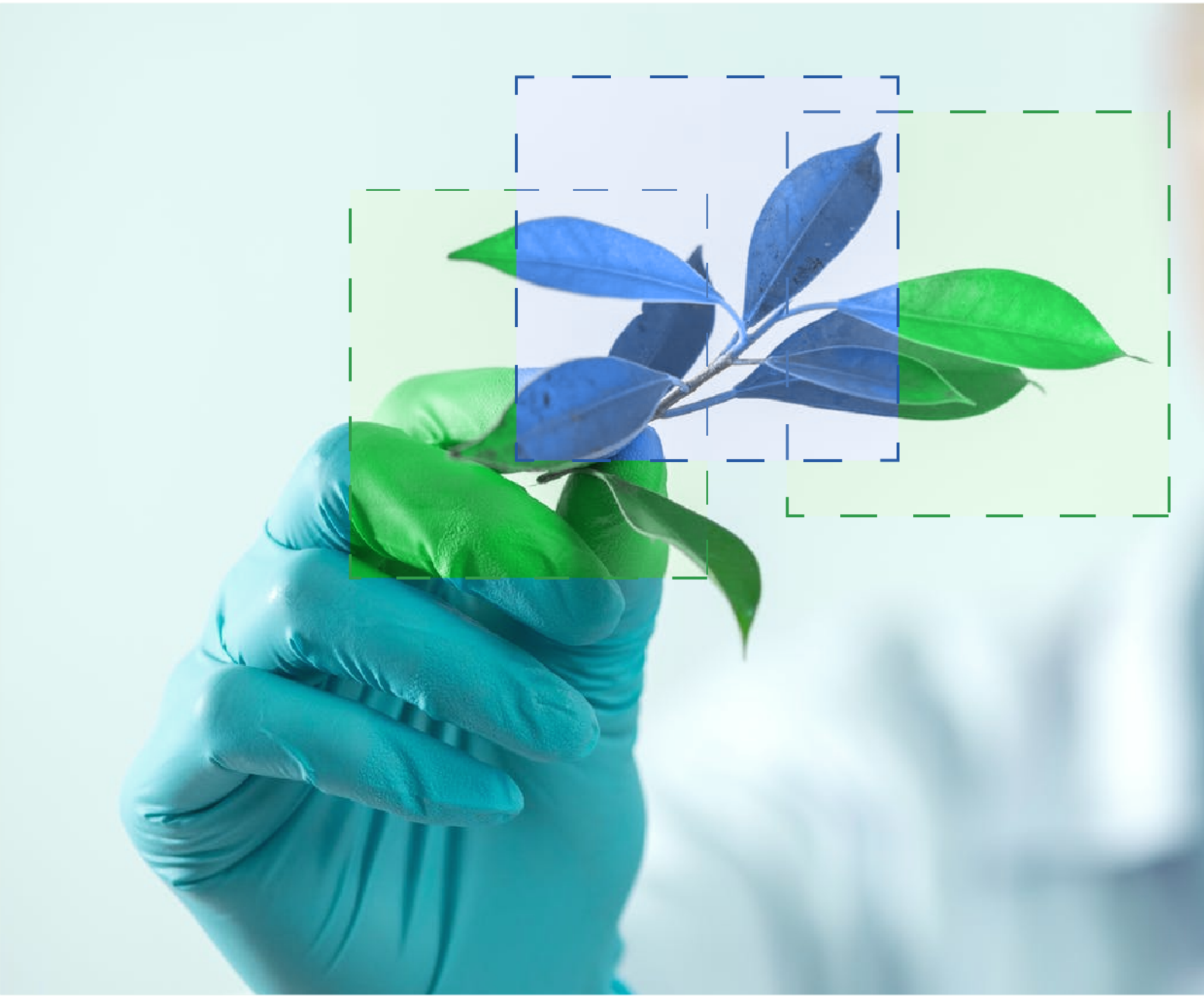
FASTER

Farmers' Adaptation and Sustainability in Tunisia through Excellence in Research



GUIDELINES ON FUTURE RESEARCH

EC Grant Agreement n. 810812

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EXECUTIVE SUMMARY

The H2020 project FASTER, Farmers' Adaptation Sustainability in Tunisia through Excellence in Research, aims to reinforce the research and knowledge transfer capacity of INRGREF related to innovative land and water management change and its implementation through Farm Advisory Systems (FAS). To achieve its mission, FASTER will develop a sustainable framework for research, international networking & partnership developing along with FAS capacity building and practice.

FASTER will deliver easily accessible practice-oriented knowledge on land and water management towards adaptation to climate change available in the long term through an eLearning platform, which will increase the flow of practical information between similar geographical areas in the Maghreb. This will contribute to increasing the visibility and recognition of researchers' work on the subject, as well as corresponding benefits outside the scientific community.

To strengthen the consortiums' collaboration and amplify the partnership with internationally-leading research institutions, the following measures will be designed and implemented: improved access to international networks and platforms, development and operationalization of awareness raising campaigns, stakeholder and public engagement processes, knowledge co-creation and dissemination, internationalisation, innovation, leadership and effective communication.

The D5.5 deliverable, "Guidelines on future research", gathers key messages that will provide the basis for developing future research proposals, setting up students' projects and theses, and academic publications with expected high impact. This roadmap is the result of many questionnaires and two working tables hold during the last year of the project, and where a series of discussions involving experts from all the participant countries allowed suggesting ground-breaking research concepts. The participation of Tunisian managers and policy makers, allowed to identify enabling factors for the application of this much needed future research.

PREFACE

“We have significant challenges ahead.” This is the most repeated sentence when talking with colleagues about global changes and their adaptation in the Mediterranean. Although considering the most likely countless efforts necessary, the remark is never said with defeatism among the research community.

However, do all researchers think similarly?

Moreover, what about other stakeholders from outside academia?

To know precisely which challenges we are talking about and escape from our single view, we decided to compile more thoughts coming from very different experts. We wanted to know which barriers we are genuinely facing, the gaps that we didn’t consider and even the opportunities that could arise from this socio-environmental change.

Many stakeholders, such as scientists, professors, consultants, policymakers and company leaders, were kind enough to answer our questions and solve our doubts. Moreover, some of them were available during follow up meetings to deepen the discussion about their point of view on the subject.

It wasn’t an easy task, but we have tried to summarize all the interesting outcomes in a single document offering a quick view of such answers and discussions. We hope you will enjoy the result.

This document presents a series of guidelines that enhance the value of agriculture and farmers and the need for holistic approaches to face future changes, among other advice.

In the end, no matter our background or where we come from all over the Mediterranean, the answer is still the same... we have significant challenges ahead!

Thank you all for your trust

Sihem Jebari
FASTER Project Coordinator

1 INTRODUCTION

FASTER addresses the specific challenges of the 2020 Twinning call program, aimed at improving the overall scientific and innovation capacity of low-performing Member States and Associated Countries by partnering with leading international counterparts. This will be mainly achieved by developing and providing the necessary monitoring, network, guidelines, support and tools to maintain the expected achievements in excellent research. In this framework, the guidelines on future research tackle the field of climate change, land and water management, as well as forestry and agriculture providing INRGREF and associated centers with additional information to access international competitive projects and continue boosting their capabilities and experience.

The report encompasses the methodology used to compile the most promising guidelines, including contextualisation and take-home messages.

1.2 METHODOLOGY

1.2.1 DEVELOPMENT OF GUIDELINES

This report has been compiled using a two-tier approach:

Surveys distributed to a diverse group of stakeholders. The objective of these surveys was to obtain main future research avenues - although coarse - related to adaptation to climate change in land & water management in the Mediterranean;

Two working tables, where stakeholders could discuss the elaboration, evaluation and selection of concrete, realistic and effective ways forward to consolidate and implement the research guidelines.

Special thanks to the stakeholders that kindly fill the questionnaires and, especially, those who participated in the discussion tables (in bold):

CPF
Juan L. Abián

CREAF
Pilar Andrés
Javier Retana
Anabel Sánchez

FAO
Christophe Besacier
Nelly Bourlion

IHE Delft Institute for Water Education
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UAB
Gustavo Pérez

KREM
Philippe Ker Rault

CSIC
Rafael Rodríguez

CONFAGRICULTURA
Daniele Rossi

Members of the project also participated in the working tables:

Annelies Broekman
Enrique Doblas

Sihem Jebari

1.2.2 DESCRIPTION OF ACTIVITIES

The objective of this report is to provide insights on the most intersting fields of research and guide future efforts towars the socio- economic objective of adapting to climate change. With this aim in mind, the following activities were promoted.

SURVEYS

The survey distributed to the target audience included key questions concretely related to adaptation to climate change, land and water management, as well as forestry and agriculture in the Mediterranean:

- Let's begin positive, what do you think have been the latest great achievements on the subject? no matter if scientific, institutional or social.
- On the other side, which do you think are the principal barriers to adaptation?
- Roughly speaking, which are the main scientific gaps and management needs that may (and should) be solved in the next years?
- Do you know of any concrete business opportunities in climate change adaptation?
- How would you evaluate the existing policy framework in relation to the subject?

The answers received indicate few key issues that have key implications:

- With respect to previous historical periods, finally climate change has been included in the political agenda.
- There is a lack of political will, a deficient institutional response and insufficient funds available to concretely put in practice the measures needed to fight climate change. This constitutes a triple barrier to innovative developments.
- Adaptation to climate change calls for interdisciplinarity, but there is a clear shortfall of initiatives that actually promote this approach in practice.
- Even though there are overarching policy strategies in place and strategic planning exercises were developed, these efforts resulted into an insufficient number of implemented actions.

WORKING TABLES

The stakeholder meetings organized aimed at catalysing research ideas in relation to the challenges Mediterranean societies will face in the near future to be able to adapt to the climate and human induced changes. Starting from a joint assessment providing an overview of latest achievements and the current policy framework in place, the discussion focused on the hindering and enabling factors for innovative research avenues to be promoted.

1st Stakeholder meeting | Main ideas extracted

Organized online 22/4/2021
Attendants: Enrique Doblas, Annelies Broekman (CREAF), Sihem Jebari, Abdelhamid Khaldi (INRGREF), Rafael Rodríguez (CSIC), Philippe Ker Rault (KREM), Raoudha Gafrej (Consultant).

- Agriculture has a key role for adapting to climate change in the Mediterranean, as it is the major sector sustaining the regions' economy. Innovating agriculture practices towards a reduced impact on water resources, soil quality and biodiversity would allow to contribute providing crucial ecosystem services needed to strengthen local populations' health and wellbeing, as well as reducing the vulnerability of productions to changing environmental conditions.
- Socio-ecosystems - like the agro-environment - are complex systems and need to be managed in an integrated way. Therefore, it is crucial to boost interdisciplinary studies and ensure results are streamlined into management, overcoming siloed perspectives. This process needs to be underpinned by institutional collaboration and policy harmonization efforts.
- In order to tackle complexity and transfer latest research findings and apply results into real world settings, a broad variety of stakeholders need to be engaged, including local populations, rural women and people normally excluded from decision making processes. It is crucial to put into value traditional knowledge into innovative projects and focus on the local dimension of adaptation. Therefore, solutions can best be designed and promoted through multi-actor platforms engaged into co-productive processes, directly sharing knowledge and establishing enriching dialogue together with researchers, experts and decision makers. Living labs are perfect examples of such kind of environment.

2nd Stakeholder meeting | Main ideas extracted

Hold on 17/06/2021
Attendants: Enrique Doblas (CREAF), Slaheddine Khlifi (ESIM), Zouhaier Nasr (INRGREF), Daniele Rossi (COPA COGECA), Gustavo Pérez González (UAB), Veronica Lenzi (MEDREG).

- Interdisciplinary environments can boost innovative solutions to be developed and living labs are a good tool for building resilience at the local level, while Innovation Hubs are necessary to enhance innovation at higher scales.
- Communication, awareness rising, and capacity building campaigns are excellent tools for adaptation. An educated and conscious society facilitates putting in practice new ideas.
- Tunisian small farmers need support to improve their participation in governance for adaptation and the transformation towards a less vulnerable agro-food sector. Farmers associations are key to achieve recognition and to disseminate successful adaptation practices.

2 ADAPTATION TO CLIMATE CHANGE IN LAND & WATER MANAGEMENT IN THE MEDITERRANEAN

2.1 LATEST GREAT SCIENTIFIC, INSTITUTIONAL OR SOCIAL ACHIEVEMENTS

Many of the consulted experts agree that climate change is high in the political agenda globally. This trend was strengthened since 2015, when the Paris Agreement was achieved and the 2030 agenda for Sustainable Development including 17 SDGs at the COP21. Global agreements have resulted in the development of many ambitious national adaptation plans to climate change in the Mediterranean, such as the National Climate Change Adaptation Strategy in Tunisia. Similarly, investments to support and reform public policies related to the water sector, agriculture and rural development, or the integration of the right to water in National constitutions, are all becoming a reality. This process is undertaken with close supervision and the support of a variety of non-governmental entity alliances, like for example, the creation of the Water Accounting Unit in the Ministry of Water in Egypt, establishment with the support of FAO and IHE Delft. Such initiatives may not be fully implemented and operative all at once but represent a consistent policy switch in favour of more sustainable governance practices.

Another great achievement is that this policy switch recognises the need to adopt holistic approaches, such as the Water-Energy-Food NEXUS. Thanks to the awareness that water, food and energy are strictly intertwined, inducing the narrative and policy principles to evolve. In example, the European new Common Agricultural Policy includes a shift from an intensive to a sustainable agriculture and from the coarse Green Deal to the more specific Farm to Fork strategy. In the same line, the recognition of the need to maintain soil carbon stocks and soil biodiversity to guarantee agricultural profit, food security, plant and human health is helping to develop very interesting initiatives in rural developments in Europe and beyond. The multi-thematic approach is operationalised by clustering approaches, such as Thematic Living Labs. In general, science and governments are starting to put on the table the needs of the society at large, thanks to the incorporation of all stakeholders of the agriculture value chain into the analysis of impacts and vulnerabilities, as well as defining solutions.

There has been a great development of tools available, such as indicators and methodologies to assess impacts and vulnerabilities of agriculture to climate change. Moreover, nowadays there is an increased availability of sound datasets and modelling tools for depicting climate projections and scenarios contributing to improve Decision Support Systems, such as the use of cost-benefit analysis for climate change impacts. Innovation has also arrived on the ground, for example with the adoption of new breeding techniques and through capacity building in terms of training (Erasmus + program, mobility, etc.). A myriad of projects have helped to achieve such developments and spread their results, such as ForClimadapt (European cooperation project on adaptation to climate change in Mediterranean forests), ALMIRA (a project aimed at adapting landscape mosaics to better manage agricultural production, soils and water), INFORMED (an

integrated research on the resilience and management of Mediterranean forests) and many research projects on sustainable soil management (Landmark, Recare, Soilcare, etc.).

Furthermore, awareness is growing among the Mediterranean populations on the consequences of climate change to their wellbeing. This is the result of the contribution of many actors, specially through IPCC-type scientific work and, more recently the MEDECC, particularly focussing on the Mediterranean region. For example, implied stakeholders and society have acknowledged some key ecological concepts, such as that forest management as a key role in water management, intertwining "blue" and "green" water. Also, fostering modifying citizens' habits to favour energy efficiency and conservation is more accepted than before.

2.2 PRINCIPAL BARRIERS TO ADAPTATION

Policy related barriers

Almost all engaged experts agree that there is a generalized **lack of political will.** Ministries and institutions do not have specific mandates and agreements or are not endowed to adopt or develop climate change adaptation strategies. This is partly due to the short terms of office compared to the longer periods of time needed to develop and implement all policies related to adaptation, which translates in a lack of initiative and effective prioritization. Additionally, there is a serious **lack of favourable institutional contexts** for adaptation policies to be adopted. The reasons for this may range from a mere reluctance to change to the corruption of institutions, but the main obstacle is that current administrative processes and institutional bureaucracy hinder reforming ordinary procedures. Especially in countries without a stable regulatory system, it may be hard to move from theory to practice.

Financial barriers

There is a great **lack of budget availability and investment capacity** to face climate change and establish the management interventions needed. The main funding for research carried out in this field is provided by specific project calls (mainly fostered by the European Commission, but also programs such as the Mediterranean PRIMA) and lately, climate finance. However, applications for calls are accessible only to a small number of researchers, project objectives are set by funders reluctant to carry the risks of innovation. In example, while the shift from intensive to organic agriculture requires external funding at its start, donors hesitate to carry the risks of funding Mediterranean SMEs. In the same line, time needed to access climate funds is extremely long. To facilitate access, global carbon markets should accredit carbon sequestration in agricultural soils. Although international organizations such as FAO are increasing investments for adaptation to climate change, the **engagement of private sector** is also necessary. Difficulties related to **technology transfer** should be also mentioned.

Research barriers

Even considering the improved availability of tools for evaluating adaptation actions, there is still a need to improve indicators and methodologies to assess real progress, especially to tackle maladaptation and biodiversity restoration. Even when these tools are adopted by managers, **data and knowledge** needed are **inaccessible and/or insufficient** in many areas of the Mediterranean. For example, provided the real quantity of water consumed by different users is unknown, its' hard to correctly assess if water resources available are sufficient for supply when these are reduced by climate change.

Societal barriers

On the one hand, there is an urgent **need to tackle climate justice and socioeconomic and improve governance aspects** of adaptation. There are dramatic barriers for societal actors' voices to access in decision making arenas. For example, in southern countries there is a lack of agricultural associations and organisations to represent rural populations, while in north of the Mediterranean citizens have low awareness about the situation of the agricultural sector, such as the difficult conditions for production and equity issues. Regarding governance practices, adaptation policies would benefit from improvements at all possible levels, adapting the structures, procedures, transparency and accessibility of decision-making processes, and engaging public authorities toward the full integration of key principles for reaching reduced vulnerability for farmers. On the other hand, **information should be better shared with the people** to overcome cultural inertia and mentalities that hinder progressing towards facing climate change. Public authorities, stakeholders and society at large (specially at the local level) should be targeted by awareness rising campaigns positively fostering willingness to change and strengthen capacity building.

Geographical barriers

To maintain the **balance between the different scales of intervention** is imperative. Although climate change is a global problem, many solutions are tailored and scattered local initiatives that cannot be easily transferred to other regions. Indeed, regional and sub-regional synergies are not easy to establish due to the heterogeneity of Mediterranean territories. Moreover, **political instability**, such as the unfortunate case of Tunisia, may bring down otherwise successful initiatives.

2.3 MAIN SCIENTIFIC GAPS AND MANAGEMENT NEEDS

Still more efforts are needed to create an appropriate enabling environment for research and innovation in the region. Upcoming research and new applications should be focussing on local scales, especially rural areas, promoting a better governance of natural resources and optimization in the use of these resources. Once increased opportunities would be in place, there is no doubt of the potential and professionality of the scientist, technicians, managers, and the many stakeholders in the Mediterranean region to boost excellence and innovation. In any

case, increased skilled human resources deployed in the Southern Shore of the Mediterranean Basin for addressing climate change challenges would be welcomed.

Availability of sound data, ground truth information and monitoring systems to allow climate change vulnerability assessments (including the costs of adaptation versus non-adaptation) still need further efforts in many parts of the Mediterranean. Especially, better access to existing data and harmonization of monitoring data would benefit the development of indicators and foster science-based decision making, which is the main tool to manage the uncertainties associated to the impacts of climate change. For example, this data and monitoring systems are crucial to assess water availability and the state of water bodies, early warning systems and risk prevention interventions to face extreme climatic events, or information useful for wildfire management. Additionally, it is also necessary to develop research aiming at adapting ecosystems to climate change, such as the selection of appropriate genetic material, understanding of the physiological traits of Mediterranean species, appreciation of levels of resilience, etc. Adaptation should integrate extreme events like floods and droughts that are increasing with climate change, and even combined events in the same year.

Despite recent achievements, interdisciplinarity in research and development could be improved. Consolidating the dialogue between science, managers and local actors around the complex challenges societies are facing is crucial. Institutions also need to go beyond siloed approaches to ensure the functionality of natural ecosystems by transversally integrating all public policies through interdepartmental cooperation. Collaborative environments to address these challenges could be also enhanced by the promotion of Cross-Border Living Lab approaches. Such Labs act as knowledge hubs able to provide not only real operational recommendations to stakeholders, but also to encourage public awareness on climate change and its impacts on the Mediterranean basin.

Interdisciplinary approaches are key to face the paradigm shift in management by considering the water-food-energy-health-education nexus. These approaches may provide insights on conflicts induced by climate change and improved understanding of interventions, such as the evaluation of nature-based solutions or the role of soils as a water storage reservoir. A broader view on climate challenges might also contribute to develop management solutions taking advantage of climatic extremes, like managing flood water for increasing water availability in periods of drought. Furthermore, management can benefit from innovative public-private and public-public partnerships mechanisms, for example for the maintenance, refurbishing and adaptation of existing infrastructure in the face of climate change impacts. The social and behavioural patterns involved in generating the sectors' dynamics should also be considered, such as water and food consumption habits or the shift to crops that consume less water.

In fact, transformational adaptation is key to sustain the reduction of vulnerability of the agriculture sector, specially the rainfed agriculture and livestock sub-sectors. In example, reducing water use should not be the main focus, but fostering the transformation of the whole agro-food system. In this line, the new Common Agricultural Policy may favour the transition from an intensive to a sustainable agriculture and research results are available to contribute improving, developing and adapting the protocols to measure the impacts of different agricultural practices on soil

carbon and biodiversity. As to ensure the producers become the main beneficiaries of the economic benefits of the ecological transition, market chains should be improved and shortened (both regarding the distance and the number of intermediaries). Finally, consumers need to be informed as to understand the cost of the agricultural products and to acknowledge the value of farmers' work.

Moreover, the mentioned recommendations in water management and agriculture should be also integrate the promotion of innovative ways to obtain and store clean energies and reduce energy dependency.

2.4 CONCRETE BUSINESS OPPORTUNITIES IN CLIMATE CHANGE ADAPTATION

To overcome the principal barriers to adaptation, international donors are important both to support the efforts of Southern countries and to veil for the application of transparent rules. They could fund pilots, living labs and small initiatives, as well as participating in the design and implementation of low investments solutions. Meanwhile, governments could enhance economic sustainability in the medium-to-long term by providing stable rules for investments attracting new collaborative business models.

Production of renewable energy (photo voltaic, photo caloric, wind power) is a clear opportunity for investment and business creation. Several Southern Mediterranean countries are launching Renewable Energy Sources auctions, able to fund solutions for existing and new buildings / infrastructure, including insulation, ventilation, and water saving.

In the agriculture sector, organic agriculture and regenerative crop and livestock production represent an opportunity to diversify current production patterns by introducing new crop varieties and products (such as aromatics and essential oils, or early crops from southern Tunisia), new techniques (irrigation with treated wastewater or the development of drought resistant seeds) and new governance initiatives (circular economy, application of the Nexus concept to water, food and energy production and management, or the establishment of a climate insurance system for agriculture and key sectors of the economy). Another field to explore is complex data harvesting, management and information provision, useful to track climate trends and their impacts on business performance, biotechnological research on water stress resistance and remediation solutions for the impacts of extreme meteorological events on agricultural production.

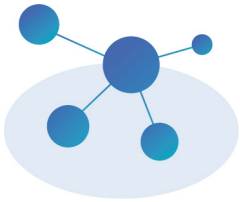
2.5 EXISTING POLICY FRAMEWORK

The current and future development of the Mediterranean regions' socio economy is very uncertain. Concerns for public health add on a complex crisis involving migration, social unrest, institutional liability, corruption and unemployment. These problems push environmental issues to the bottom of the political and economic agenda. Therefore, the political sector is considered not very sensitive to the need for adaptation to climate change in water, land and agriculture, and there is a perceived lack of respect for the farmers, which are in an urgent need for agricultural extension services.

Although the situation has improved a lot in the last ten years, many Mediterranean countries face volatile political and institutional frameworks. European Mediterranean countries enjoy a more stable context, with many regulatory frameworks at in place to guide water, land and forest management as well as environmental protection and restoration of biodiversity. However, implementation and enforcement at national level is still challenging. In fact, many interesting and ambitious policies and strategies are available all over the Mediterranean, characterized by a recognition of the impacts of climate change and the need for adaptation, although these are not supported by the funding and procedures needed for correct implementation. In other words, there's a lot of narrative but little impacts.

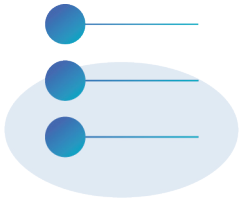
In part, insufficient funding is due to insufficient involvement of the private sector. Achieving the aims of the SDGs requires high investments governments are unable to correspond. Strong pressure from public opinion calls for changing the described inertia. and local populations have high expectations inspired by the development of experimental pilots and projects providing promising results.

3 GUIDELINES FOR THE FUTURE



3.1 CONTEXT

- Climate change is high in the political agenda but there is a generalized lack of political will and favourable institutional context.
- There is a great lack of financial resources and investment from the private sector, but new opportunities arise as we have new needs to face climate change.
- Management tools and resources are developed and available although fairly implemented and in consequence showing little impact.
- Awareness is growing on the consequences of climate change, which could be used to promote citizen science.



4.2 GUIDELINES

- Key role of **agricultural land in sustainability**, as providers and regulators of ecosystem services.
- The need for **holistic** and interdisciplinarity studies and multisectoral and **clustering** initiatives to put ideas into action.
- Potential of **Living Labs** and other kind of local and innovative projects, while **Innovation Hubs** are necessary to planification at higher scales.
- An educated and conscious society facilitates to put in practice new ideas, and **Farmers** associations are the perfect first step to do so!

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