustainable Agricultural Development Strategy towards 2030
Changes in energy prices	SDG7	- EU Renewable Energy Directive 2009/28/EC - Directive on energy efficiency 2012/27/EU - EU Strategy for Biofuels (COM(2006) 34)	- Sustainable Development Strategy: Egypt vision 2030
Measures of water use efficiency (eg. irrigation systems) can impact food prices	SDG6	- EU Water Framework Directive (2000/60/EC) - Nitrates Directive (91/676/EEC) - CAP - EU Regulation 1305/2013, and amendments	- National Water Resources Plan 2017 –2037 - Sustainable Agricultural Development Strategy towards 2030

# Evaluating the economic performance within the WEFE Nexus

## Within the WEFE Nexus:

1. What is the level of the economic performance of the farmers in the SIGMA Nexus case study areas?
2. What are the factors that can affect their economic performance?
3. How the efficiency of resource use can be managed along with environmental performance?





## WP2: Comparative technical analysis

# WP2 Description

The objective of WP2 is to compare the hydrological and ecological conditions of the case study sites in Egypt and Greece: Rethymno (Crete, Greece), Menia and Noubaria (Egypt).

The comparative analysis will enable researchers to monitor the quality of the project's outcomes by ensuring their comparability and to produce a homogeneous input for the WEcoF innovation portal.

# Selection of ecological and hydrological indicators

## Water

- 24 indicators examined
- 2 selected

## Energy

- 3 indicators examined
- 1 selected

## Food

- 3 indicators examined

## Ecosystems

- 24 indicators examined
- 1 selected

## Cross-sectoral indicators

- 4 indicators examined
- 2 selected

# Hydrological modelling to simulate regional outcomes

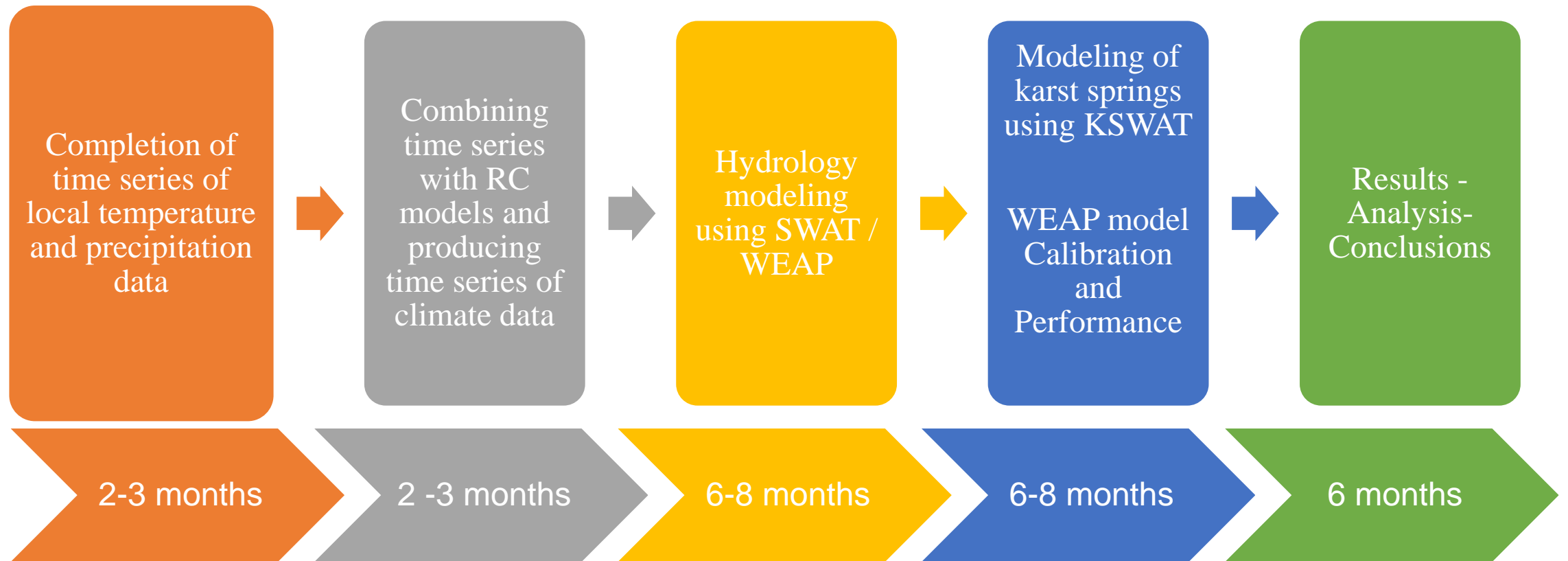
Greek  
case  
study

**SWAT**  
Soil & Water  
Assessment Tool

Egyptian  
case  
study

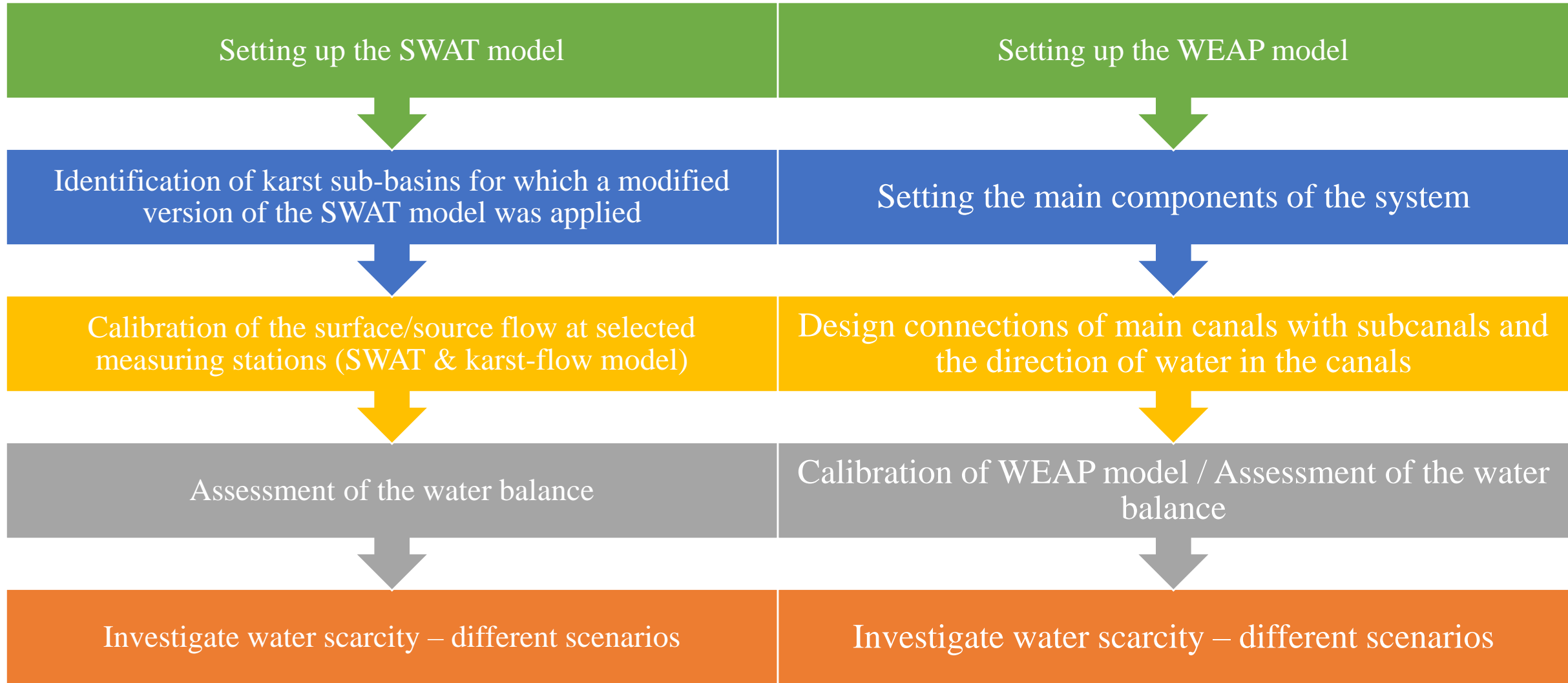
**WEAP**

# Hydrological models





# Methodology





## Sustainable Innovation and Governance in the Mediterranean Area for the WEF Nexus

### WP3: Stakeholder engagement, capacity building and governance

# WP3 Description

The objective of WP3 is to identify the viewpoints of key stakeholders and promote knowledge-transfer. This will ensure technology diffusion and Nexus scalability. Based on the identification of key stakeholders at the sites in WP5, WP3 will conduct a Delphi study to identify the main challenges of and solutions to the WEF Nexus along with a focus group research.

WP3 will also develop general guidelines for stakeholder engagement in the project and conduct a governance analysis on understanding the regulatory capacities of the Nexus at different levels.

# Triangulation

Valuable insights of both FG participants and Delphi experts were complementary to one another.

How do diverse stakeholders understand and frame the interconnections and interdependencies across the WEFE sectors?

**TRIANGULATION**

What types of solutions would the stakeholders put in place to improve WEFE integrated resource management?

What are the prospects of applying qualitative methodologies in Nexus research designs?



# Sustainable Innovation and Governance in the Mediterranean Area for the WEF Nexus

## WP4: WEcoF innovation portal

# WP4 Description

The main outcome of WP4 will be the WEcoF innovation portal, an online platform that aligns research and innovation, and addresses the need to set the synergies among the three main sectors of the Nexus in the targeted countries.

To identify the innovation needs in the Water-Ecosystems-Food Nexus, a value chain approach will be applied to map the Nexus activities and locate areas of improvement. The use of an enterprise social networking methodology as a basis for communication for the triple-helix will promote the Nexus concept as the means to initiate innovation in the three sectors.

# WEcoF Innovation Portal



- It creates a learning and sharing environment for the targeted stakeholders in a cross sectoral learning.
- Creates a culture of collaborative practice, sharing and problem solving, link and aggregate multiple conversations and data sources.
- It is a virtual space for storing, accessing personalized content (news, events, documents, calendar, images, tasks, data, etc...)

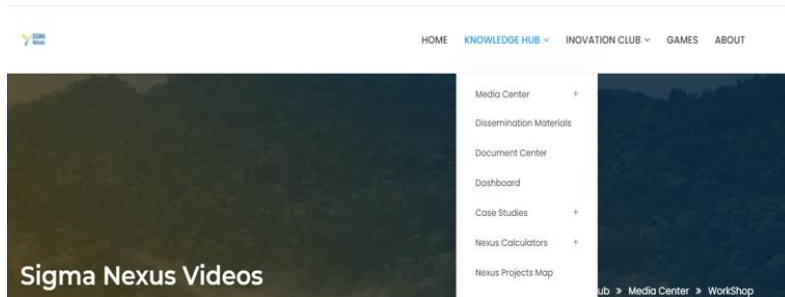
# SIGMA Nexus\_Capacity building tool



## SIGMA Nexus Knowledge hub

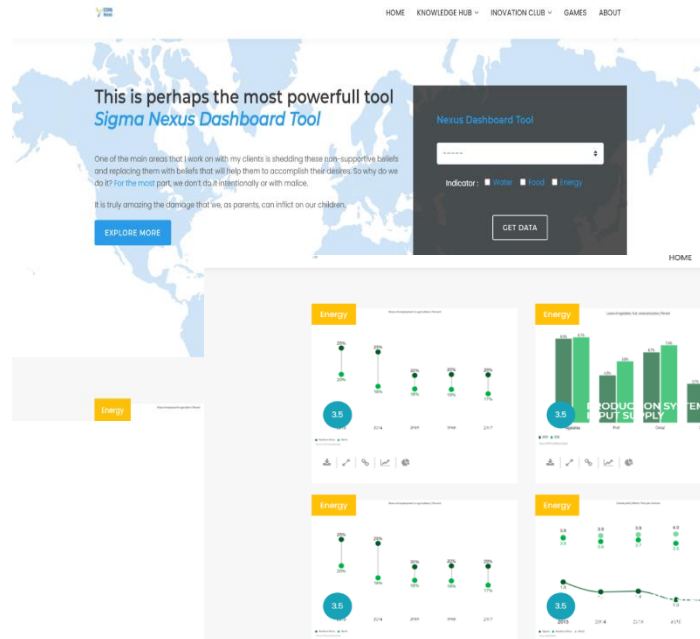
The knowledge hub will provide innovative resources that address synergies among dynamic industries and equip stakeholders with needed skills.

### KNOWLEDGE HUB Menu



## SIGMA Nexus innovation club

We foster a diverse environment with professional, academics and policy makers and farmers to promote collaboration and to break disciplinary silos



## SIGMA Nexus Game

Aims at bridging knowledge with technology through cloud-based game that facilitate policy development within the nexus





# Value chain mapping

## Summer Experiment 2021



## (Ongoing) Winter Experiment 2022



# Sustainable Innovation and Governance in the Mediterranean Area for the WEF Nexus

## Dissemination Activities

# SIGMA Nexus and Horizon Results Booster



Project	Status
 SIGMA Nexus	Project Group leader
 AWESOME WATER-ECOSYSTEM-FOOD	Joined group
 NEXUS-NESS	Joined group
 NEXOGENESIS STREAMLINING WATER RELATED POLICIES	Joined group
G o N E X U S	Joined group
 REXUS	Joined group

# SIGMA Nexus and Horizon Results Booster



Id	Result	Result type	Project(s)	TRL
<b>WEFE Nexus training and assessment</b>				
R1	WEcoF Innovation Portal	Training	SIGMA Nexus	5
R2	Self-Learning nexus assessment engine	Tool	NEXOGENESIS	5
R3	WEFE Nexus Footprint	Tool	NEXOGENESIS	5
R4	WEFE Nexus indicator	Framework	SIGMA Nexus	3
R5	Assessment of WEFE Nexus performance	Assessment	GoNEXUS	4
<b>WEFE Nexus solutions and technologies</b>				
R6	Nexus Ecosystem Lab methodology	Methodology	NEXUS-NESS	1
R7	Solutions for climate resilient water management	Framework	GoNEXUS	5
R8	Prototyping Agrohydrological model	Model	NEXUS-NESS	5
R9	Aquaponics solutions	Demonstrator	AWESOME	5
<b>WEFE Nexus policy packages and models</b>				
R10	Macro, mesa, and micro level models	Model	AWESOME	5
R11	Participatory co-learning model for socio-economic benefits	Model	NEXUS-NESS	1
R12	User-validated policy packages	Framework	NEXOGENESIS	6
R13	Projections for future WEF demands	Framework	GoNEXUS	5
R14	Advanced modelling toolbox	Toolbox	GoNEXUS	5



**Thank you**

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<https://sigma-nexus.eu/>