



MedArtSal

## Sustainable Management Model for Mediterranean Artisanal Salinas

**MedArtSal Salina Sustainable Management Model**

**DEFINITIVE VERSION**

**WP3 | OT3.4 | A3.4.3- MedArtSal integrated Model  
(Sustainable Management Model & Tools)**

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## About the MedArtSal project

MedArtSal - sustainable management model for Mediterranean Artisanal Salinas - is funded by the European Union under the ENI CBC Med Programme. The project total budget is € 3.2 million, and the EU contribution is € 2.9 million (90%). MedArtSal is a four-year project which aims to promote the sustainable development of artisanal salinas, providing concrete support on economic, environmental and governance issues. Addressing common challenges in four Mediterranean regions (Italy, Spain, Lebanon and Tunisia), the project will promote the development of a sustainable and adaptable management model fostering the territorial valorisation of artisanal salinas. The project is led by CUEIM – University Consortium for Industrial and Managerial Economics (Italy) and the partners are Association for the Development of Rural Capacities (Lebanon), Fair Trade Lebanon (Lebanon), IUCN Centre for Mediterranean Cooperation (Spain), Mediterranean Sea and Coast Foundation (Italy), Saida Society (Tunisia), University of Cádiz (Spain) and Tuniso-Italian Chamber of Commerce and Industry (Tunisia).

<https://www.enicbcmed.eu/projects/medartsal>

The 2014-2020 ENI CBC Mediterranean Sea Basin Programme is a multilateral Cross-Border Cooperation (CBC) initiative funded by the European Neighbourhood Instrument (ENI). The Programme objective is to foster fair, equitable and sustainable economic, social and territorial development, which may advance cross-border integration and valorise participating countries' territories and values. The following 13 countries participate in the Programme: Cyprus, Egypt, France, Greece, Israel, Italy, Jordan, Lebanon, Malta, Palestine, Portugal, Spain, and Tunisia. The Managing Authority (MA) is the Autonomous Region of Sardinia (Italy). Official Programme languages are Arabic, English and French. For more information, please visit: [www.enicbcmed.eu](http://www.enicbcmed.eu).

The European Union is made up of 27 Member States who have decided to gradually link together their know-how, resources and destinies. Together, during a period of enlargement of 50 years, they have built a zone of stability, democracy and sustainable development whilst maintaining cultural diversity, tolerance and individual freedoms. The European Union is committed to sharing its achievements and its values with countries and peoples beyond its borders.

A layout version of this document will be available at:

<https://medartsal.com>



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(Lead Partner)



ASSOCIATED PARTNERS



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## Contributors and Acknowledgements

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## Executive summary

This document describes the MedArtSal sustainable management model for the sustainability of Mediterranean artisanal salinas, from a new business model to an environmental-base innovation. The purpose of the document is to present the final version of the MedArtSal model and all the hands-on tools for fostering the application of the model suggestions and best practices, developed with a collaborative approach and support of several salinas from the project countries (Italy, Spain, Tunisia and Lebanon).

The MedArtSal project defined and developed a Model for the sustainable management of the artisanal salinas in the Mediterranean area, completed with I) A Handbook for Salinas sustainability based on the conceptual model finalized with 26 factsheets. II) the Operational Plan for Salinas in the Med, III) A “Policy Guidelines Document”. The MedArtSal model is supported by several tools developed by the project consortium, for boosting the application of the model by the salt producers and the salina managers in the selected countries (Italy, Spain, Tunisia and Lebanon) as well as in the Med area.

Three main components of the MedArtSal model (socio-economy, environment, and governance) have been elaborated and accomplished with 15 pilot actions’ results, defining a new approach for sustainability of the salinas.

This model promotes the adoption of innovative sustainable actions in artisanal salinas and is made up of good practices, commerce, biodiversity and ecosystem service preservation, as well as other services.



Photo@ Monica Guizzardi

## Background and introduction

Sustainability is a term widely used and sometimes with different meanings, therefore there are numerous definitions of the concept of sustainability, but they all converge towards the same idea, which can be summarized as «Sustainability is the development that meets the needs of the present without compromising the capacity of future generations, guaranteeing the balance between economic growth, protecting the environment and social well-being». This term of "sustainable development" was first coined in an official document in the text of the agreement signed by thirty-three African countries in 1969, under the auspices of the International Union for Conservation of Nature (IUCN).

In the context of the MedArtSal project, a sustainable Salina would be one that uses natural resources to obtain economic income, but in a socially and environmentally respectful way, ensuring the future use of resources.

The generation of the model has been focused on mainly coastal Salinas, due to their high number, greater homogeneity and common problems. However, as many of the processes in both types of Salinas are similar or the same, many aspects of the model can be applied equally to inland Salinas.

The creation of a model aimed at simplifying the explanation of environmental heterogeneity and the relationships among its variables is always a challenge. Although the model developed will never explain 100% of the system variability, such models are widely used in research to help us understand the most probable scenarios or make reliable predictions of future changes. (Halpern et al., 2012; Mori & Christodoulou, 2012).

In MedArtSal project, the model for sustainability of salinas is multispectral complex model as it has to take into account **economic, social, cultural, management and governance** variables. Due to this complexity, a mixed model integrating quantitative as well as qualitative aspects has been developed in order to identify the priorities and goals to focus on achieving a sustainable Salina. In this regard, a model is nothing more than knowing how an ideal Salina would be in terms of the economy, to be profitable, environmentally, to preserve natural resources, and with the capacity for innovation that allow them to advance in a future sustainable way, as well as evaluate the best governance model to optimally carry out all these activities aimed at sustainability. By knowing the ideal values for each of these terms, we can know where we want to move forward. Therefore, with these reference values or ranges, a Salina can be evaluated and defined towards where and how it can advance in sustainability.

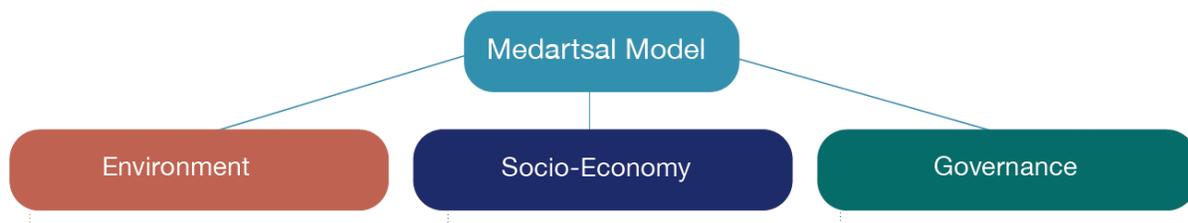
## 1. Model description and Objectives

The MedArtSal project defined and developed a Model for the sustainable management of the artisanal salinas in the Mediterranean area, completed with I) A **Handbook** for Salinas based on the conceptual model finalized with 26 factsheets. II) the **Operational Plan** session, III) A **“Policy Guidelines Document”**. The MedArtSal model is supported by several tools developed by the project consortium, for boosting the application of the model by the salt producers and the salina managers in the selected countries (Italy, Spain, Tunisia and Lebanon) as well as in the Med area.

### *Building the Model*

Previous to the model conceptual construction, a deeply bibliographic review was done, together with consultancies with different experts on Salinas (MAVA Foundation, SEO-Birdlife among them). We found that any model existed or any published index of sustainability in salinas, therefore, MedArtSal Model is the first attempt to analyse and measure how a sustainable salina would be. To do this, a questionnaire consensuses with all partners and consultors, were send to all artisanal Salinas identified in the Med, and this allow us to know the actual situation of the Salinas in an integral way, as we could get answers about productivity, environmental issues and social aspects. This allowed us to do a benchmarking analysis of the artisanal Salinas (ref. project document 3.1.2 Benchmarking analysis of Artisanal Salinas in the Med) which help us to identified best practices for Salinas sustainability.

With this information and taking into account all variables analysed we could finally build the model (ref. project document “OT3.3 – Building the MedArtSal Model and testing), in which three main components or pillars of the MedArtSal model (**environment, socio-economy, and governance – Figure 1.1**) have been elaborated and accomplished with 15 pilot actions’ results, defining a new approach for sustainability of the salinas.



*Figure 1.1 MedArtSal model – Pillars*

Indeed, the MedArtSal model is as a multispectral model that considers economic, social, cultural, management and governance variables, while taking into account both quantitative and qualitative aspects, for the effective sustainability of the salt production, site and management.

With the purpose to be a high added value of the project, the MedArtSal tools have been defined, designed and addressed to the needs of the salt-pans managers and all the stakeholders, enabling the

final beneficiaries to get a positive impact on their business as well as their territories, in the following fields:

- a) Business: an e-commerce platform; a protocol for microalgae culture in Salinas was developed together to macroalgae cosmetics products. 3 videos tutorial explaining the processes were elaborated.
- b) Tourism: the MedArtSal Tourism book in 5 languages collects 13 travel experiences with the description and details of the salinas involved. In Tunisia, a travel experience movie was recorded to create new opportunities in those unknown territories of the Tunisian salinas.
- c) Environment: a protocol for improvement of breeding birds in Salinas is available, a video tutorial explaining how to improve it were produced; a database for the flora and fauna mapped in the Tunisian salinas lays has been developed for the creation of new monitoring process in those territories.
- d) Education: many video tutorials like show cooking, cosmetic show and cosmetic production are available. The online Capacity Building mobile App has been distributed in the main online store for free.
- e) Citizens: the MedArtSal platform shows the results of the project and easily introduces the theme of the sustainability and the importance of a sustainable approach in business as well as in the common life (i.e. ecotourism).

Moreover, the activities of 15 pilot actions in 4 countries (Italy, Spain, Lebanon and Tunisia) and 2 case studies (La Esperanza salina in Spain, and SAIDA salina in Tunisia) prioritized the feasibility of the macro thematic interventions (Figure below) that the salt producers can introduce in their salina, contributing to the definition of the 3 pillars of the model.



## Pillar 1 – Economic sustainability



*MedArtSal - The Economic Sustainability in the MedArtSal Model*

One of the primary challenges faced by artisanal salinas is being economically viable. All over the Mediterranean, the lack of profits has led to their gradual disappearance, deterioration of facilities and loss of biodiversity, particularly since the 1950's.

According to the MedArtSal model, for a salina to be economically sustainable, management measures should focus on:

- **Improving productivity.**

In many salinas, the amount of salt produced is not high enough to generate sufficient income to sustain the activity. As part of the MedArtSal pilot actions, different strategies have been pursued to improve productivity, as for example enlarging salt ponds, restoring facilities and damaged areas. In Italy, the recovery of tanks, canals and traditional embankments of SEI – Saline Ettore e a Infersa has led to an estimated increase in production between 10% and 15%.

In the Sabkhet Lâadhibet salinas in Tunisia (Ben Gardane province), the quality of salt has been improved thanks to the modernization of the evaporation basins. At the same time, diversifying productive activities has proven to be a key element to increase economic productivity.

- **Optimizing sales strategies.**

Marketing and positioning salt products are part of a process that requires a certain level of expertise, but also finding the most suitable strategy at the right moment. Since the war in Ukraine started, the managers of **Salinas de Chiclana** in Spain saw a 50% rise in the price of packaging. These changes posed a direct threat to their business viability. Throughout the project, the exchange with other salinas has contributed to find other alternatives.

In Lebanon, the project has played a crucial role in developing a consistent brand for four salinas, namely **Al-Najja r Salinas** (Blanc Sel), **Georges Sleiman Salinas** (Evaure), **Malek Salinas** (Sea Jewels) and **Salacia Beach Resort**. This branding initiative involved packaging, labeling and creating a visual identity for the salt products.

Thanks to this, owners and managers are now better able to present their products, enhancing their visibility, being aware of their unique selling proposition and increasing their market share. Furthermore, the salt products from all these salinas will be marketed through the **MedArtSal online platform** via <https://medartsal.com/>

- **Fostering social equity.**

In the governorate of Gabès (Tunisia), the restoration of the **Jebel Hadifa salina** will also provide significant benefits to the local population. By constructing and improving the paths of the salina, the project prevents salty water from the rain invading and contaminating the surrounding agricultural fields managed by local farmers. In the area, poor water quality and excessive salinity lead to a lack of agricultural products. At the same time, these works will facilitate the movements of the population living nearby. Overall, this pilot action expects to create 40 new jobs.

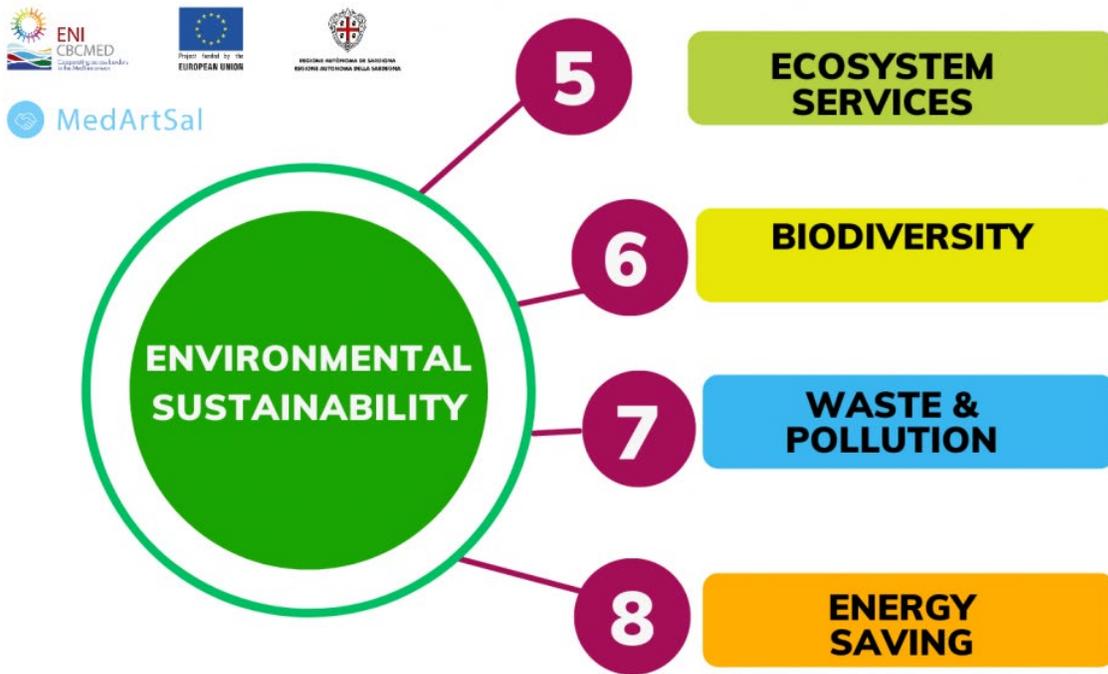
In another region of Tunisia - the Kerkennah islands – the project of the salina has involved young graduates from the Sfax region in aquaculture and awareness raising activities.

- **Embracing innovation.**

The use and cultivation of microalgae which grow in some artisanal salinas stands as one of the most innovative solutions developed during the MedArtSal project. In Spain, two salinas have explored the potential and viability of cultivating algae for food, cosmetic and well-being purposes. In the salina **Roqueta y Preciosa**, the production of the algae *Spirulina* with raceways has proven to be successful. In the case of **Salinas de Chiclana**, the managers have developed a line of cosmetics based on microalgae and other raw products from the salina.

## Pillar 2 – Environmental sustainability

For decades, the abandonment of artisanal production has led to the decline of salt ponds, which often host important areas for bird nesting, but also provide a variety of ecosystem services that range from food production to carbon sequestration or water purification, among others. The recovery of these sites through MedArtSal is contributing to restore the environmental balance of these ecosystems, besides growing awareness on their unique value and multifunctional character.



*MedArtSal - The Environmental Sustainability in the MedArtSal model*

The MedArtSal model considers the following areas in order to enhance the environmental sustainability of salinas:

- **Maintaining ecosystem services.**

*“By containing an extraordinary amount of water, the salina has managed to save the city of Cervia”* – these were the words of Massimo Medri, Major of Cervia after the devastating floods that occurred in the North of Italy in May 2023. This is a clear example of the valuable and highly profitable services that the ecosystem of a salina can provide to its local populations. In this case, the investments have contributed to reduce the disaster risk.

- **Maintaining or improving biodiversity.**

Several of the pilot actions in MedArtSal are already having a positive impact on biodiversity, particularly for birds. The restoration project in **Salinas de Marchamalo** (Spain) is also improving nesting and resting habitats for seabirds in a heavily urbanized area of Murcia. Likewise, the project in **Parco della Salina di Cervia** (Italy) has restored eight nests and created another 3 under the supervision of the national competent authority.

- **Managing waste and pollution.**

The primary goal of the project in **Salina San Vicente** (Spain) has been to produce sea salt of the highest quality (virgin and fleur de sel), by reducing plastic waste from the waters in the pre-breeding stages. To do so, the project has tested the reduction of contamination by plastics and microplastics through the installation of a waste expulsion system.

- **Saving energy.**

Energy supply is currently a major concern for countries like Lebanon, where power shortages are a constant issue. Running a salina requires a significant amount of power supply, especially to keep the water pumping system active. Aiming to become as energy sufficient as possible, the project of **Sleiman Salinas** has managed to fully sustain water pumping on wind energy thanks to the installation of a wind will.

### Pillar 3 – Fostering governance

Although governance structures greatly differ from one country to another, governance fragmentation is a common challenge for the effective management of artisanal salinas, regardless of the country where they are based.



*MedArtSal - The Governance in the MedArtSal model*

For this strong difference among Regions, the MedArtSal model recommends:

- **Analysing administrative situations to find the most suitable solutions in each case.**

In Lebanon, a significant part of the territory where salinas are located belong to the Church. In Spain, restoring the Salinas of Marchamalo has made it necessary to request authorizations from different levels within the administration (from national to local). All these situations pose key challenges to the viability and long-term sustainability of the projects.

- **Identifying best practices.**

Although influencing laws and regulations is a challenging process, especially as external actors, certain activities can help to produce some of the needed changes. This is the case of tourism activities, labelled differently by each MedArtSal pilot site, whether as “salt-tourism”, “ecotourism” or “heritage tourism”. In the Bahia de Cádiz NP in Spain, the ecotourism itinerary developed by MedArtSal (in partnership with the MEET Network) has created a local cluster to directly involve the key stakeholders in the area. In the same

line, but with a focus on the main goal of promoting and preserving the heritage of Italian salt, a heterogenous SMEs cluster among salinas and related organizations based in different country regions has been developed in Italy.

- **Advising policy-makers.**

Innovative projects such as the ones subgranted by MedArtSal are an excellent way of attracting attention from policy and decision-makers. indeed, the closing event of MedArtSal in Beirut witnessed the inclusion of the **Salinas of Ras Al Malalih** in Anfeh on the national map of cultural, heritage and ecological tourism.

- **Focusing on cultural aspects.**

Many artisanal salinas have the potential of becoming World Heritage sites in the category of “cultural landscapes”. In each case, understanding, promoting and justifying the “universal outstanding value” of these sites is a task that depends on the initiative of the local and national administration, with the support of civil society organizations and local entrepreneurs.

The achieved results by sub-grantees, and by UCA and SAIDA researchers in their case studies delve into how to improve sustainability of the different salinas and on the basis of self-assessment evaluation index (parg 2. Salinas Sustainability Index) and, by means the Operational plan and the Handbook, the model can drive the improvement of the salinas in term of (Figure 1.2):

- Best practices in sustainable tourism**
- Diversification of products**
- Best practices to improve biodiversity in a Salina (Flora improvement; crustaceans, molluscs and fishes; Birds)**
- Governance**



Figure 1.2 Conceptual summary of the sustainable model for artisanal Salinas

## 2. Salinas Sustainability Index

The final model is based on quantitative values by which a Salina can evaluate itself and be able to determine its degree of sustainability. In this way, the quantitative part of the model has been developed on the SSI, which includes the values and ranges according with Salina economic, environmental and innovation aspects to be considered as sustainable. Note that this SSI does not include governance since the salt worker cannot manage directly to improve this aspect. The SSI includes the three main parts that a salt worker can improve in terms of sustainability: socio-economy aspects, environmental and innovation aspects (through diversification of products).



The SSI has been developed such that it can be used as an overall SSI (taking into account all variables) but can also be employed in separate sub-indexes, which can provide information on specific aspects of the Salinas:

- **GLOBAL SSI:** including the entire set of selected variables related to socio-economic, environmental or diversification aspects.
- **Socio-economic sub-index:** considering all relevant selected variables which provide information on economy and society.
- **Environmental sub-index:** considering all relevant selected variables which provide information on biodiversity conservation and environmental protection.
- **Diversification/Innovation** (understanding diversification as an aspect of innovation in the Salinas) sub-index: considering all relevant selected variables which provide information on the new products, techniques, methodologies and any type of diversification or innovation activities.

The SSI was developed in several steps (as shown in the figure 2.1) with the participation of all project partners.

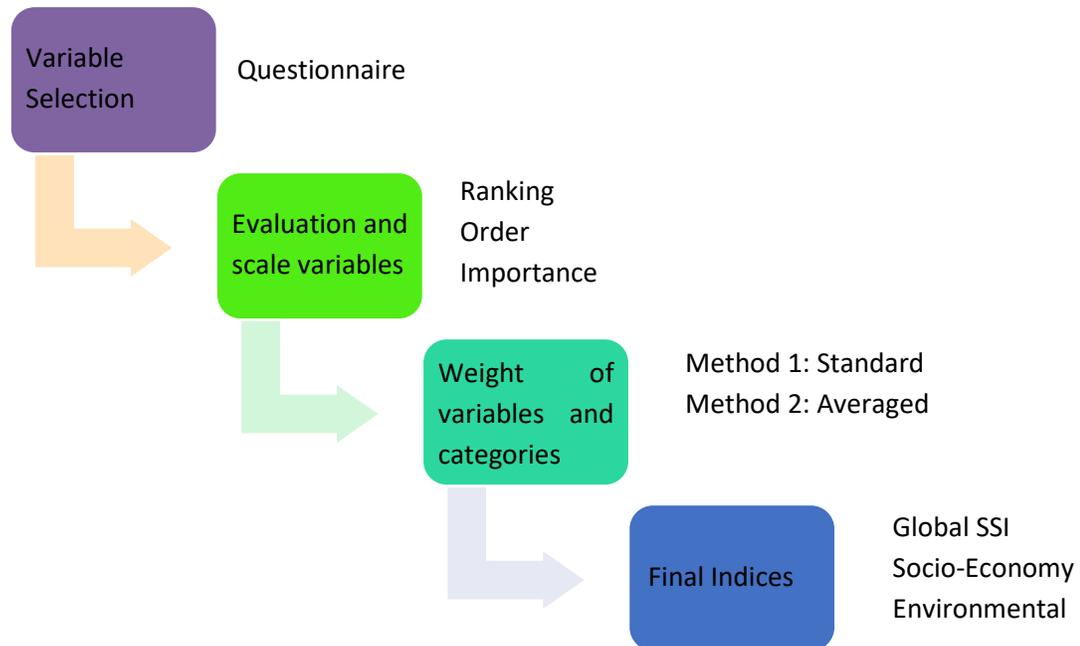


Figure 2.1. Scheme for creating the Salinas Sustainability Index (SSI)

## SSI Toolkit

The Toolkit has provided at the following address <https://medartsal.com/b2b/>

Based on the four independent indices and on the evaluation table for the considered variables, a self-evaluation tool (SSI Toolkit) for artisanal Salinas has been developed. The toolkit can be used by any worker in the salt sector. By entering the required information (i.e. values for the 22 SSI variables) in relation to the Salina, an SSI score can be obtained and therefore an assessment of the sustainability status of the Salina. Moreover, this Toolkit provides information about Salinas' strengths and weaknesses in order to guide the salt worker on where to prioritize their improvements in order in order to increase their sustainability. Some examples of the Toolkit are shown:

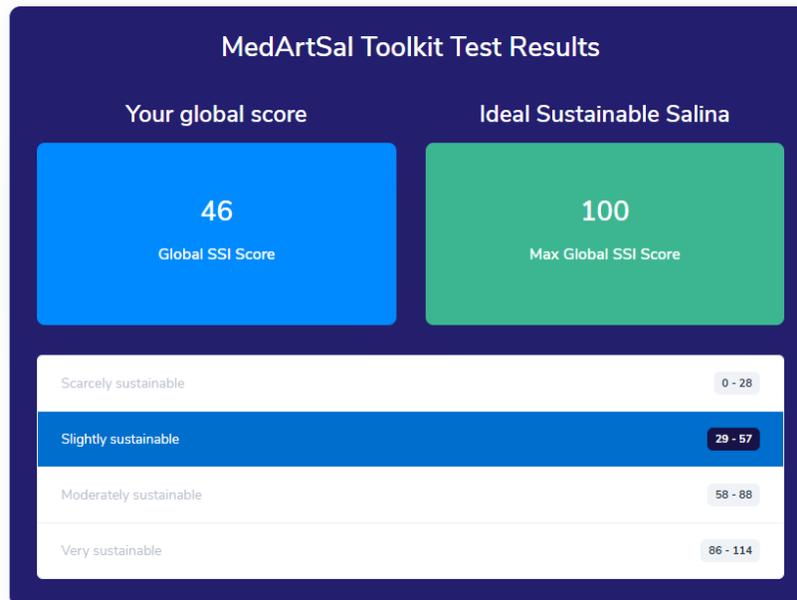


Figure 2.2. Overall result with the overall sustainability score achieved by an example Salina

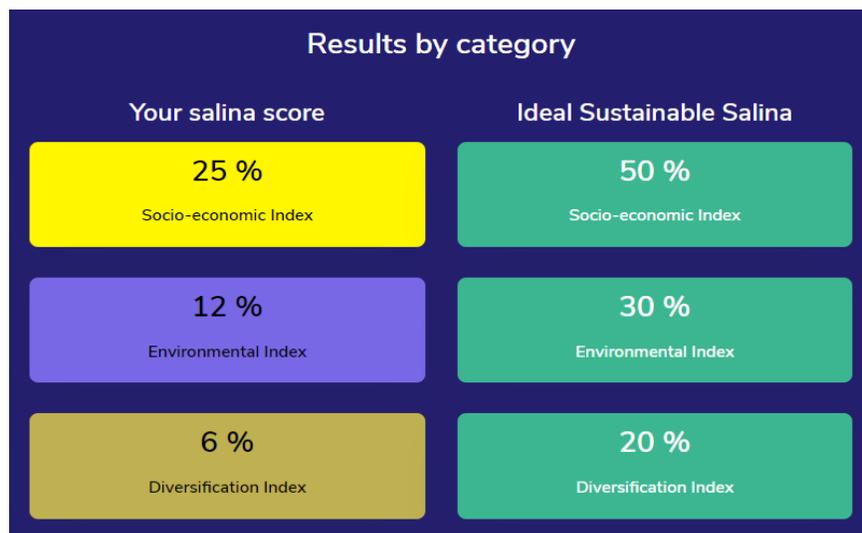


Figure 2.3. An example of a particular result in relation to the different categories that make up the SSI, socio-economic, environmental and diversification

### 3. How to improve Sustainability of the Med Salinas

#### Operational Plan description

The Operational Plan (OP) aims to achieve multiple objectives by utilizing the sustainability model developed previously. This model provides inputs at various territorial and hierarchical levels, enabling

different stakeholders to contribute towards salinas' environmental responsibility and social sustainability (e.g., human rights, social security, etc.). The OP is based on a diagnosis of constraints and opportunities at the regional and national level and identification of solutions and recommendations. It further establishes the conditions in which the model can be better implemented, within a regional focus, therefore the collaboration of all MedArtSal partners is crucial in order to build a more accurate OP that benefits all stakeholders in the territory. By creating a network and implementing the model, all stakeholders will benefit from improved sustainability. The level of change needed for each territory must be assessed to implement the model and determine which aspects of the OP are needed for each specific context.



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The main idea behind this plan can be summarised as "Who has to do what to improve what", in the context of seeking the sustainability of the artisanal salinas. To answer this question we establish different levels, with the general approach of *Assessment -> Planning -> Management and focus on the general /regional national and international levels*, described in the document "**A3.4.2 Operation plan-MedArtSal**".

The SWOT analysis in the Operational Plan has the basis for developing improvement or reinforcement tasks and identifying critical issues and main challenges. The proposed methodology consists of two main parts:

1. Each country analyses the elements of the matrix at a local level with the help of experts in the field. Each participant of this assessment will choose five strengths, weaknesses, opportunities and threats, which then will be ranked from 1 to 5 in order of relevance. The one that has been chosen by more experts has more relevance for the diagnosis of the situation of each country.
2. Once the five main weaknesses and threats have been identified, it is time to propose tangible actions to be implemented by different key stakeholders at local, national and international level.

To make it easier to propose specific actions, the experts have to define a goal for each SWOT element.

Based on the selected methodology, each country formulated a country-based SWOT to later indicate how each hierarchical level of relevant stakeholders will face the challenges of the sustainability of artisanal salinas. A list of Key policy recommendations has been provided for each country as support in further developments of sustainability of the salt pans as well as the territory.

## Country-based plan | Lebanon

Table 1. Lebanese SWOT main elements after the experts' analysis. Prepared by the authors.

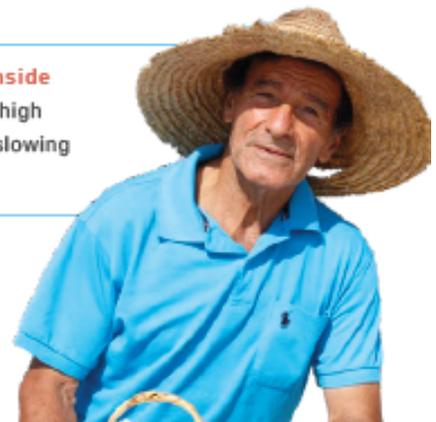
 <b>Strengths</b>	 <b>Opportunities</b>
<ul style="list-style-type: none"> <li>● <b>Abundance of natural resources in salinas</b> that can be harnessed to provide economic benefits, but also for nature, tourism activity, heritage and cultural preservation, as well as food and gastronomy-related</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Improving the protection of important natural sites</b> through salt-production activities</li> </ul>
<ul style="list-style-type: none"> <li>● <b>Promoting Fleur de sel</b> - a highly valued salt variety in haute cuisine</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Developing "salt tourism"</b> as a business model that harnesses the beauty of the landscape and ecological value of artisanal salinas</li> </ul>
<ul style="list-style-type: none"> <li>● <b>Diversifying products and services</b> (macro &amp; microalgae, tourism, outdoor activities to maximise benefits</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Developing local ecotourism clusters</b> to promote tourism in the zone concerned</li> </ul>
<ul style="list-style-type: none"> <li>● Very specific and high-quality products and services that can <b>only be obtained or developed</b> in certain places, such as in the Mediterranean</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Boom of gastronomic tourism</b> is creating a high demand for natural, healthy, functional and organic products</li> </ul>
<ul style="list-style-type: none"> <li>● Potential to create <b>gourmet products</b> that are becoming increasingly popular.</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Developing a single designation of origin</b> or label, which unifies several different brands, especially to target international markets</li> </ul>
	<ul style="list-style-type: none"> <li>● Carrying out some <b>institutional promotion</b> and local direct sales actions in the municipalities could help to increase revenue</li> </ul>

SWOT  
**W Weaknesses**

SWOT  
**T Threats**

- **Lack of infrastructure:** better infrastructure could enable tourism to develop in salinas: signage, tourist information points, accesses, basic services, etc.
- **Need for direct financial public aid and credit,** as well as advice to support corporate actions and brand development
- **Limited marketing efforts:** lack of promotion (both physical and online). Poor knowledge of market segmentation
- **Quality certification:** lack of synergies between salinas and associations to develop common quality standards, for example, appellations of origin, labels, etc.
- **Support to entrepreneurship:** business projects require initial support to assess project viability, as well as for the implementation, helping to tackle both economic and administrative challenges
- **Low levels of profitability:** artisanal salt products are usually undervalued
- **Land and property management:** salinas often lay within neglected land, where ownership is fragmented.

- **Uncertain legal** status of salinas, for example, when land is rented from religious entities or when the timeframe remains unspecified
- **Inconsistent regulations for this sector** (laws may be very old, not adapted to current context, offering insufficient coverage, etc)
- **Costly maintenance** of the structures of the salinas for small businesses and entrepreneurs
- **Low competitiveness** of local and organic products compared to the prices of industrial salt
- **Lack of an adequate legal framework** to protect and promote the artisanal management of salt pans
- **Lack of coordination inside public administration,** high amount of bureaucracy slowing down the processes



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## Key policy recommendations for Lebanon

**ESTABLISH A COOPERATIVE OF OWNERS** of salinas who actively participate in law and decision-making related to salinas and request infrastructure maintenance

**FACILITATE THE WORK** of salt workers during the maintenance season by simplifying the process to obtain permissions

**PROMOTE GREATER DIVERSIFICATION OF ACTIVITIES** by authorizing or removing bureaucratic hurdles to certain commercial activities such as ecotourism

**PROTECT AND ENHANCE THE VALUE** of artisanal salinas through new regulations, promoting their recognition as UNESCO World Heritage and developing a certification model for artisanal salt

**LEGALISE THE STATUS OF SALINAS** by both updating and creating regulations and policies, aiming to reduce or limit the import of salt and to facilitate the export of artisanal salt

**PROMOTE USE OF NEW TECHNOLOGIES** to optimize the production while respecting traditional knowledge and helping develop new salt products

Source: Prepared by the authors

## Country-based plan | Italy

Table 2. Italian SWOT main elements after the experts' analysis. Prepared by the authors.

 <b>Strengths</b>	 <b>Opportunities</b>
<ul style="list-style-type: none"> <li>● <b>Abundance of resources</b> in commercial salinas offers a wide array of possibilities to develop economic activities, based on natural, touristic, historical, cultural, gastronomic or heritage-related values</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Expanding commercial activity</b> to enter international markets</li> </ul>
<ul style="list-style-type: none"> <li>● Artisanal treatment allows to create <b>personalised salt varieties</b> to fit the standards of gourmet cuisine</li> </ul>	<ul style="list-style-type: none"> <li>● Developing comprehensive projects that <b>apply the Nature-based Solutions</b> standard to protect, sustainably manage, and ecosystems while addressing societal challenges effectively</li> </ul>
<ul style="list-style-type: none"> <li>● Artisanal salinas which are active play an important role in <b>preserving nature</b> (not only in terms of species, but also of ecosystem services)</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Exploring synergies with other small business</b> to carry out joint marketing actions</li> </ul>
<ul style="list-style-type: none"> <li>● There is a high potential to simultaneously <b>develop diverse products and services</b>, e.g. macro and microalgae cultivation, tourism</li> </ul>	<ul style="list-style-type: none"> <li>● The unique landscape and natural value of artisanal salinas is well-suited to <b>develop ecotourism</b>, especially at a moment of increasing demand for nature and outdoor experiences, as well as for tailor-made tourism, as in <i>saliturismo</i></li> </ul>
<ul style="list-style-type: none"> <li>● Artisanal salinas can produce <b>gourmet products</b> which are becoming increasingly popular, such as <i>fleur de sel</i>, algae, etc.</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Promoting the universal value</b> of salinas by fostering the exchange and international cooperation between researchers, businesses and others</li> </ul>

SWOT  
**W** Weaknesses

- Maintaining the technical infrastructure of salinas entails a **high economic cost**
- **Lack of compliance** with legal obligations
- **Missing a regulatory authority** which certifies the quality of *fleur de sel* and virgin salt
- Artisanal salt remains an **undervalued product** with low levels of profitability
- **Marketing efforts are still limited** to smaller local markets and don't target international ones

SWOT  
**T** Threats

- In the absence of a clear regulation or standard to certify the quality, there is a **lack of differentiation** between artisanal salt and industrial salt
- **Salt flats are declining**, losing their natural quality or even disappearing as a result of climate change effects
- **Low market prices** threaten the competitiveness of local and organic salt products
- **Business activities** in salinas struggle to become economically sustainable
- Business projects are **lacking financial, administrative and policy support** from the public administration, which is key for implementing, sustaining the projects and making them more profitable

## Key policy recommendations for Italy

**DEFINE A LEGAL FRAMEWORK** of certification for artisanal salt to boost recognition as a high-value product

**IMPLEMENT ADAPTATION MEASURES** according to the National and Regional strategy for climate change adaptation

**DEVELOP NETWORKS** to transfer knowledge related to technology and management as well as to provide access to funding opportunities

**CREATE A SUSTAINABLE VALUE CHAIN** for saltpans through public subsidies

**SIMPLIFY ADMINISTRATIVE PROCESSES** and develop a specific regulatory framework for the artisanal sector

**SUPPORT INTERNATIONALISATION** of sector and international cooperation

**DEVELOP A SECTORAL PLAN** for artisanal salinas including salt production jobs in the National Catalogue of Professional Qualifications from the Ministry of Education

Source: Prepared by the authors



© Saline Ettore e Infersa

## Country-based plan | Spain

Table 3. Spanish SWOT main elements after the experts' analysis. Prepared by the authors.

 <b>Strengths</b>	 <b>Opportunities</b>
<ul style="list-style-type: none"> <li>● <b>High environmental value</b> in active artisanal salinas (biodiversity and ecosystems services)</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Potential of Nature-based Solutions to protect, sustainably manage,</b> and restore natural and modified ecosystems addressing societal challenges effectively</li> </ul>
<ul style="list-style-type: none"> <li>● <b>High potential for diversification</b> of products/services (macro &amp; microalgae, halophytes plants, healthy activities, tourism)</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Increased demand</b> for tailor-made tourism which benefits from the landscape and ecological value of the artisanal salinas, including nature &amp; outdoor experiences, and "salt tourism" (ecotourism)</li> </ul>
<ul style="list-style-type: none"> <li>● <b>Potential to create gourmet products</b> in which there is growing interest: fleur de sel, algae, etc</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Resurgence of the gourmet and natural market.</b> Gourmet salt market growth both in volume (3.6% per year) and in value (4.8% per year)</li> </ul>
<ul style="list-style-type: none"> <li>● <b>Existence of abundant resources and values</b> in the salinas that can be exploited economically: natural, tourist, heritage, historical, cultural and gastronomic</li> </ul>	<ul style="list-style-type: none"> <li>● <b>High demand</b> for natural, healthy, functional, artisanal, organic and local products.</li> </ul>
<ul style="list-style-type: none"> <li>● <b>Very specific and high-quality</b> products and services that can only be obtained or developed under certain conditions</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Blue Carbon market</b> as a possible source of future business</li> </ul>

<p>SWOT</p> <p><b>W</b> Weaknesses</p>	<p>SWOT</p> <p><b>T</b> Threats</p>
<ul style="list-style-type: none"> <li>● <b>Need for synergies</b> between salinas and associations to foster legitimacy, e.g. through the development of labels or designations of origin</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Lack of differentiation</b> between artisanal salt and industrial salt. There is no clear regulation or standard to certify artisanal salt as a product</li> </ul>
<ul style="list-style-type: none"> <li>● <b>Advanced age of salinas owners/workers</b> and difficulties for generational renewal</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Insufficient or deficient administration</b> and/or spatial planning regulations</li> </ul>
<ul style="list-style-type: none"> <li>● <b>Lack of coordination</b> in the corresponding administrations, slowness and bureaucracy. Complicated governance, lack of legal framework to protect artisanal management and old regulations</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Pressures due to urban developments or land use</b> changes in favour of tourism, intensive agricultural or aquaculture developments</li> </ul>
<ul style="list-style-type: none"> <li>● Artisanal salt products haven't been sufficiently <b>linked to other products and services</b> provided by salinas, such as aquaculture, gastronomy, tourism or environmental education</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Lack of public financial and policy support</b> for the implementation, maintenance and viability of business projects, need for economic and administrative incentives</li> </ul>
<ul style="list-style-type: none"> <li>● <b>Significant deficit of infrastructure</b> that would allow the development of tourism in the salinas: signage, tourist information points, accesses, basic services, etc.</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Scarcity of local commercial links</b></li> </ul>

## Key policy recommendations for Spain

**RECLASSIFY** artisanal salt production as agriculture, instead of mining, acknowledging its low environmental impact and enabling appropriate regulation

**SIMPLIFY ADMINISTRATIVE PROCESSES** and review the status of use concessions to promote active salinas

**PROFESSIONALISE THE SECTOR** by developing a specific training programme and a professional category for salt workers

**DEVELOP A SPECIFIC REGULATORY FRAMEWORK** for the artisanal sector and provide technical support, promoting public subsidies for salt workers & entrepreneurs

**GAIN INSTITUTIONAL SUPPORT** for nature conservation, natural resource management, governance and decision-making

**ESTABLISH A LOCAL NETWORK** among salt owners to develop a common label which supports their products and services to make them more competitive on a larger scale

**DISSEMINATE THE INHERENT NATURAL AND CULTURAL VALUES** of salinas through outreach, awareness-raising and educational campaigns (fair, public and private advertising, reaching target markets, etc)

Source: Prepared by the authors



Bahía de Cádiz salt pans. © MEET Network/Estamosgrabando

## Country-based plan | Tunisia

Table 4. Tunisian SWOT main elements after the experts' analysis. Prepared by the authors.

 <b>Strengths</b>	 <b>Opportunities</b>
<ul style="list-style-type: none"> <li>● <b>Salinas hold significant potential as recreational sites</b> and to carry out outdoor activities</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Increasing profit by placing artisanal salt as a product on international markets</b></li> </ul>
<ul style="list-style-type: none"> <li>● <b>Salinas offer many opportunities for product and service diversification</b> (from macro &amp; microalgae cultivation to tourism, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Bringing attention to the value of salinas by promoting national and international cooperation among businesses, research groups and other key actors</b></li> </ul>
<ul style="list-style-type: none"> <li>● <b>Quality of salt and food are highly suitable to create gourmet products</b> which are becoming increasingly popular, e.g. <i>fleur de sel</i>, algae, etc.</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Promoting the ecological value of artisanal salt</b> based on the positive perception of agro-environmental products</li> </ul>
<ul style="list-style-type: none"> <li>● <b>The abundant resources and values</b> offered by artisanal salinas can be utilised to create economic activities based on natural, gastronomic, historical, cultural, heritage and tourism-related assets</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Strengthening e-commerce presence</b> by extending marketing efforts to new commercial channels</li> </ul>
<ul style="list-style-type: none"> <li>● <b>High environmental value</b> of active artisanal salt mines provides precious ecosystem services and contributes to preserve endemic biodiversity</li> </ul>	<ul style="list-style-type: none"> <li>● Suitable sites to develop projects related to Nature-based Solutions <b>that protect, sustainably manage, and restore</b> ecosystems while effectively addressing societal challenges</li> </ul>
	<ul style="list-style-type: none"> <li>● <b>Improving the environmental protection</b> of salinas</li> </ul>

<p>SWOT</p> <p><b>W</b> Weaknesses</p>	<p>SWOT</p> <p><b>T</b> Threats</p>
<ul style="list-style-type: none"> <li>● <b>Undervalued product and low profitability</b></li> </ul>	<ul style="list-style-type: none"> <li>● <b>The online market is mainly being supplied by large distribution companies</b></li> </ul>
<ul style="list-style-type: none"> <li>● <b>Need for better coordination</b> between corresponding administrations, to speed up administrative procedures</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Lack of differentiation</b> between artisanal salt and industrial salt</li> </ul>
<ul style="list-style-type: none"> <li>● <b>Weak digital, technical and marketing skills</b></li> </ul>	<ul style="list-style-type: none"> <li>● <b>Market price pressure threatens competitiveness</b> of local and organic products</li> </ul>
<ul style="list-style-type: none"> <li>● <b>Important deficit of infrastructure</b> that would allow the development of tourism in salinas: signage, tourist information points, accesses, basic services, etc.</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Large distribution requires a high volume of production</b></li> </ul>
<ul style="list-style-type: none"> <li>● <b>Insufficient investment</b> in productive information and communication technologies</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Misguided belief among consumers that ecological, bio and natural products are synonyms</b></li> </ul>
<ul style="list-style-type: none"> <li>● <b>High economic and technical cost</b> of maintaining the structure of salt works</li> </ul>	

## Key policy recommendations for Tunisia

By strengthening their online presence, artisanal salt producers can **INCREASE THEIR VISIBILITY** and position artisanal salt products in a wider international market

**IMPROVE TRANSPORT SERVICES** (storage, roads, ports, etc.) and export logistics

**UPDATING THE LEGISLATION** in force is essential to protect SMEs - not only to secure adequate funding, but also to promote fair market competition

**EXPLORE SYNERGIES** and clustering opportunities between Tunisian and international salinas for better exchange of technical knowledge, aiming to improve products and services

**INTEGRATE NEW SUSTAINABLE ACTIVITIES**, such as ecotourism or harvesting of fish that naturally enter the basins, to increase interest in the development of artisanal salinas

**UPDATE THE LEGISLATION** ("Code Minier" for Tunisian salinas) so as to allow the production of other products beside salt

**PROMOTE GREATER PUBLIC INVESTMENT** to develop artisanal salinas. This includes public aid for salt producers and scientific research on the quality of salt and to increase the selling price accordingly

Source: Prepared by the authors



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## General Recommendations for salina sustainability improvement

Promote and encourage the organisation of salt producers in **networks, cooperatives or associations** to foster collaboration, exchange of information and standardisation of processes and prices.

The creation of a network or coalition of salina owners can also help to **facilitate participation in legislative procedures and the defence of the sector's interests**

**Change regulations** at national and international level to give artisanal coastal salinas their own legal framework.

**Protect the natural habitat** of the salinas by including them in the catalogues of protected natural areas or other types of protection, preventing their abandonment and promoting biodiversity conservation plans.

Provide adequate **technical and financial support** to salt producers to help diversify their products and revive and ensure the sustainability of traditional salt farms, in order to maintain the ecosystem services and benefits to local economies provided by salina ecosystems, as well as their associated culture.

Internationalise and modernise the sector by providing salt producers with access to and **training** in technology, marketing and sales techniques.

Create a **professional category** for salt workers and apprentices.

Create **thematic clusters or networks** that include both salt producers and key business sectors, such as HoReCa (Hotels, Restaurants and Cafés) in the territory where the saltworks are located, in order to promote the role of salinas as drivers of local economies.



MedArtSal partners in Cádiz (Spain). © IUCN

## 4. Proposed actions to increase the sustainability of the salinas

Proposed actions to address the main **threats** and **weaknesses** affecting the participating salinas, identified from the SWOT analysis, for the different components of the MedArtSal Model, in the 4 project countries: Lebanon, Italy, Spain and Tunisia.

The proposed actions or recommendations are defined per Key Stakeholders/User Community:

- Regional / EU policy-makers
- Policy-makers (at local level)
- National authorities
- Technology engineering (Public/private research centres and universities)
- Salinas owners

And based on the MedArtSal sustainability components: Governance, Environment, Socio-economic, Diversification

## Lebanon

Table A-1. Proposed actions to address the main **threats** affecting Lebanese salinas, identified from the SWOT analysis, for the different components of the MedArtSal Model.

Threats	Key Stakeholders/User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
Difficult maintenance of the structures of salinas	Regional / EU policy-makers				
	Policy-makers (at local level)	Facilitate the work of saltworkers during maintenance season			
	National authorities	Legalize the status of the salinas through updated regulation			Grand permission for salinas owners to carry out diverse activity such as eco-tourism
	Technology engineering				
	Salinas owners	<p>Create a coalition of salinas owners to facilitate participation in law-making consultative procedures to legalise the status of salinas and request support for maintenance</p> <p>Work with decision makers to legalize the status of salinas and</p>			

Threats	Key Stakeholders/User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
		request support for maintenance			
Old regulations (Insufficient or deficient sector regulations)	Regional / EU policy-makers				
	Policy-makers (at local level)				
	National authorities	New regulations for salt production. Create a model of certification for artisanal salt	Include the salinas in the Management of the PA that will be created in the region of the salinas		
	Technology engineering				
Market price pressure threatens the competitiveness of local and organic products	Salinas owners	Lobbying to have new regulation for Salt Production	Campaigning to include the salinas in the National natural heritage		
	Regional / EU policy-makers				
	Policy-makers (at local level)				
	National authorities	New policies to limit the imported salt			
	Technology engineering			optimize the production while respecting the traditional know-how	

Threats	Key Stakeholders/User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
	Salinas owners	Lobbying toward the Ministries in order to reduce the import of Salt			Development of new products (salt with spices...)
Lack of a legal framework to protect and promote the artisanal management of salt pans	Regional / EU policy-makers				
	Policy-makers (at local level)	Develop a legal framework for protecting artisanal salinas (special regulation)	include the salinas in the Management of the PA that will be created in the region of the salinas		
	National authorities	Have some municipal decree that leads to the protection of salt pans			
	Technology engineering				
	Salinas owners				
Legal Status of Salinas	Regional / EU policy-makers	Lobbying towards Ministries regarding the importance to sustain the artisanal salinas			
	Policy-makers (at local level)	Legalize the status of the salinas through updated regulation			
	National authorities	Create a model of certification for artisanal salt			
	Technology engineering				

Threats	Key Stakeholders/User Community implementation for	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
	Salinas owners				Develop local tourism and activities related to salt production
Lack of coordination in the corresponding administrations, slowness and bureaucracy	Regional / EU policy-makers	Encourage regional or EU-level policy reforms that emphasize efficient coordination and decision-making processes to counteract bureaucracy			
	Policy-makers (at local level)	Encourage the development and utilization of centralized platforms to facilitate quick and efficient information sharing among various stakeholders, promoting collaboration and synchronization  Tailor regional or national policies to suit local contexts, ensuring they address specific bureaucratic challenges faced at the local level.  Invest in capacity-building programs to enhance the administrative capabilities of local			

Threats	Key Stakeholders/User Community implementation for	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
		stakeholders, ensuring they can effectively navigate bureaucratic processes.			
	National authorities	Review and streamline bureaucratic processes within the national framework, making them more accessible and efficient for stakeholders involved in the MedArtSal project.			
	Technology engineering				
	Salinas owners	Foster partnerships with regional and national authorities, encouraging a collective effort to overcome bureaucratic hurdles			

Table A-2. Proposed actions to address the main **weaknesses** of Lebanese salinas, identified from the SWOT analysis, for the different components of the MedArtSal Model.

Weaknesses	Key Stakeholders/User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
Fragmented and abandoned property for many years	Policy-makers (at local level)				
	National authorities	Facilitate the process of obtaining permission for the maintenance and reactivation of salinas			
	Technology engineering				
	Salinas owners	Create a structure to unify the salt producers (cooperatives...)	Gradually revive the abandoned salinas		
Undervalued product and low profitability	Policy-makers (at local level)				
	National authorities	Anfeh is the only village producing artisanal Salt in Lebanon, the Municipality can link this issue to all the Municipality plans and events to highlight the value of artisanal Salt			
	Technology engineering		Producing studies that provide evidence on the environmental		

Weaknesses	Key Stakeholders/User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
			value of saltponds		
	Salinas owners				Diversify activities to raise awareness on the importance of salinas, their preservation and the quality of their products
Lack of synergies between salinas and associations to create, for example, designations of origin, labels, etc	Policy-makers (at local level)				
	National authorities				
	Technology engineering				
	Salinas owners	Establish a legal body such as a cooperative or association to advocate for the interests of the sector and enhance communications with other associations and ministries			
Lack of promotion both onsite and online. Little knowledge of market segmentation	Policy-makers (at local level)	Facilitate the process of exporting artisanal salt			
	National authorities			Organise an international event to promote local salinas	

Weaknesses	Key Stakeholders/User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
	Technology engineering				
	Salinas owners	Registration of their salinas in the corresponding list of the Ministry of Economy and Industry in order to be able to export		Create market linkages with international partners	Promote artisanal salt as part of the diversified activities of salinas such as eco-tourism, educational-tourism etc.
Important deficit of infrastructures that allow the development of tourism in the salinas: signage, tourist information points, accesses, basic services, etc.	Policy-makers (at local level)				
	National authorities	Create a national/regional branding "appellation d'origine"; improve the access to the salinas; provide information on the tourist services offered by the salinas at the tourist information points			
	Technology engineering				
	Salinas owners	Create a national/regional branding "appellation d'origine"; develop a signage system			Promote networking with travel agencies and tour operators to disseminate information about the salinas. Commercialise visits to salinas

Weaknesses	Key Stakeholders/User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
Direct financial public aid and via credit are required, advice for corporate actions and brand creation, institutional promotion and local direct sales actions in the municipalities.	Policy-makers (at local level)	Facilitate the credit and ensure financial aid for salt ponds owner in order to revive new salinas and develop the existing ones			
	National authorities	Promote initiatives by the Municipality to present the artisanal saltpans and the salt produced			
	Technology engineering				
	Salinas owners			Develop commercial brands	
Initial support would be necessary for the implementation and viability of business projects, both economic and administrative facilities.	Policy-makers (at local level)	Create a Program of Support for salinas owners			
	National authorities				
	Technology engineering				
	Salinas owners				

## Italy

Table B-1. Proposed actions to address the main **threats** affecting Italian salinas, identified from the SWOT analysis, for the different components of the MedArtSal Model.

Threats	Key Stakeholders/User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
Lack of differentiation between artisanal salt and industrial salt. /There is no clear regulation of the organic salt standard (product)	Regional / EU policy-makers	To boost recognizing of artisanal salt as an organic and artisanal product through strengthening alliances with other countries.	Advocate for salinas to be recognised as natural and cultural habitats.		
	National authorities	To develop guideline for setting criteria on a definition of artisanal salt versus extensive salt production.	Advocate the organic salt has an environmentally friendly (compared to the industrial one)	Incorporate salinas and their products in the promotional campaigns of national products	
	Policy-makers (at local level)	To create advisory group of stakeholders to work on this differentiation (At regions level). Advocate for salt to be recognised as an artisanal product.	Advocate the organic salt has an environmentally friendly (compared to the industrial one)	Incorporate salinas and their products in the promotional campaigns of artisanal products (local, regional, national ...levels)	
	Technology engineering				
	Salinas owners	Create and participate in local groups and advocacy.		Add their products to the national and regional promotional campaigns	
Denaturalisation (and disappearance) as a consequence	Regional / EU policy-makers	Define action plans and funding schemes devoted to implement actions for climate	Advocate salinas to be recognized as natural and cultural habitats to be protected.		

Threats	Key Stakeholders/User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
of climate change effects		change mitigation and adaptation.			
	Regional authorities	Define action plans & funding schemes devoted to implement actions for climate change mitigation and adaptation.	Advocate salinas to be recognized as natural and cultural habitats to be protected.		
	National authorities	Define action plans and funding schemes devoted to implement actions for climate change mitigation and adaptation.			
	Technology engineering		Networking and sharing experience on engineering solution to increase the capability of the salina to act against climate change effects.	Networking and sharing experience on engineering solution to increase the capability of the salina to act against climate change effects.	
	Salinas owners	Create and participate to groups and network for knowledge transfer and access to funding opportunities to foster the importance of artisanal salinas in contrasting climate change effects	Create and participate to groups and network for knowledge transfer and access to funding opportunities to foster the importance of artisanal salinas in contrasting climate change effects		

Threats	Key Stakeholders/User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
Market price pressure threatens the competitiveness of local and organic products	Regional / EU policy-makers	To boost recognizing of artisanal salt as an organic and artisanal product through strengthening alliances with other countries			
	Policy-makers (at local and regional level)	To develop guideline for setting criteria on a definition of artisanal salt versus extensive salt production.		Incorporate salinas and their products in the promotional campaigns of national products	
	National authorities	Provincial advisory group of stakeholders to work on this differentiation (At regions level).  Advocate to be recognised salt as artisanal product.	Advocate the organic salt has an environment-tally friendly (compared to the industrial one)	Incorporate salinas and their products in promotional campaigns of artisanal products (local, regional, national ...levels)	
	Technology engineering				
	Salinas owners	Create and participate in local groups and advocacy.		Add their products to the national and regional promotional campaigns	To invest in potentiate or create new products and services.
It is difficult to make projects in artisanal salinas economically sustainable	Regional / EU policy-makers	To create dedicated funding schemes devoted to actions to support economic sustainability of salinas.			
	Policy-makers (at local and regional level)	To create dedicated funding schemes devoted to actions to support economic sustainability of salinas.		To support creation of associations or clusters	

Threats	Key Stakeholders/User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
	National authorities	To create dedicated funding schemes devoted to actions to support economic sustainability of salinas.			
	Technology engineering	Networking and sharing experience on sustainable solutions in term of technology, creation of new revenues, production technologies, other management solutions.			Networking and sharing experience on sustainable solutions in term of technology, creation of new revenues, production technologies, other management solutions.
	Salinas owners	Create and participate to groups and network for knowledge transfer and access to funding opportunities.	Foster salinas environmental character, implement programme for sustainable eco-friendly tourism.	Develop crowdfunding actions as well as visibility actions	To invest in potentiate or create new products and services.
Lack of public financial and policy support for the implementation, maintenance and viability of business projects, both economic and administrative facilities.	Regional / EU policy-makers	Salinas recognition as a habitat in EU Habitat directive.  Promote salinas as a World Intangible Cultural Heritage by UNESCO.			
	Policy-makers (at local level)	Offer a professional training for salt workers to improve capacities and anticipate and match future skills (new technologies, efficiency energy, etc		Promotional campaign for public to increase awareness of salinas products value.	Provide financial support for innovative products and activities (microalgae, macroalgae cosmetics, eco-tourism...)

Threats	Key Stakeholders/User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
		Simplification in authorisation and bureaucracy for smaller and artisanal salt plants			
	National authorities	<p>Professionalization of salt production sector. Develop a new professional/vocational qualification to be included in the National Catalogue of Professional Qualifications from the Ministry of Education.</p> <p>Public financial programme/plan for salt workers and entrepreneurs (subsidies, etc)</p>			
	Technology engineering			<p>Promote transference from research to technological private sector for innovative solutions in salt production and promotion.</p> <p>Create a scientific cluster for sector innovation</p>	

Threats	Key Stakeholders/User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
	Salinas owners	<p>Create a coalition of salinas owners to request grants for maintenance, new products development and professional trainings</p> <p>Explore cooperative entrepreneurship to reduce costs and develop joint sales and marketing strategies</p>		Facility the access to general public (opening hours, visits, etc..)	

Table B-2. Proposed actions to address the main **weaknesses** of Italian salinas, identified from the SWOT analysis, for the different components of the MedArtSal Model.

Weaknesses	Key Stakeholders/Us er Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
High economic and technical cost of maintenance of salinas structures	Policy-makers (at local level)	Public subsidies for salt workers and entrepreneurs	Include salina natural area in the local General Urban Plan (i.e. scope of the salt pans)		Supporting the retraining of the facilities in the salinas as cultural heritage
	National authorities	Public subsidies for salt workers and entrepreneurs			
	Technology engineering	Networking and sharing experience on sustainable solutions in term of technology, creation of new revenues, production technologies, other management solutions.			Co-design of new projects and solutions
	Salinas owners	Adopting a 3-year business strategy			Including diversification in the business strategy
Non-compliance with the legal obligations	Policy-makers (at local level)	Supporting the compliance process	Include salina natural area in the local General Urban Plan		
	National authorities	Creating a clear and simplified framework for artisanal salt producers	Definition of the environmental framework for salt pans area including a private-public cooperation.		
	Technology engineering				

Weaknesses	Key Stakeholders/Us er Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
	Salinas owners	Creating a plan for reduce the legal existing gaps			
There is not a regulatory council for quality approval for fleur de sel and virgin salt.	Policy-makers (at local level)				
	National authorities	Definition of regulatory framework			
	Technology engineering (Public/private research centres and universities)			Supporting the technical requirements for the new framework	
	Business actors				Supporting the market
	Salinas owners	Providing a sustainable management plan proportionate to the production unit		Creating a national association for the quality valorisation of artisanal salt productions	
Undervalued product and low profitability	Policy-makers (at local level)	Provide technical and financial support for diversification and innovative actions from local clusters		Incorporate salinas and their products in the promotional campaigns of artisanal products)	
	National authorities			Incorporate salinas and their products in the promotional campaigns of national products	
	Technology engineering	Networking and sharing experience on sustainable solutions in term of technology, creation of new revenues, production technologies, other		Networking and sharing experience on sustainable solutions in term of technology, creation of new revenues, production	Networking and sharing experience on sustainable solutions in term of technology, creation of new revenues,

Weaknesses	Key Stakeholders/Us er Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
		management solutions.		technologies, other management solutions.	production technologies, other management solutions.
	Salinas owners	Create and participate to groups and network for knowledge transfer and access to funding opportunities.  Explore cooperative entrepreneurship to reduce costs and develop joint sales and marketing strategies	To potentiate the environmental character of the salina and implement programme for sustainable eco-friendly tourism.	Add their products to the national and regional promotional campaigns	Invest in potentiate or create new products and services.
Marketing in very local markets, lack of internationalization.	Policy-makers (at local level)	Support local initiatives with an international attractiveness  Support cluster creation for internationalisation			
	National authorities			Incorporate salinas and their products in the promotional campaigns of national products	
	Technology engineering				
	Business actors	Participating in cluster actions		Participate to international initiatives	Supporting new ideas and projects as well as the

Weaknesses	Key Stakeholders/Us er Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
					international market
	Salinas owners	Explore cooperative entrepreneurship to develop joint sales and marketing strategies, even internationalization		Participate to international initiatives	Creating new value chains with other sectors (tourism, gastronomic, wellness)

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## Spain

Table C-1. Proposed actions to address the main **threats** affecting Spanish salinas, identified from the SWOT analysis, for the different components of the MedArtSal Model.

Threats	Key Stakeholders/USER Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
Lack of differentiation between artisanal salt and industrial salt	Regional / EU policy-makers	<p>To boost recognizing of artisanal salt as an organic and artisanal product through strengthening alliances with other countries.</p> <p>Advocate for the recognition of salinas as natural and cultural habitats.</p>			
	National authorities	<p>To develop guideline for setting criteria on a definition of artisanal salt versus extensive salt production.</p> <p>Explore whether the “Consejo Regulador de Productos Ecológicos” (Regulatory Board for Organic Products) can certify artisanal salt</p>		Incorporate salinas and their products in the promotional campaigns of national products	
	Policy-makers (at local level)	<p>Provincial advisory group of stakeholders to work on this differentiation (at the level of ‘disputations’ - provincial councils-). Advocate for the salt to be recognised as an artisanal product.</p>		Incorporate salinas and their products in the promotional campaigns of artisanal products	

Threats	Key Stakeholders/USER Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
	Technology engineering				
	Salinas owners	Create and participate in local groups and advocacy		Add their products to the national and regional promotional campaigns	
Insufficient or deficient administration and/or spatial planning regulations	Regional / EU policy-makers				
	Regional authorities	Increase control of real activities in concessions  Update the database with real active salinas Land use planning and regulation (eg.: <i>Plan de Ordenación del Territorio de Andalucía</i> , (POTA) - the Andalusian Spatial Planning Plan-)  Single and simplified administrative process (one-stop administrative window)			
	National authorities				
	Technology engineering				
	Salinas owners				
Pressures due to urban	Regional / EU policy-makers				

Threats	Key Stakeholders/ User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
developments or land use changes in favour of intensive agro/aquacultural developments	Policy-makers (at local and regional level)	Mainstreaming biodiversity and climate change into spatial planning. To favour environmentally sustainable activities	Identify key areas for environmental protection and restoration.  Include salinas as a key element of green/blue infrastructure.  Develop natural capital accountability for salinas.  Promote ecological coastal corridors	Support dialogues for disseminating lessons and best practices on integrated planning.	Promote activities diversification in salinas to increase sustainability
	National authorities				Promote activities diversification in salinas to increase sustainability
	Technology engineering				
	Salinas owners		Develop natural capital accountability for salinas		Diversify products and activities to increase profitability
Lack of public financial and policy support for the implementation, maintenance and viability of	Regional / EU policy-makers	Salinas recognition as a habitat in EU Habitat directive.  Promote Salinas as a World Intangible Cultural Heritage by UNESCO.			

Threats	Key Stakeholders/USER Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
business projects, both economic and administrative facilities.	Policy-makers (at local and regional level)	Offer a professional training for salt workers to improve capacities and anticipate and match future skills (new technologies, efficiency energy, etc)		Promotional campaign for general public to increase awareness of Salinas products value.	Provide financial support for innovative products and activities (microalgae, macroalgae cosmetics, eco-tourism...)
	National authorities	1. Professionalization of salt production sector. Develop a new professional/vocational qualification to be included in the National Catalogue of Professional Qualifications from the Ministry of Education. 2. Public financial programme/plan for salt workers and entrepreneurs (subsidies, etc)			
	Technology engineering			Promote transference from research to technological private sector for innovative solutions in salt production and promotion.  Create a scientific cluster for sector innovation	

Threats	Key Stakeholders/ User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
Scarcity of local commercial links	Salinas owners	<p>Create a coalition of salinas owners to request grants for maintenance, new products development and professional trainings</p> <p>Explore cooperative entrepreneurship to reduce costs and develop joint sales and marketing strategies</p>		Facility the access to general public (opening hours, visits, etc.)	
	Regional / EU policy-makers				
	Policy-makers (at local level)	Guidelines to strengthen links between primary artisanal salt producers and other food industry sectors (increase understanding of different parts of the supply chain)		Information campaign to general public to increase local artisanal salt demand	
	National authorities			Information campaign to general public to increase local artisanal salt demand	
	Technology engineering				
	Salinas owners	Promote local cluster to enhance the visibility of salinas products, develop eco-tourism activities, organise fair trade market.			Support development e-commerce platform for artisanal products

Table C-2. Proposed actions to address the main **weaknesses** of Spanish salinas, identified from the SWOT analysis, for the different components of the MedArtSal Model.

Weaknesses	Key Stakeholders/User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
Age of Salinas owners/ workers and difficulties for generational renewal	Policy-makers (at local level)			Incentives for young/women job position for salt makers	
	National authorities	Acknowledge the metier of salt makers: new niche of young employment		Campaign for the valorisation of a traditional profession (IES, universities) and modernise the sector.	
	Technology engineering	Participate in a working group to develop innovative approaches/ technologies			
	Salinas owners	Creation a working group (with salina owners, <i>Grupos de Desarrollo Rural</i> - Rural Development Groups-, universities, education authorities) to define a roadmap for the development of a curricular educational plan for training as salt maker			
Lack of coordination in the corresponding administrations , slowness and bureaucracy. Complicated	Policy-makers (at local level)	Single and simplified administrative process (one-stop administrative window)  Recognise local concession holders as			

governance, old regulations		potential beneficiary for grants			
	National authorities	Facilitate the transfer of the Administrative competences from the mine legislation to agriculture regulation.  Recognize local concession holders as potential beneficiary for grants			
	Technology engineering				
	Salinas owners	Advocate for salt-producing to be considered under the agricultural regulation			
Lack of synergies between salinas and associations to create, for example, designations of origin, labels, etc.	Policy-makers (at local level)	Provide technical and financial support for local salinas association and label creation			
	National authorities				
	Technology engineering				
	Salinas owners	Boost local associationism among salina owners			
The artisanal salt product is not complemented with other typical products of	Policy-makers (at local level)	Provide technical and financial support for diversification and innovative actions from local clusters			
	National authorities	Promote financial support specifically for salinas innovation			

salinas, such as aquaculture, gastronomy, environmental education, etc. or have difficult conditions for tourism	Technology engineering			Promote knowledge transfer from academy to salt owners. Know-how on innovative products: micro & macro algae	
	Salinas owners	Create a cluster to unify products labels (Eg: ecotourism package)	Create partnership with environmental organisations to develop joint projects for sustainability (biodiversity/blue carbon/circular economy)		Create partnership with Universities, NGOS and regional administrations to prepare joint proposals for funding
Low capability to generate marketing strategies optimized for the market.	Policy-makers (at local level)	Promote financial support specifically for salinas innovation including marketing  Digital and marketing training			
	National authorities	Promote financial support specifically for salinas innovation including marketing			
	Technology engineering				
	Salinas owners	Participate in training courses (e.g.: natural capital/ecommerce, marketing, etc.)  Develop joint strategies marketing (ecommerce, etc)			

## Tunisia

Table D-1. Proposed actions to address the main **threats** affecting Tunisian salinas, identified from the SWOT analysis, for the different components of the MedArtSal Model.

Threats	Key Stakeholders/User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
The online market is concentrating on large distribution companies	Regional / EU policy-makers				
	Policy-makers (at local level)				
	National authorities				
	Technology engineering				
	Salinas owners			More visibility and support for a better positioning of artisanal salt mines and their products  The use by artisanal salt works of online marketing to reach new markets	Product diversification to better access the international market and to better exploit the local and sectoral market
Necessary differentiation between artisanal salt and industrial salt.	Regional / EU policy-makers	Updating legislation in force to protect SMEs			
	Policy-makers (at local level)	Updating legislation in force to protect SMEs			
	National authorities				
	Technology engineering				

Threats	Key Stakeholders/User Community implementation for	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
	Salinas owners			Better promote the artisanal product and make it known to customers	
Market price pressure threatens the competitiveness of local and organic products	Regional / EU policy-makers				
	Policy-makers (at local level)				
	National authorities	Invest in the sustainable development of artisanal salinas			
	Technology engineering				
	Salinas owners				
Large distribution requires a high volume of production	Regional / EU policy-makers				
	Policy-makers (at local level)				
	National authorities				
	Technology engineering				
	Salinas owners			Clustering and search for synergies between different artisanal salinas and between Tunisian and international salinas	
Consumer belief that ecological, bio, natural, etc. they're synonyms	Regional / EU policy-makers				
	Policy-makers (at local level)				

Threats	Key Stakeholders/User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
	National authorities				
	Technology engineering				
	Salinas owners				

Table D-2. Proposed actions to address the main **weaknesses** of Tunisian salinas, identified from the SWOT analysis, for the different components of the MedArtSal Model.

Weaknesses	Key Stakeholders/User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
Undervalued product and low profitability	Regional / EU policy-makers				
	Policy-makers (at local level)				
	National authorities				
	Technology engineering				
	Salinas owners	Invest in scientific research to improve the quality of salt and increase the selling price accordingly.			
Lack of coordination in the corresponding administrations, slowness and bureaucracy	Regional / EU policy-makers				
	Policy-makers (at local level)				
	National authorities	Unify the sector into a union structure			
	Technology engineering				
	Salinas owners				
Weak technical information	Regional / EU policy-makers				
	Policy-makers (at local level)				
	National authorities				
	Technology engineering				

Weaknesses	Key Stakeholders/User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
	Salinas owners			Strategic clustering and share of information and know-how among artisanal salinas  Promoting transmission of technical knowledge from the old to the new generations	Establishment of partnerships with experienced foreign producers useful to improve the existing products and services and start producing new ones.
Important deficit of infrastructures that allow the development of tourism in the Salinas: signage, tourist information points, accesses, basic services, etc.	Regional / EU policy-makers				
	Policy-makers (at local level)				
	National authorities				
	Technology engineering				
	Salinas owners	Urge regions to work to value artisanal salt pans			
Investment in productive information and communication technologies is low	Regional / EU policy-makers				
	Policy-makers (at local level)				
	National authorities				
	Technology engineering				
	Salinas owners				
High economic and technical cost of maintaining salt	Regional / EU policy-makers				
	Policy-makers (at local level)				

Weaknesses	Key Stakeholders/User Community for implementation	MedArtSal sustainability components			
		Governance	Environment	Socio-economic	Diversification
works structures	National authorities	Encourage SMEs through adequate funding with payment facilities and provide the necessary support			
	Technology engineering				
	Salinas owners				The integration of new sustainable activities such as ecotourism or the development of fish resources that naturally enter the basins could be an asset for artisanal salinas

## 5. MedArtSal tools for model application

### Diversification&Socio-economic&environmental tool| MedArtSal handbook

The MedArtSal Handbook of good practices has been developed for putting into practice the MedArtSal Sustainable Management Model for Mediterranean Artisanal Salinas.

This comprehensive handbook provides information, research and innovative tools on sustainable actions that fall under the MedArtSal Model -for the sustainable management of artisanal salinas and support good practices and efforts in the salt flats through diversification of services, commerce, biodiversity preservation, ecosystem services and tourism (Figure 2). There are four sections covering key topics including, environmental quality and biodiversity, the diversification of goods and services in salt flats, best practices for governance and a final section showcasing case studies of salinas projects funded under MedArtSal in Italy, Lebanon, Spain and Tunisia.

The solutions and recommendations presented in the handbook are aimed at all stakeholders associated with Mediterranean artisanal salinas, from salt flat workers and managers to local and regional level policy and decision makers, as well as local communities based in and around the salinas. These practical examples and good practices may not all be exportable, in whole or in part, to other saltworks in other countries or surrounding regions, as in some cases their applicability may depend on the existing context, natural, social or economic environment, or legislation.

The handbook is composed of 4 sections, and each session describes the selected best practices:

1. environment = 7 best practices (factsheet #1 – 7)
2. socio-economy = 15 best practices (factsheet #8 – 22)
3. governance = 1 best practice (factsheet #29)
4. case studies = 11 best practice (factsheet #30A – 33C)

The handbook is available at [www.medartsal.com](http://www.medartsal.com), under Tool session.

### Diversification&Socio-economic tool| Tourism book

The Tourism book or Travel Book has been realized by all the project partners from Italy, Spain, Tunisia and Lebanon.

A road map of thirteen storytellers introduces the MedArtSal experiences during the project, when the MedArtSal team visited many salt pans across the Mediterranean.

The main aim of this travel book is to show what MedArtSal team discovered, how much attractive are the salinas in Italy, Spain, Tunisia and Lebanon and how to experience the sustainable tourism in these gems of the Mediterranean area.

The tourism book is translated into 5 languages (**English, Italian, French, Spanish, Arabic**) and covers 4 countries by means the visits of:

1. Marsala, Italy
2. Cervia, Italy
3. Molentargius, Italy
4. Conti Vecchi, Italy
5. Anfeh, Lebanon
6. San Vicente, Spain
7. Chiclana, Spain
8. La Esperanza, Spain
9. Marambay, Spain
10. Marchamalo, Spain
11. Alemán, Spain
12. Kerkennah, Tunisia
13. Saida, Tunisia

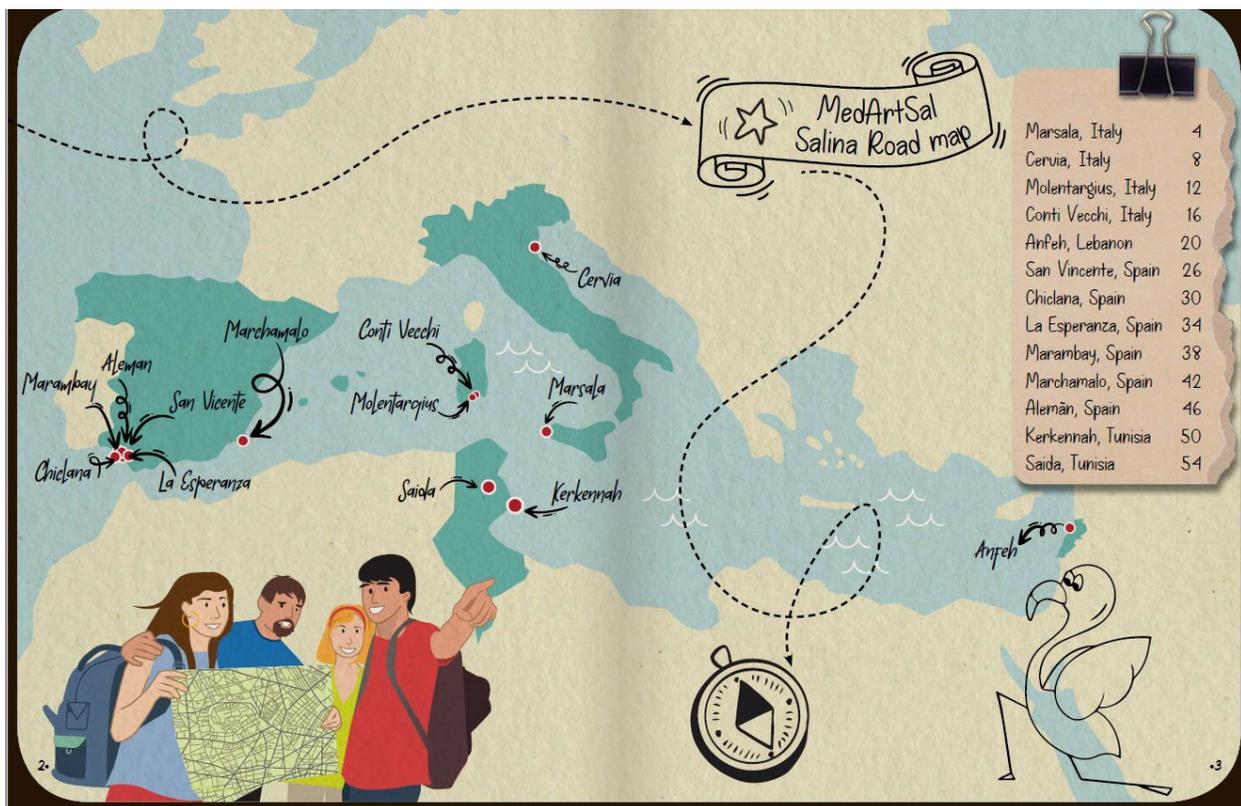


Figure 4.1 Map of the salinas in the travel book.

The Travel books are available at [www.medartsal.com](http://www.medartsal.com), under Tool session.

## Environmental tool | Database for biodiversity in Tunisia

For the coastal territories of Tunisia, in the salt pans area, CTICI partner has been in charge to create a database to collect information on the flora and fauna of the Tunisian salt pans. The focus was on three salt pans, in Thyna-Sfax, Kerkennah and Monastir, for which a new tailored and interactive database has been implemented with the data of fauna (98 species- mainly birds) and marine fauna and flora, mainly algae.

Frequencies of bird observations

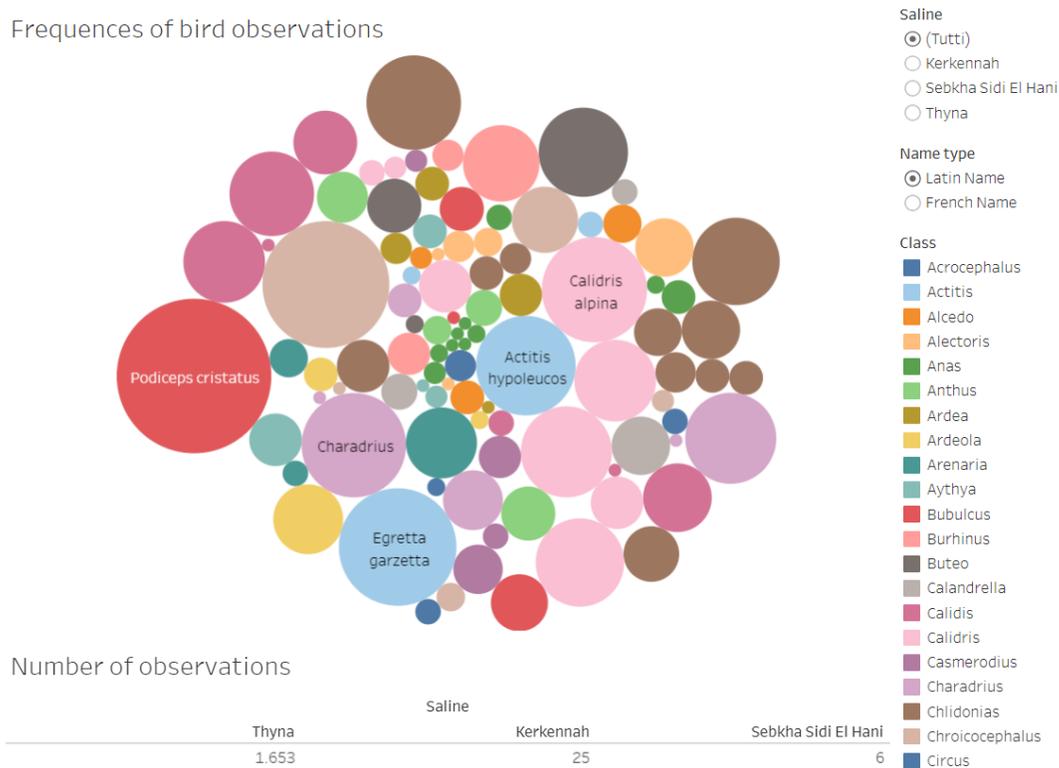


Figure 4.2 Number of observations and frequencies of bird observed.

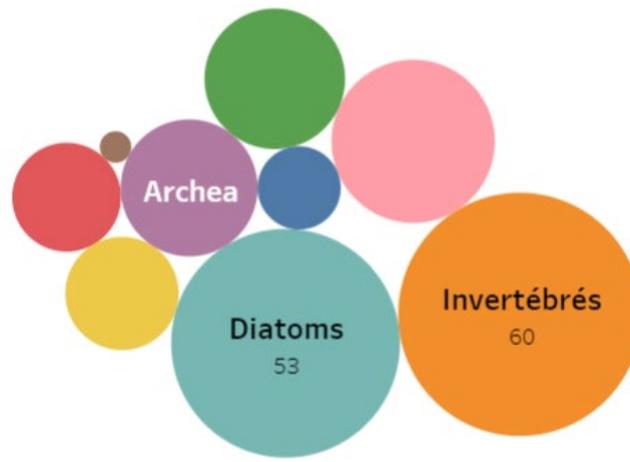


Figure 4.3 Number and type of fauna species recorded.

The two Databases for the biodiversity in Tunisian salinas are available at [www.medartsal.com](http://www.medartsal.com), under Network session, and from the following links:

Data for Birds

[https://public.tableau.com/views/SaltPansofTunisia-Biodiversity/Cover?:language=it-IT&publish=yes&:display\\_count=n&:origin=viz\\_share\\_link](https://public.tableau.com/views/SaltPansofTunisia-Biodiversity/Cover?:language=it-IT&publish=yes&:display_count=n&:origin=viz_share_link)

Data for other species

[https://public.tableau.com/views/SaltPansofTunisia/Cover?:language=it-IT&publish=yes&:display\\_count=n&:origin=viz\\_share\\_link](https://public.tableau.com/views/SaltPansofTunisia/Cover?:language=it-IT&publish=yes&:display_count=n&:origin=viz_share_link)

## Environmental tool| Protocols for management of a salina in the conservation of species

Salinas are increasingly used by aquatic birds as an alternative habitat, both by reproductive, wintering species or those that use the Salinas during their moments of rest on their migratory movements (Palomino y Molina, 2009; Dias et al., 2014). The water control by the salt worker provides areas with different levels of water depth and salinity, which gives it great importance as regards the survival of many birds, especially waders (Pérez-Hurtado et al., 1993; Pérez-Hurtado, 2004).

The time of greatest abundance of birds in the Salinas occurs in the winter months, in addition, in these months it is particularly when the salt activity decreases due to less solar radiation and the absence of dry winds that promote the evaporation necessary for accumulation of salt (Pérez-Hurtado, 2004). It is

therefore in these winter months where the water levels in the different areas of a saline could be managed to increase accessibility to the birds that use this habitat, thereby increasing their number of birds and their diversity (Broche, 2006; Holm y Clausen, 2006; Bolduc y Afton, 2009; Pérez Hurtado y Hortas, 2009).

According to the results obtained during La Esperanza case study (Cadiz, Spain, by University of Cadiz), it is recommended to maintain water levels of a maximum depth of 4 cm in the crystallizers during the winter months, a maximum of around 20 cm in the evaporators and a maximum depth of 40 cm in the estuaries and reservoirs, all with a gradually sloping banks to improve accessibility (Castro et al., 2014). Some authors recommend for similar habitats (artificial saline swampy ponds) the construction of additional ponds that alternately maintain the levels good for smaller birds (Bolduc and Afton, 2009). In the case of Salinas that already have this type of additional ponds, the technique of creating temporary drains that keep ponds with shallow water depth could be encouraged. If this rotation system is maintained year after year, it would increase the predictability of these habitats and therefore their use by birds.

Regarding to the management in the Salinas to favor the reproduction of water bird species, UCA results show that the contribution of calcareous material in the area is an important attraction for endangered species such as the Kentish plover and the Little tern. Larger species, such as Pied avocets, are favored by the management carried out in the clearing of vegetation and improve the settlement on the walls of the Salinas.

Finally, UCA researchers observed how more sophisticated structures, such as Y-shaped sticks, seems to be attractive during the first days of reproduction in different species.

As a result of the case study in Spain, UCA researchers delivered some management recommendations that could favour Salinas biodiversity.

Management action	Structure/area	Beneficiaries	Season
Maintaining water depth at 40 cm maximum	Storage ponds	Birds with legs between 10 – 37 cm long	Winter (feeding)
Maintaining water depth at 20 cm max.	Evaporators	Birds with legs of 0 – 15 cm long	
Maintaining water depth at up to 4 cm	Crystallizers	Birds with legs less than 4 cm long	
Adding calcareous substrate	Walls and plains	Little tern and Kentish plover	Before breeding period
Clearing of vegetation	Walls	Pied avocet (prior study of possible predators needed)	

## Business tool| Protocols for *Dunaliella salina* exploitation: a business diversification opportunity for the artisanal Salinas

Artisanal Salinas in Mediterranean area are facing economical sustainability issues, and product diversification (algae exploitation, tourism activities development, etc.) can represent a solution. Indeed, in-land Salinas are typical of North African Countries. They are normally located far from the sea and their salt collection; water management and ecosystems are different from the most known marine Salinas.

In this context, the specific goal of the Case Study performed at SAIDA (Tunisia) was to demonstrate the possibility to produce and commercially exploit the microalgae *Dunaliella salina* in active, in-Land Salinas. *Dunaliella salina* was selected as it grows naturally in saltworks. The economic interest of this microalgae is mainly linked to its ability to develop high levels of carotenoids in extreme conditions (high irradiation, high salinity, and nutritional stress), converting from its green to its red form.

The main *D. salina* manufacturers worldwide commercialize the dried powder of the red microalgae and the natural  $\beta$ -carotene obtained from it by solvent or critical CO<sub>2</sub> extraction.

The business model developed by SAIDA during the case study in Tunisia, is based on large scale production and may be replicable by Salinas wishing to fully convert their business from salt to microalgae production. For artisanal Salinas aiming to integrate salt production with microalgae exploitation, a different, lower cost exploitation model has been defined through the Pilot Action at SAIDA, which excludes the commercialization of the pure  $\beta$ -carotene and focuses on the commercialization of the wet *D. salina* paste and its oil extracts, as well as on the production of simple cosmetic/food products derived by them.

The Case Study succeeded in demonstrating that *D. salina* exploitation is a potential way for artisanal saltworks to diversify their business, and it is feasible in active, In-land Salinas.

- The exploitation can be based on the two steps microalga production in outdoor raceway or on direct collection from salt ponds during natural blooming. The Pilot plant set up during the project (2 raceway basins of 4 m<sup>3</sup> + 4 small basins of 550 l + harvesting equipment) produced up to 3 kg of the red microalgae paste / m<sup>3</sup> of harvested volume after 10-20 days of growth and 15-20 days of carotenogenesis.
- The Primary target products identified and developed during the Case Study were the red *D. salina* paste and its Oil extracts. A Pilot scale extractor was developed and built to treat up to 3 kg of *D. salina* paste in less than 2 hours to produce up to 1.9 liters of enriched oil.
- Secondary products' prototypes were developed. Those include edible oils, red "fleur de sel"; soap; massage and sun-protection oils; anti-ageing cream and salt scrubs. They all showed relevant antioxidant benefits.



Figure 4.4 SAIDA pilot plants and new cosmetic prototypes.

## 6. MedArtSal tools for collaborative approach

### Business tool| MedArtSal.com

MedArtSal platform “Medartsal.com” aims to represent an innovative solution for data sharing and business and can provide innovative sustainable actions for salinas, providing a sound operational support and specific guidance on the best development strategy compared to the features and needs of the area. The platform is made up of the combination of good practices, commerce, biodiversity data and networking, as well as other services line e-learning session ([MEDARTSALE \(medartsale-learning.com.lb\)](https://medartsale-learning.com.lb)) and blog.

The platform provides information on the salt and other products of the salina, the tourism and cultural activities in the salina and the events and food experiences.

The registration in the platform as well as in the MedArtSal network can contribute to increase the salina visibility at national and international level, improving the market of salt and other products like cosmetics products, foods and touristic products.

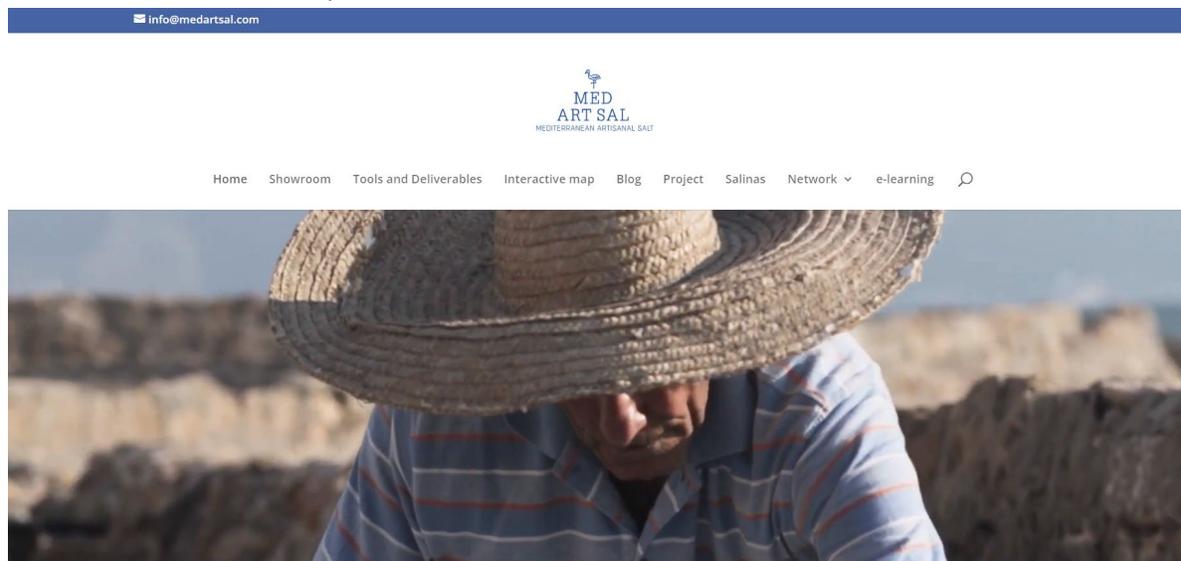


Figure 5.1 – Medartsal.com home page

### Governance tool| MedArtSal clusters

In the framework of the marketing activities envisaged by the MedArtSal project, it has been possible to learn more about the production and marketing activities of Mediterranean Artisanal Salinas in the four involved countries (Italy, Spain, Lebanon and Tunisia) and to deepen new possible strategies for their improvement. The Mediterranean artisanal salt production belongs to a constantly evolving market niche, whose growth prospects could be favored by less pressure within the channels of distribution compared to what happens for industrial salt. Thus, with the aim to contribute to the promotion and marketing of artisanal salt by combining traditional and digital strategies, the project envisaged the development in

each partner country of **Clusters of Small and Medium Enterprises** for the promotion of tourism sustainable and territorial marketing strategies, in line with the specific needs of each involved territory. As Governance tool, the MedArtSal project contributed to the creation of **2 local SME clusters and 2 operative partnerships**, as follows:

1. Tunisia: the project DESK, as pilot action, contributed to definition of a partnership between the company Sodimer and the 2 association AGC and ASCOB for the development of new governance of the salinas introducing new safety policy for workers and new activities for citizen;
2. Lebanon: the pilot actions in Anfeh contributed to the development of new partnership of salt producers for the development of tourism activities, supported by new branding;
3. Spain: the tourism was the driver for the constitution of new SME Cluster in Cadiz area;
4. Italy: A interregional SME cluster born for the valorisation and the sustainability of the Italian salt as natural heritage.

The report “A 5.3.2 SMEs cluster, supported by Visual identity test” is available at [www.medartsal.com](http://www.medartsal.com), under Tool session.

### Diversification&Socio-economic&environmental tool| MedArtSal videos

A YouTube channel has been opened in order to share for free all the videos broadcasted by MedArtSal, both for promotional purposes and technical ones.

#### [MedArtSal - YouTube](#)

In total, 32 videos have been uploaded to the Youtube channel of the project, including 3 external videos from programmatic partners. The videos targeted salina owners, decision markers, business owners and also proved to be valuable for the actual project partners.

This list explains 6 different categories of videos produced and uploaded to the channel.

*Videos to promote the MedArtSal project*

- Promotional video of the MedArtsal project (MedSea)
- Promotional video about the MedArtSal project actions and sites in Tunisia (CTICI)
- Promotional video of the ecotourism itinerary developed in Bahía de Cádiz NP (IUCN-Med)
- Promotional video prepared in the context of the Day of the Mediterranean 2022, as part of joint action led by ENI CBC Med programme (IUCN-Med, CUEIM)

*Solutions for the management of salinas (pilot actions)*

- Explanation of pilot action by President of ANSE, Salinas de Marchamalo, Murcia in Spain (IUCN-Med)
- Explanation of pilot action by the team of CPV Bahía de Cádiz, Salina Preciosa y Roqueta, Cádiz, Spain (IUCN-Med)
- Explanation of pilot action by team at Salina San Vicente, Cádiz, Spain (IUCN-Med)
- Explanation of pilot action by the team of ALEMA in Salinas de Chiclana, Cádiz in Spain (IUCN-Med)
- Results of pilot actions in the Kerkennah Islands, managed by SODIMER, prepared (MedSea)
- Production of microalgae (arabic), Tunisia (Saida)
- Production of microalgae (English), Tunisia (Saida)
- Birdwatching in artisanal salt pans (UCA)
- Video testimonial (Shorts) from subgrantee in Anfeh, Lebanon (FTL)
- Video testimonial (Shorts) from subgrantee in Sleiman Salinas, Lebanon (FTL)
- Video testimonial (Shorts) from subgrantee in Malek Salinas, Lebanon (FTL)
- First production of salt in the Salinas de Marchamalo, in Murcia, Spain (ANSE)

*Video tutorials*

- Growing microalgae in salinas (UCA)
- Growing macroalgae in salinas (UCA)
- Improving biodiversity in salinas (UCA)
- Applications of macroalgae in salinas (UCA)
- Use of artisanal salt products for cosmetic purposes (Saida)
- Cooking with artisanal salt products (UCA)

<i>Interviews</i>	<i>Events</i>	<i>External videos</i>
<ul style="list-style-type: none"> <li>• Interview with the Director of the Tunisel Salinas in Tunisia (CTICI)</li> <li>• Interview with President of ACG in the Kerkennah Islands, Tunisia by CTICI</li> <li>• Experience of algae cultivation (in English and Italian) by CUEIM</li> <li>• Interview with Caterina Praticò from Interreg Med Blue Growth Community by CUEIM</li> </ul>	<ul style="list-style-type: none"> <li>• Impressions from the closing event - Salt Fair in Beirut (FTL)</li> <li>• Presentation of MedArtSal project in Spain on World Gastronomy Day</li> </ul>	<ul style="list-style-type: none"> <li>• Two videos recorded by the ENI CBC Programme during the visit to the Lebanese salinas</li> <li>• Presentation of the FISHMEDNET project on capitalization within the NEXT MED Programme (video of the FISHMEDNET project)</li> </ul>

## 7. References

- Project document “A3.3.3 Building the MedArtSal Model”
- Project document “A3.4.2 Operation plan-MedArtSal”.
- Project document “A3.4.1 MedArtSal - Handbook of good practices”
- Data for Birds - [https://public.tableau.com/views/SaltPansofTunisia-Biodiversity/Cover?:language=it-IT&publish=yes&:display\\_count=n&:origin=viz\\_share\\_link](https://public.tableau.com/views/SaltPansofTunisia-Biodiversity/Cover?:language=it-IT&publish=yes&:display_count=n&:origin=viz_share_link)
- Data for other species - [https://public.tableau.com/views/SaltPansofTunisia/Cover?:language=it-IT&publish=yes&:display\\_count=n&:origin=viz\\_share\\_link](https://public.tableau.com/views/SaltPansofTunisia/Cover?:language=it-IT&publish=yes&:display_count=n&:origin=viz_share_link)
- [www.medartsal.com](http://www.medartsal.com)
- E-learning platform [MEDARTSALE \(medartsale-learning.com.lb\)](http://MEDARTSALE(medartsale-learning.com.lb))
- Project document “A 5.3.2 SMEs cluster, supported by Visual identity test”
- Project document “O 4.2 Testing case study in in-land Salinas: Sebkhah, Tunisia” – factsheet
- Project document “O 4.1. La Esperanza case study” – factsheet