



FOCUS TO ACTION

Capitalisation on Climate Change Adaptation Practices in the Mediterranean area

Project portfolio

July
2021

List of project profiles

1. **France:** Sustainable Agriculture in the Mediterranean (AdMed) **p. 4**
2. **France:** Adaptive management of the lagoons and marshes on the Camargue saltworks site **p. 8**
3. **Greece:** LIFE AgroClimaWater **p. 12**
4. **Italy:** Assisting the adaptation to climate change of urban systems in the cross-border space (ADAPT) **p. 16**
5. **Lebanon:** Water management in Menjez **p. 20**
6. **Lebanon:** Optimising the production of goods and services by Mediterranean forest ecosystems in a changing global context **p. 24**
7. **Morocco:** Agroecology to build agricultural resilience **p. 28**
8. **Morocco:** Improving the resilience of the Mesguina argan forest by promoting green jobs and empowering women **p. 32**
9. **Morocco:** Information systems to support water planning **p. 36**
10. **Palestine:** Adapting the city of Ramallah to climate change **p. 40**
11. **Tunisia:** Resilient territorial planning for climate change in the Douimis river basin **p. 44**
12. **Tunisia:** Adapting Kerkennah to the effects of climate change **p. 48**

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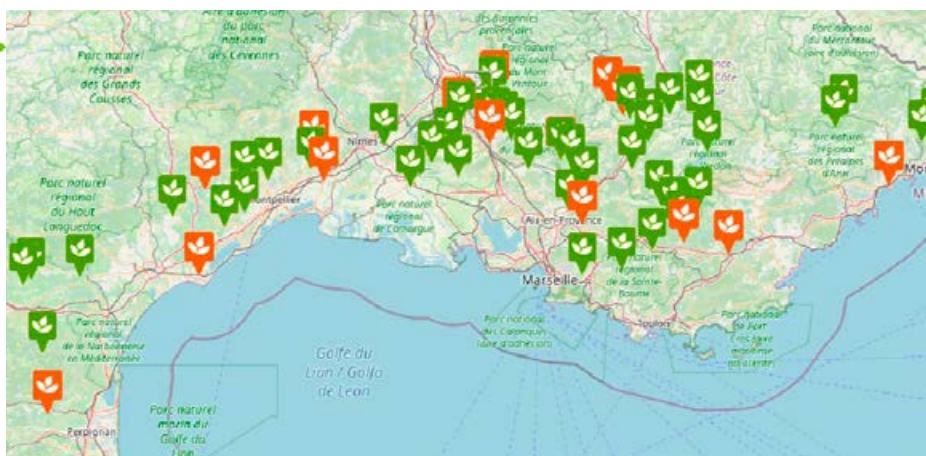
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Country: France

Project managers: GR CIVAM PACA, FR CIVAM Occitania, National CIVAM network

Climate issue: Water stress, changes in rainfall patterns, rising temperatures, etc.



Map of groups making up the CIVAM network. Source: CIVAM network

How does this initiative contribute to the territory's adaptation to climate change?

> Agricultural systems are growing weaker

In the South and Occitania regions, agricultural systems have shown increasing fragility due to climate change in recent years. Crop yields on certain farms are stagnating or declining, resulting in zero or negative profitability, especially during periods of drought, which are affecting the region more and more frequently. Climate change, which is likely to cause changing rainfall patterns, higher temperatures, and more frequent, longer droughts, therefore seems set to exacerbate the socio-economic vulnerability of the agricultural sector. Today, certain rural stakeholders are questioning the sustainability of agricultural systems and practices.

> Support from CIVAMs to develop and adapt agricultural practices, through ADméd

CIVAMs (Centres d'Initiatives pour Valoriser l'Agriculture et le Milieu rural - Action Centres to Promote Agriculture and Rural Areas) bring together farmers and rural stakeholders to achieve territorial innovation through information-sharing, discussions and group momentum. They work to develop and promote cost-effective, autonomous agricultural systems that fit into their territory and form the core of local food systems.

Since 2010, the South and Occitania regional CIVAMs have joined forces within the ADméd hub (Agricultures Durables en Méditerranée - Sustainable Agriculture in the Mediterranean) to support farms in improving their practices. This includes making them more resistant to climate change impacts and ensuring their sustainability.

> Agroforestry: a driver for economic, social and environmental resilience

Many initiatives supported by the CIVAMs within the ADméd network are especially aimed at developing farming and agroforestry groups.

One of the members of the ADméd network, Mr. Rastello, a farmer from the Plan d'Aups (Sainte Baume) municipality, took up agroforestry in 2016. He is interested in this activity for several reasons. First of all, agroforestry offers a wide range of technical options and enables economic diversification. It has many advantages from an environmental point of view, and helps to mitigate and adapt to climate change.



Agroforestry plot
Credits: GR CIVAM PACA



Visit to the Rastello plot.



Project spotlight

> Goal:

To promote resilient agriculture by means of a farmers' exchange network to share innovative practices

> Background

The ADméd project was created in 2010 by the Occitania and South region CIVAMs as a structure for joint actions on agricultural sustainability.

The goal was to identify the main difficulties in the Mediterranean area with the region's farmers, to provide support for groups and to work with them on practical tools for action.

Through training, experience-sharing and visits, farmers develop initiatives and try out new practices ('living countryside' initiative, cost-effective and autonomous production systems, creating and maintaining farming and rural activities, etc.) while benefiting from the assistance, support and constructive criticism of their other colleagues within the group. Several discussion topics have emerged: reusing green waste, managing organic matter, managing water quantities, sustainability of market gardening and wine growing systems, etc.

> How the CIVAMs take action through ADméd

The ADméd project, like all other CIVAM actions, aims to promote experience-sharing between farmers and the joint development of practical initiatives to improve the resilience of agricultural systems within a territory. ADméd implements three tools for action, as follows:

- Creating networks on agricultural practices, and providing support for farmers;
- Structuring and supporting groups;
- Advocacy on public policies and territorial development to raise the awareness of funding bodies and politicians about agricultural issues.

> Focus on an agroforestry initiative

Mr. Rastello, a farmer located in Plan d'Aups (83), noticed that meadow and cereal yields had been steadily falling for several years. Productivity losses, which are partly due to soil degradation and aridity in the area, are likely to get worse as the physical impacts of climate change take hold. To ensure the future viability of his farm, Mr. Rastello

modified his production system using soil restoration principles: reducing tillage (direct sowing) and reintroducing trees on his farm. The farmer revisited the ecosystem of his agricultural land using a two-stage plan:

- In the short term: implementing direct sowing under plant cover for annual crops. This technique dispenses with tillage and integrates plant cover into crop rotations, which will help to naturally loosen the soil and increase living organisms within it.
- In the long term: implementing agroforestry. This practice consists in combining woody plants and annual crops and/or livestock-rearing on the same plot of land.

In 2017, after having participated in a course organised by GR CIVAM PACA, he received support from a design consultant and several local institutional partners (municipalities, Regional National Park, etc.), and created his first 1.5 hectare agroforestry plot.

 Territory concerned	 Initiative holders	 Partners
South and Occitania regions	CIVAM PACA Regional Group, CIVAM Occitania Regional Federation, CIVAM Network (national federation)	Multiple sources of funding: Ministry of Agriculture (DRAAF), ADEME, Europe, Foundations, etc. Funded as a project.
 Calendar	 Human resources	 Financial resources
Start date: 2010 Network start date: 2011 The network will be maintained provided that funding remains available	2 full-time facilitators from CIVAM PACA 1.5 full-time facilitator from CIVAM OCCITANIA	Variable according to each initiative, the technical skills involved and the agreed funding arrangements.

What are the tangible results?

> Gradual adaptation of the agricultural sector to ensure long-term resilience

The promotion of sustainable agriculture in the Mediterranean region by the CIVAMs, especially by creating networks between farming stakeholders, aims to gradually build the long-term resilience of production systems to growing pressure from socio-economic, environmental and climate factors.

More specifically, by implementing agroforestry practices, Mr. Rastello is seeking to achieve the following results: minimise the erosion of fragile soil exposed to potentially severe weather events (droughts and floods), improve grass and cereal production by boosting shade from trees acting as "climate shelters", reduce water losses and sustainably store carbon in the soil, protect and maintain biodiversity, increase nectar and pollen production (by mainly choosing melliferous species) to sustain the village's beekeeping activities, develop beneficial organisms for crops and reduce the use of plant protection products.

In this case, the use and maintenance of ecosystem services are considered as vectors to improve the resilience of agricultural systems, especially to climate change.

> Sharing best practices by creating farmers networks

Since 2010, experience-sharing days, training courses, visits and workshops at farms on topics of interest (including agroforestry) have built a large, tight-knit network of

farmers and project initiators. These themed workshops bring together various entities involved in agricultural development, experimentation and research, and a large number of participating farms. Sustainability assessments are also carried out and presented during group sessions.

These discussion sessions provide a favourable environment to form new partnerships and launch new projects.

> CIVAMs highlight valuable initiatives and promote outstanding practices

A [website](#) has been created to shine a spotlight on valuable initiatives in the Mediterranean area. This includes a series of experience factsheets that highlight outstanding practices.

There are currently 33 factsheets, promoting various innovative activities. Videos and brochures are also produced and distributed, for example: "[Why and how to reuse green waste on a farm.](#)" Many other events (seminars, training sessions, etc.) and documents (study reports, assessments, etc.) also help to improve agricultural practices by promoting valuable initiatives.

> Increasing cooperation with the research community

Experimentation is another important issue for farmers investing in alternative agricultural practices or new operational methods. It is often difficult for farmers to shoulder the financial burden of "live"

experimentation on their own, and even more difficult to share its results.

For example, when setting up an agroforestry plot, many options are available to select tree species (trees for timber or wood-energy, fruit trees, melliferous trees, etc.). These choices depend on technical and economic factors, and reference documents do not always exist on such topics.

For this reason, farmers are asking for greater cooperation with the research community. The South region CIVAM is therefore currently taking steps to increase cooperation with INRAE in Avignon to design decision-making tools that will be tested with groups of farmers.

Other joint projects could also be envisaged, by taking inspiration from the wide range of research topics in this field: interactions between trees and crops with regard to light, water or nutrients; the impact of trees on useful biodiversity and carbon storage under temperate conditions; the sociological obstacles to the development of agroforestry, etc.



Compost made up of green farm waste
Credits: GR CIVAM PACA



Agroforestry visit & direct sowing under plant cover



What are the conditions for success?

> Engage in public-private co-funding

Certain agroforestry practices are too costly for farmers to self-finance without additional external funding (particularly when a farmer wishes to extend agroforestry over a large portion of the farm's useful land). In this case, investments must cover project planning (feasibility study, scaling, etc.), purchasing trees and equipment, as well as monitoring and managing trees (especially for timber) and skills acquisition. The latter involves either paying for technical consultancy, or employing specialist staff.

In the South region, there is limited public funding for agroforestry. The key to compensate for the lack of public funding is to engage in co-funding opportunities combining public-private funds, or to approach foundations. Dependence on public funding (mainly regional, departmental, Ministry of Agriculture or European funds) is currently a major constraint for farmers.

> Improve technical support, in agroforestry and other areas

Reintroducing traditional agricultural systems – which have now been updated with modern farming equipment – must not be limited to alternative networks; farmers must also receive widespread support from mainstream technical networks (chambers of agriculture, technical institutes, etc.).

> Support for experimentation through cooperation with research institutes

Ideally, solid expertise and an experimental period are required before investing in a new farming practice, due to the specific agricultural, climate and soil conditions of each plot of land. Creating networks with farmers that have already tried out new practices, who have a clear view of their agronomic and economic performance and whose farming land has similar characteristics, can help other farmers adopt new practices.

> Combine practical initiatives with advocacy campaigns targeting various political authorities

Although there is a growing interest among elected representatives and other public decision-makers (at the departmental, regional and national level) in innovation and evolving agricultural practices – especially due to their direct link with climate change mitigation and adaptation – organisations working in this sector believe that there is still a “gap” in awareness, which must be bridged through advocacy.

Regional CIVAM representatives are therefore responsible for maintaining connections with public authorities that play a role in defining agricultural policy (DRAAF, DDTM, DREAL, etc.). They also ensure that changes in public policy, especially those relating to

sustainable practices, are communicated to members of the network.

Practical issues encountered in the field are seen as effective tools to influence deliberations and budgetary decisions at the departmental or even Ministerial level, based on a bottom-up approach.

> Maintain a dynamic perspective on adaptation

One of the lessons learnt from the farmers' network is that adapting agricultural practices is a dynamic process. This is especially the case for agroforestry projects, which cannot be designed in a standardised manner. Time must be assigned for experimentation and experience capitalization, using flexible approaches. The development of agricultural practices must therefore be based on a long-term vision and approach that aims to achieve a gradual return to ecosystem services.

Words of a participant

“We must allow ourselves to continually update and develop our projects, and gradually implement resilient systems [...]. There is plenty of space for experimentation.”

*Christian Rastello,
farmer*



Visit to the Valensol site.
Credits: GR CIVAM PACA

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ExAgroforestry farmer - Plan d'Aups Sainte Baume

Study carried out by Lucie Royer, Ramboll

For more information

[ADMéd project website](#)

[CIVAM network website](#)

Advocacy to develop agroforestry:
L'agriculture à l'abri des arbres en Région
[SUD](#) - Trees provide shelter for farming
in the South region



Country: France

Project managers: Coastal Conservation Authority (owner), Camargue Regional National Park (manager and coordinator), Tour du Valat and French Nature Protection Society (co-managers)

Climate issue: rising sea levels



Lagoons and marshes at the Camargue saltworks site.

Source: Wilim. L map - Tour du Vallat - 2011, Ecological Engineering Resource Centre

How does this initiative contribute to the territory's adaptation to climate change?

> The Camargue is threatened by rising water levels

Rising sea levels (estimated at +16 cm between 1902 and 2010) and coastal erosion (exacerbated by increasingly frequent storms) are already having a severe impact on the shoreline and biodiversity of lagoon ecosystems, as well as the way they function. In the medium to long term, climate change will seriously affect the biodiversity of isolated wetlands, especially less-mobile species (plants, molluscs, etc.) and endemic species, which cannot migrate to adapt to disruptions in their ecosystem.

The Camargue is particularly exposed to flooding by the sea, since 70% of its surface area is less than 1 m above sea level, and the delta is sinking (subsiding) by about 2 mm every year. This situation is compounded by a projected rise in sea levels of between +10 and +25 cm by 2050.

> Pressure on natural environments and activities

Rising sea levels and coastal erosion are impacting certain economic activities (the saltworks for example), with significant effects on biodiversity and major financial consequences (costly maintenance of "artificial" conditions, both specifically for salt production and more generally sea defences to protect the area). As a result of rising sea levels in the Camargue, it has become increasingly difficult to drain the Vaccarès lagoon. In addition, the whole area's population, infrastructure and activities – including tourism – are threatened by natural or climate-related disasters.

> Adaptive management as a nature-based solution

The restoration of Camargue wetlands on the site of the former saltworks is a strategy to slow and reduce rising sea levels and risks of flooding, and thereby increase resilience to the impacts of climate change.

The challenge is to use the wetlands' capacity to temporarily store sea water during flood events.

In addition, *Salicornia* and other marsh ecosystems can also trap sediment.

> Rediscovering the delta's natural, gravity-based mechanism, and creating new uses on the site

In addition to the natural formation of a shifting coastal sandbar, which helps to reduce erosion and submersion risks at zero cost, the management approach has also helped to improve the overall ecological status of the lagoon habitats. This has revived fish stocks at sea and in the lagoons, increased the populations of nesting colonies of gulls, terns, and waders, while bare ground has been recolonised by *Salicornia* salt meadows. In addition, the approach has also encouraged the diversification of the site's uses, including ecotourism, beach tourism, fishing, hunting, and grazing.





Project spotlight

> Goal:

To achieve a controlled, gradually retreating shoreline in sectors affected by erosion and to recreate a natural, gravity-based water mechanism by reconnecting the lagoons with one another, with the sea and with neighbouring sub-water catchments.

> Background

The Rhone delta, also known as the Camargue delta, is located to the west of Marseille and covers 140,000 hectares. In particular, it contains rice cultivation and salt production areas. The Salin-de-Giraud saltworks (Bouches-du-Rhone) were created in 1855 and gradually increased in size in the 19th and 20th centuries. Between 1950 and 1970, the Compagnie des Salins du Midi installed major infrastructure to transform the Camargue marshes into an industrial salt production area. These installations maintained artificially high water levels in the summer, so that sea water could be pumped into evaporation ponds in spring and summer, and low levels in winter. At the same time, larger numbers

of people visited the area, since the site was much more accessible.

Between 1990 and 2007, the site fell on hard times, which led to the sale of part of the saltworks. Since the Coastal Conservation Authority purchased the 6,527-hectare site between 2008 and 2012, this salt-producing area has now been transformed into a wetlands conservation zone.

> Technical description

The co-management convention between the Coastal Conservation Authority, the Camargue Regional National Park (PNR), the French Nature Protection Society (SNPN) and Tour du Valat set the following management objectives, based upon which several operations were defined:

- Re-establish a more natural hydrology mechanism
- Replenish coastal ecosystems
- Maintain or increase habitat for colonies of water birds

- Implement an adaptive management approach in response to rising sea levels
- Take into account local economic issues

Abandon coastal embankments and consolidate internal dikes. Concerning the existing water infrastructure for salt production, several steps were taken to reconnect the various water bodies during two phases of work in 2015 and 2019: canals were dredged, sluices were built or renovated, and dikes were levelled.

From a socio-economic perspective, the North and South entrances to the site were enhanced (signposts, restoration of historical buildings), conventions were signed for agro-pastoral and hunting activities, and beach management plans are defined every year (Beauduc area).

Water quality is regularly monitored, as are the area's plants and wildlife, to evaluate the impact of the modified water mechanisms on the landscape and biodiversity.

 Territory concerned Lagoons and marshes on the Camargue saltworks site	 Initiative holders Coastal Conservation Authority (owner), co-managers: Camargue PNR (coordinator), SNPN, Tour de Valat	 Partners WWF, European Union, Rhône-Méditerranée-Corse Water Authority, French Ministry of Ecology, Total Foundation, South Region, MAVA, Fondation de France
 Calendar 2011-2019	 Human resources Around 4 full-time staff / year Hydro-morphological, hydro-biological and ecological monitoring Project management (water infrastructure works, renovation of cultural heritage, etc.)	 Financial resources Total budget for the 2013-2016 management period: €1,814,770, subsidised by the partners and the Coastal Conservation Authority Water infrastructure work carried out in 2019: €600,000

What are the tangible results?

> A natural water mechanism and recolonisation by wildlife

A “natural” water mechanism has been re-established: the area’s morphology has changed (overwash and reformation of a coastal sandbar), water movements are gravity-induced and variations in water levels are less controlled and more natural. The gradual disintegration of coastal embankments has resulted in sand being redeposited along the shoreline, modifying the topography of beaches. The de-compartmentalisation of lagoons enables water to flow more freely, lower salinity has helped fish reproduction sites to recover, the return to a natural water cycle (floods in winter, drought in summer) has left space for *Salicornia*, marsh plants and aquatic vegetation to recolonise the area, and the endangered European eel has reappeared. Many species of birds have also returned to the site, also due to lower salinity levels.

> A less costly strategy than building dikes

Abandoning nine kilometres of coastal embankments has resulted in savings of 13-17 million euros in reconstruction investments, 7-24 million euros in dike construction costs, and at least 800,000 euros per year in maintenance.

Investments are being focused on maintaining the inland embankment, which is 16 km long. The total estimated value of coastal wetlands can be as high as 160,000 euros per hectare per year, taking into

account carbon storage, coastal protection, healthy fish stocks and improved water quality. Moreover, the economic advantages of ecological restoration also include the many ecosystem services that restored wetlands can provide, including possibilities for tourism and leisure activities.

> Efforts must continue

A number of future actions are planned or being considered, based on the results of 10 years of adaptive management, including:

- Creating cycle paths (in conjunction with local authorities) and testing a shuttle service to improve access to the site;
- Continuing water system restoration works, including upstream;
- Defining forward-looking models/scenarios on the effects of rising sea levels;
- Maintaining dialogue with local actors and residents of the neighbouring village, Salin-de-Giraud;
- Evaluating the hydrological functions of restored ecosystems and their ability to act as a climate buffer zone.

> Difficulties to be overcome

Following the removal of polder enclosures, low quality fresh water has entered the site due to upstream agricultural activities, and solutions must be found to improve water quality. New, unintended species of wildlife have colonised the former saltworks, including large birds of prey such as the

European eagle-owl (*Bubo Bubo*), which is threatening the reproduction of the Flamingo colony. When a site is renatured, it is not possible to control everything, and sometimes there must be compromises on biodiversity.

Finally, it was not easy for site users to accept the abandonment of the coastal embankment. Communication and cooperation with Camargue residents must be improved to help them accept the long-term changes on the site.

> Encouraging alternative approaches to risk management in coastal areas

Adaptive management, as presented here, only applies to the former saltworks, which is owned by the Coastal Conservation Authority. It should however enable the following questions to be asked: under which conditions is this type of management a good idea, or even necessary? Which compromises are required to implement it? The objective being to promote a more coherent, systematic shoreline management approach throughout the country or even internationally. The LIFE adapto project, which commenced in 2017 for a period of 4 years on 10 experimental sites throughout France and its Overseas Territories, will contribute to this reflection process. This project aims to demonstrate that integrating ecosystems and natural habitats into flexible shoreline management can provide a climate change adaptation solution in coastal areas.



Author: Camille Parrod, ACTeon

What are the conditions for success?

> Key success factors

One important factor for success was the unprecedented partnership between the three co-managers (PNR, SNPN, Tour de Valat), each of which provided skills and a distinct vision of the issues affecting the Camargue coastline.

Another key factor was the social acceptance of this approach for which very little experience exists (worldwide), and which requires the local population and tourists to accept uncontrolled natural development. Although the conflicts and feelings generated by the approach may be difficult to manage, it is essential to take them into account. This may be achieved, for example, through usage agreements, the involvement of stakeholders in defining measures (concertation), regular communication on the approach and its results, etc.

Finally, financial support from private sponsors helped accomplish certain activities within the approach.

> Critical areas

There are several critical areas for future phases of the project. These include increasing the capacity of co-managers to monitor, quantify and plan future scenarios for a rapidly-evolving site. In addition, a better understanding of (complex) shoreline

and sediment mechanisms, and their effects on the site's plants and wildlife, must be gained.

Special attention must be paid to the social acceptability of these transformations and to changing perceptions: this involves explaining to the local population and users that the current changes are not catastrophic and that although natural processes may be unpredictable or disturbing, they make the site rich and original.

Final tasks include evaluating the ability of restored ecosystems to function as a hydrological and climate buffer and retrospectively demonstrating the value of this management experience.

> Arguments for adaptation

In view of rising sea levels and coastal mechanisms (especially where there is erosion), many coastal areas will be exposed to higher risks of saltwater intrusion. Coastline maintenance strategies are costly, and may not be effective against extreme weather events.

The idea is to think about what is workable locally, and here nature-based solutions can provide an interesting alternative to "inflexible" management - in the end it is better for coastal areas to anticipate a retreating shoreline rather than it being forced upon them.

> Useful lessons for similar initiatives

In this case, the lagoons and marshes on the Camargue saltworks site were acquired by the Coastal Conservation Authority, which enabled new goals for wetland restoration to be set, with a certain amount of "freedom" to define the overall management strategy.

Defining a management plan is a vital step to set objectives, establish priorities and agree on the means that will be used to ensure that the approach "comes to life". Combining public and private funding enables any remaining budget needs to be covered.

Contacts

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Anais Cheiron, French Nature Protection Society

Study carried out by **Camille Parrod**, ACTeon

For more information

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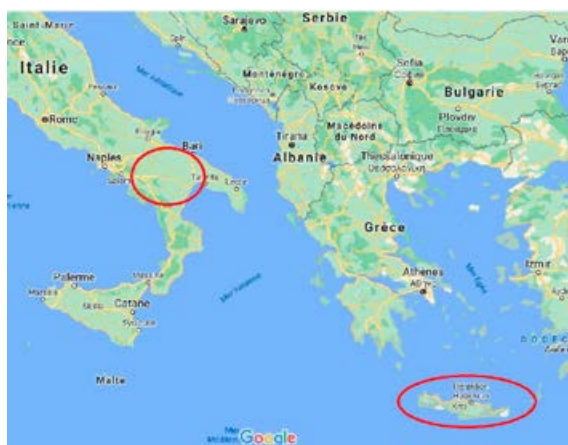
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- "Report on ten years of ecological restoration at the Camargue saltworks site lagoons and marshes", 3 & 4 October 2019, Salin-de-Giraud.



LIFE 14 CCA/GR/00389 - AgroClimaWater



Country: Greece (for the site visit) and Italy
Project manager: HYETOS S.A. Studies, Research & Consulting Services
Climate issue: Extreme events, desertification

How does this action contribute to the territory's adaptation to climate change?

> A territory affected by extreme events and desertification

Main impacts observed on natural environments in this kind of territory are extreme events like heat waves and floods but at the same time desertification due to low annual rainfalls, that lead to ecosystem degradation (i.e. soil erosion).

> Agricultural productions under pressure

These impacts affect the economic activities by reducing and sometimes destroying all the agricultural production. Ecosystem degradation may result into problems like plant diseases that directly affect the production.

> How to increase production and quality at a reduced cost?

This project is a natural resource management initiative for the well-being and increase of the local production, considering local climate change effects. Climate change impacts on production were the main reason to launch the project but also the local needs in order to identify the best ways to adapt on the climate change and at the same time increase the production by reducing production costs. Therefore, the adaptation of tree plantations to the upcoming climate change effects (water scarcity, floods) and the adaptation of the agricultural practices

(low-cost techniques) were the main goal of the initiative.

> The added-value of adapting orchards in Crete

The project has contributed to the implementation of agricultural practices improving the state of natural resources, to socio-economic development incentivizing farmers to stay and continue to produce locally. Water governance actions were also explored. The Adaptive Capacity of the agricultural sector was also developed through public consultation and training of the involved parties on the requirements of the Agricultural Water Management System and the proposed water management adaptation (to climate change) strategy.



Composting of olive mill byproducts.
 Credit: Nektarios Kourgialas



Green olives.
 Credit: felipe caparros/ Shutterstock.com



Legumes for soil fertility.



Training for pruning.

> Goal:

The LIFE AgroClimaWater project's main objective is to promote water efficiency and support the shift towards climate resilient agriculture in Mediterranean countries through the development of water management adaptation strategies in three Farmers' Organizations (F.O.Rs) in two areas in Crete, Greece (Platanias and Mirabello) and one in Basilicata, Italy (Metapontino).

> Background

Like large areas of southern Europe characterized by low annual rainfall, Platanias in Crete (Greece) is particularly affected by climate change. In addition, these areas (e.g. Crete region) are also characterized by conflicts of use around water, notably between agriculture and tourism. Maintaining a high level of production in orchards, while significantly reducing water use, would free up enough water for climate-resilient agriculture. On the other hand, a lack of adaptation of orchards would reinforce the trend of

abandonment with negative consequences for local communities and ecosystems.

The project was mainly focused on the application of good agricultural practices to adapt to climate change enhance water efficiency and rationalize agrochemicals utilization in 10 pilot farms per project area (8 olive farms and 2 citrus farms in the Platanias area) for 3 cultivation periods (years) under the supervision of the Farmers' Organizations' agronomists.

> Technical description

The project identified good agricultural practices that were applied into the demonstration plots of each pilot site and monitored. The groups of interventions include:

- Reduction of water evaporation losses from soil surface, e.g. Soil mulching, No weed control, Weed mowing
- Reduction of transpiration water losses through winter pruning and summer pruning

- Reduction deep percolation water and nutrient losses, e.g. Increasing organic matter, Fertigation
- Reduction of surface runoff (especially in sloppy areas), e.g. introducing traps and bio-rolls from pruning residues
- Measures in order to maximize the efficiency of irrigation, based on the calculation of evapotranspiration losses in each farm
- Rationalization of fertilizers and agrochemicals utilized, according to a fertilizing schedule (based on soil and leaf nutrients analysis on each farm)

 Territory concerned	 Initiative holders	 Partners
<p>Two areas in Crete, Greece (Platanias and Mirabello) and one in Basilicata, Italy (Metapontino) – Arid and Semiarid environments</p>	<p>HYETOS S.A. STUDIES, RESEARCH & CONSULTING SERVICES (Coordinator) - www.yetos.gr</p>	<ul style="list-style-type: none"> • University of Basilicata • Hellenic Agricultural Organization «DEMETER» • RodaxAgro Ltd • Agricultural Cooperative Partnership Mirabello Union S.A • Assofruit Italia • Platanias Municipality Development Enterprise
 Calendar	 Human resources	 Financial resources
<p>Project duration: 60 month (1 September 2015 – 31 August 2020).</p>	<p>N/A</p>	<p>The project LIFE AgroClimaWater with total budget 2,423,223 € is co-financed by the European programme: 1,395,749 € (57.8%), and the project partnership: 1,027,474 € (42.2%).</p>

What are the tangible results?

> Natural resource management for the resilience of local farms in Crete

The initial objective of the project, to reduce by 30 % the water usage and at the same time to increase the production, was reached with different means.

More than 20 farmers were identified as active on the field, while hundreds participated to the trainings and workshops provided by the project.

All the actions were relevant to the expectations of the beneficiaries and the needs of the territory, especially on how to improve the quality of life of the locals by increasing the production but at the same time reducing the costs of the production, considering climate change impacts (water scarcity, floods, heat waves) and indirect climate change effects like plant diseases.

> Social, economic and environmental co-benefits

The project has contributed to avoid further soil erosion at pilot actions' scale, by testing and applying relevant low-cost techniques (e.g. soil mulching, cover crops, winter and summer pruning application of organic matter, application of irrigation according to the crop water needs, fertigation, etc.).

Using less pesticides also resulted a positive contribution to environmental and health issues.

Better conditions were created for local farmers to continue producing locally and avoid abandoning their fields. Indeed, due to the financial crisis in Greece and the low price of the olive oil and citrus crops, many farmers tend to abandon their fields.

> Further implications

There was room for adaptation as some activities were slightly changed based on the local needs and reality (for example, application of fertigation and no-tillage practices were already adopted by some farmers; summer pruning and application of kaoline in olive farms were not applied due to an unusually rainy summer, therefore the benefits under these circumstances would have been insufficient to justify the cost of application).

Also, 3 pilot farms had to be replaced – one was bought by an owner who did not intend to continue the farming activity, the two others were owned by a non-cooperative farmer, who never accepted the new irrigation system and the monitoring equipment in the demonstration part of his field.

Only in one farm, a significant yield reduction occurred due to olive fruit fly infestation, before harvesting as there was a misunderstanding between the farmer and the contractor as to the responsibility to apply plant protection sprays in the demonstration part of the field.

A major aspect that is still under discussion among the project partner and local stakeholders, concerns plant protection activities (against insect and fungal infestations), that were not included in the project but would be necessary.



Olive tree infected with aphids.
Credit : Akkalak Aiempradit/
Shutterstock.com

Words of a participant

"Natural Resource Management is essential for the well-being and the fight against climate change"

*George Motakis,
local farmer,
agronomist of the agriculture cooperative*

What sustainability?

The sustainability of the initiative is mainly achieved through the involvement of the local actors (municipalities, Institutes, farmers organisations, agricultural cooperatives). The institute (partner) will also continue to provide support to local beneficiaries based on meteorological data. Finally, the project's activities are going to be further integrated into the management principles of the region, after discussion with the local authorities. It will be of everyone's benefit to focus on sustainable methods of managing the water resources and engaging all relevant stakeholders.

What conditions for success?

> Key success factors

The project's activities were positively perceived by the relevant stakeholders of the region.

Another success factor is to benefit from both local practices and knowledge and bilateral support from the political and technical actors of the region.

Communication and awareness-raising are significant in order to further engage local stakeholders and decision-makers.

The project partner was constantly working on including more and more stakeholders (farmers) actively on the field activities, especially this year as there were issues with the amounts of production.

There is strong added value arising from knowledge transfer and training of local farmers to alternative techniques and practices. Practical exchanges (through field visits) help participants to get familiar with low-cost techniques that could be used to increase their production and the quality of their products.

Visible results also confer legitimacy to proposed solutions, related to the management of natural resources and more specifically of water and water run-off. Significant differences have been observed between the fields with applied low-cost techniques, compared to the ones without.

However, there are still some difficulties to overcome, especially on subjects related to stakeholder engagement and the communication with the farmers.

> Arguments to mobilize on adaptation

Climate change increases existing conflicts (namely, conflicts of use around water, notably between agriculture and tourism) and calls for solutions. It has been proven that low-cost solutions exist to increase production and quality of products in arid and semi-arid areas.

Maintaining a high level of production in orchards, while significantly reducing water use, would free up enough water for climate-resilient agriculture. Moreover, a lack of adaptation of orchards would reinforce the trend of abandonment with negative consequences for local communities and ecosystems.

> Useful lessons for similar initiatives

Activities were well planned from the beginning and local producers involved from the design phase of the project. The inclusion of plant protection could be an extra activity to be provided.

Main advices given to an organization that wants to carry out a similar initiative could be:

- Seek maximum local engagement

- Select appropriate sites for the field activities (and be ready to adapt them in case of unforeseen situations)
- Set up continued monitoring of activities and results, have a transparent and constant communication with farmers who are part of the experimentation concerning what is expected from them, and how the project team will intervene during the project's calendar (to avoid any misunderstandings as it has been the case, affecting project results)
- Enough time to evaluate results and capture natural conditions, to better reflect "climate change conditions"
- Include as many different variables as possible, like different cultivations, to provide wider feedback of climate change results on different aspects.



Recycling pruning waste
Credit: Nektarios Kourgialas

Contacts

From the Institute of Olive, Subtropical Plants and Vine of Chania, Hellenic Agricultural Organization "Dimitra", the involved researchers were: Dr. N. Kourgialas, Dr. G. Psarras, Dr. G. Koumbouris

Reference point: kourgialas@nagref-cha.gr

Investigation by **Thanos Smanis**, independent consultant

For further information

Project Website:

<http://www.lifeagroclimawater.eu>

Deliverables:

<http://www.lifeagroclimawater.eu/category.asp?mcid=3>

Publications:

<http://www.lifeagroclimawater.eu/category.asp?mcid=4&cid=13>

Dissemination Material:

<http://www.lifeagroclimawater.eu/category.asp?mcid=4&cid=5>



Source: ADAPT project – 2014-2020 Italy-France Maritime Interreg project

Countries: Italy (for the site visit) and France
Project manager: ANCI Toscana
Climate issue: catastrophic flooding in urban areas linked to sudden and extreme rainfalls

How does this action contribute to the territory’s adaptation to climate change?

> Flash floods threaten high density urban areas

The project was exclusively dedicated to the flash floods caused by extreme rainfall events in urban areas. Impacts have been analysed as a whole and on the general structure of the city.

Flash floods in high density urban areas can cause damage to buildings and green areas, disruption to critical infrastructure, including roads, water distribution and sewage systems, injury and illness, and in some cases loss of life. The impacts of flooding can be felt months and years after the event, in particular on health, well-being, livelihoods and social cohesion.

> Planning as an instrument for “climate-proofing” cities

The main issue of climate change events such as heavy and sudden rainfalls, that may cause flash floods, is their unpredictable nature.

Consequently, it is challenging to develop an early-warning system, similar to the usual Civil Protection Plans. The most viable solution to address their impacts, reduce risks and increase the resilience of urban areas, is the development of adaptation actions according to planning instruments that take into consideration climate change. The project aspired to contribute to the resilience of cities, and strengthen knowledge and skills of institutional actors and stakeholders.

> The replicability of the project’s results in other urban areas and territories

The main activities developed by the project are replicable and scalable to other cities and territories. For example, the “Guidelines for the redaction of Adaptation Plans to flooding risk” are applicable to other municipalities that wish to develop Local Adaptation Plans. Furthermore, the cross-border Joint Adaptation Plan, that calls for homogeneous programming, contains

replicable and transferable adaptation solutions to other cities that experience similar climate vulnerabilities.

Different tools allowed for building adaptive capacity in urban areas and promote knowledge transfer on climate adaptation: public consultation, workshops, open access webinar and training to administrators and operators of the Municipalities and interested stakeholders (e.g. technicians, associations, and citizens).



Draining soils



Authors: Anna Urgeghe and Sassari Municipality



Project spotlight

> Goal:

ADAPT project's main goal is to make the Italian and French cities of the Upper Tyrrhenian area able to adapt to the consequences of climate change, in particular to floods caused by sudden and intense rainfalls, through capacity building, the strengthening of knowledge on climate adaptation, as well as the improvement of planning instruments.

> Background

Flash floods are a major threat to settlements, with social, economic and environmental consequences. Heavy rainfall can produce large volumes of surface water that can overwhelm drainage and sewer infrastructure. Moreover, the excessive waterproofing of cities exacerbate the negative impacts of heavy rainfall, contributing to catastrophic flooding events.

Over the past 5 years, floods due to sudden and intense rain events have caused more than € 1 billion of damages in the cross-border

area of the Upper Tyrrhenian, between Italy and France.







With the increase of average temperatures, drought period and frequency of extreme rain events, climate change already represents a common challenge that cities must face, not only fighting its causes but also adapting to its consequences, through their structure, organization and enhancement of their resilience.

> Technical description

In the context of the project and in line with the local adaptation plans and Cross-borders Joint Adaptation Plan, experimental activities were carried out in the project territories, including:

- 7 drainage infrastructures in portions of roads, green spaces and public buildings to improve the drainage capacity of the urban areas (Livorno, Oristano, Alghero, Sassari, Vado Ligure, Savona, La Spezia)

- 3 models of green infrastructure management to improve their water retention capacity (Var Department, Anci Toscana, Bastia Agglomeration Community)
- 2 monitoring systems to control the water level in underground passages and sewers (Rosignano, CISPEL)
- 1 information system for road management in the event of urban flooding (Ajaccio)
- 1 geographic information system (La Spezia)
- 1 validation model for adaptation interventions, to assess their consistency with the cross-border adaptation plan (CIMA)
- Greening (revegetation) action in schools (Ajaccio)

 Territory concerned	 Initiative holders	 Partners
Upper Tyrrhenian areas: Cities in Italy (Tuscany, Liguria, Sardinia regions) Cities in France (Corsica region, Var Department)	ANCI Toscana (http://ancitoscana.it/)	Comune di Livorno (IT) Communauté d'Agglomération de Bastia (FR), Mairie d'Ajaccio (FR); Département du Var (FR); Fondazione CIMA (IT); Comune di Rosignano Marittimo (IT); CISPEL (IT);; Comune di Alghero (IT); Comune di Sassari (IT); Comune di Oristano (IT); Comune di La Spezia (IT); Comune di Savona (IT); Comune di Vado Ligure (IT)
 Calendar	 Human resources	 Financial resources
Start date: 02/2017 Original End date: 02/2020 Extension: 06/2020	The INTERREG Maritime program allows for covering the 15% co-financing using internal human resources.	The project with a total budget of € 3.796.730,05 is co-financed by the INTERREG Maritime € 3.227.220,55 (85%), using the European Regional Development Fund (ERDF), including € 128.248,41 for the drainage infrastructures in Sassari (Italy)

What are the tangible results?

> Raising awareness and supporting the development of Local Adaptation Plans

Different events took place during the project, ensuring the mobilization of relevant stakeholders, among which: 12 initial local workshops and 13 empowerment workshops made basically for the administrators and operators of the Municipalities and interested stakeholders (representatives of the economic-social system and citizens); over 20 events of knowledge transfer, capitalization and networking; various Social ADAPT events (citizen awareness events) and Urban Partnerships for Adaptation (PUA) meetings; and training courses and webinars publicly available on the on-line platform.

Moreover, documents were produced to guide cities in their planning, including: guidelines for the redaction of Adaptation Plans to flooding risk; a cross-border Joint Adaptation Plan; and 11 Local Adaptation Plans drawn up by each urban system participating in the ADAPT project, based on Local Climate Profiles (they are not totally new plans but they are also based on a re-interpretation of current available plans). A total of 259 actions were planned in these local adaptation plans, classified between soft "non structural" actions (191 actions, e.g. studies; training, information and awareness; governance, planning, etc.), and structural actions (68 actions, including 23 green – e.g. green infrastructure to promote water drainage and mitigate other negative effects of climate change, and 45 grey actions – e.g. drainage infrastructure and measures promoting the collection and reuse of excess meteoric water).

> Supporting the development of new infrastructures and improved infrastructure management

7 drainage infrastructures in urban roads, green spaces and public buildings were built to improve the drainage capacity (Livorno, Oristano, Alghero, Sassari, Vado Ligure, Savona, La Spezia). Infrastructure management tools were also developed: 3 green infrastructure management models to improve rainwater management and infiltration; 2 monitoring systems to control the water level in the underpasses and the sewage system; 1 information system for traffic management in the event of urban floods (Ajaccio); 1 model of validation of adaptation interventions, to assess their consistency with the joint adaptation plan (CIMA).

> Improved urban resilience to extreme events

Training, communication, planning and implementation of green and grey adaptation interventions contributed to improve the resilience of cities of the Upper Tyrrhenian areas to extreme events.

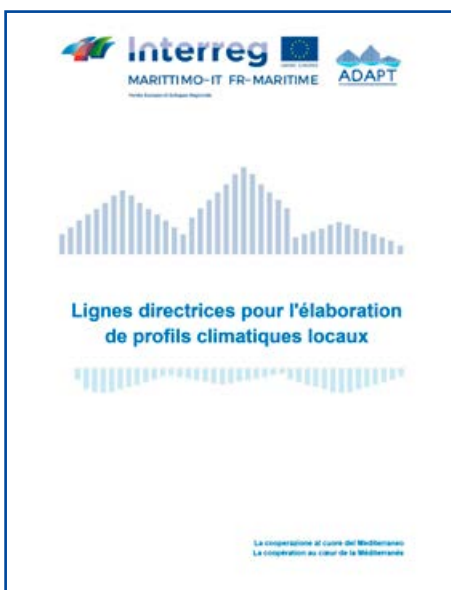
Strengthened knowledge (e.g. quantity and quality of climate data on urban areas) and skills of institutional actors on climate change adaptation as well as improved management, governance, civil society participation in territorial planning that considers climate change are key elements in the cities' resilience.

> Limits and follow-up of the project

A more holistic approach is needed to elaborate an Adaptation Plan that could significantly improve the resilience of the urban systems to climate change. To maximize the positive effect of an Adaptation Plan, other important phenomena (other than heavy and sudden rain) that have negative impacts on urban areas should also be included in the assessment (e.g. extreme temperatures, drought, extreme wind, change in solar radiation, sea level rise). Adaptation actions could be then planned to address more impacts simultaneously.

Additionally and for future projects, an extra effort should be done to ensure the engagement of the policy makers, planning and applying ad-hoc methods to ensure political administrators' involvement along the entire project development. Their active participation would surely have had positive impacts on the project's long-term sustainability.

For the success of the Local Adaptation Plans, the involvement of citizens is also essential and should be guaranteed at an early stage (e.g. in the design phase), facilitating discussion on priorities and exchange of knowledge. If engagement is well managed, it could give the opportunity to reach categories that are usually not included or initially not interested, as well as the ones particularly vulnerable to climate change.



Words of a participant

"ADAPT has worked for the genetic mutation of cities, both in the physical structure and in the structure of services, so that they adapt to climate change"

Marinella Osilo, Environmental Sustainability Office Manager, Comune di Sassari

What sustainability?

The project contributed to improve the resilience of urban areas to the risks related to flash flood; and disseminate information about climate adaptation, transferring knowledge also to other municipalities not directly involved.

For the sustainability of the initiative it is essential that Administrations keep up the commitment, ensuring that future political decisions support the adoption, improvement (considering other climate hazards, risk and further impacts) and implementation of the Adaptation Plans and Actions and their integration in existing planning instruments. Discussion with the Regional Institutions are already taking place to promote the allocation of funds, in the next regional funding programs, to the development of the actions foreseen in the Adaptation Plans.

What conditions for success?

> Key success factors

One of the major factors of success was that the project's partners were well selected, consequently the partnership was relevant and competent to implement the project. The involvement of a pragmatic research centre (i.e. CIMA), that was already developing innovative research projects on climate adaptation under other programs, such as the Horizon 2020, was really beneficial.

The successful management of the internal communication was another important factor to avoid difficulties in the selection of project priorities and decisions, all established in agreement between partners.

All activities had the wider social acceptance and was positively perceived by the relevant stakeholders of the region.

The development of a Cross-borders Joint Adaptation Plan and approach that calls for homogeneous programming in order to maximize the positive results of the actions related to adaptation was also key.

Finally, the project has a wide potential as the number of beneficiaries that can access the Guidelines (replicable and scalable) as well as the online training courses is very high (millions of people, and thousands of Municipalities).

> Critical areas

The main constraint was the low participation and involvement of some political administrators at municipality-level. This behaviour could be perceived by citizens as a lack of interest, demonstrate that the activity is not a priority and impact negatively any further project results.

On the opposite side, the activities had a wider social acceptance and were positively perceived by stakeholders, whose level of participation was high.

The main focus of the guidelines for the development the Local Adaptation Plans is on infrastructure (Grey and Green) development, therefore other soft actions were partly overlooked. The integration of a specific section on "Services" and other adaptation measures is also needed to ensure the resilience of urban areas (e.g. a quality manual and to establish procedures, with a check list).

The monitoring of key climate variables and indicators related to the management and further development of adaptation actions should be ensured.

> Arguments to mobilize on adaptation

The negative consequences of flash floods on densely populated areas can engage public responsibility to ensure the safety of populations, goods and activities

Because heavy and sudden rainfalls are usually unpredictable, the implementation of adaptation measures is the only viable solution to guarantee resilience of urban areas.

Moreover, the active involvement and planning of municipalities is now facilitated, compared to before. For example, networks of municipalities build and progressively expand, promoting knowledge transfer, the application of best practices, policy and planning instruments that assess and address adaptation and resilience to climate change from an inter-municipalities perspective.

Finally, green solutions could be preferred for their multiple benefits on climate change adaptation and mitigation, biodiversity enhancement, recreational use and social aspect. Also, in most cases, they are less expensive than grey infrastructure and promoted by several funding instruments.

> Useful lessons for similar initiatives

At project level, it is essential to select the correct partner according to the dimension of the adaptation planning and to involve the maximum number of municipalities. The number of involved municipalities allows to provide evidence that the results reached by the project are significant and can be replicated.

During project design, it is important to promote and seek complementarity with other projects on climate adaptation, and to plan for stakeholder and citizen participation from the first stage.

The implementation of strategies and ad-hoc engagement processes could be established as project task, to ensure the active participation and commitment of the political administrators.

Adaptation is a transversal topic in urban areas and should be embedded in the objectives of all municipal services/offices.

Throughout the project's implementation, networking with other municipalities or urban services providers can ensure the results will respond to effective needs and be properly disseminated.

Finally, Adaptation Plans should be considered as a harmonization of current plans rather than a new planning instrument and there must be a broader reflection and connections as well as a cross-border analysis. They should include all climate change risks and consider and integrate a section on the management of services and their interconnection.

Contacts

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Investigation by **Anna Urgeghe**, independent consultant

For further information

<http://interreg-maritime.eu/fr/web/adapt/projet>

<https://www.facebook.com/ADAPTmaritime/posts/2436439223294789>

https://twitter.com/ADAPT_maritime

<https://www.youtube.com/channel/UCrc5aumEuRRIObyfNEbbPXg>



Country: Lebanon:
Project manager: Menjez municipality
Climate issue: Sustainable use of water resources in a peripheral rural environment

How does this initiative contribute to the territory’s adaptation to climate change?

> In Lebanon, a massive drop in water levels is on the horizon

With a 1.5°C temperature increase projected in 2050, and +3.2°C by the end of the century, rainfall in Lebanon is expected to decline by -4% and -11% respectively. It should be noted that, even today, Lebanon’s per capita water resources place it just above the water stress marker. Lower rainfall will have a serious impact both on the replenishment of groundwater and on the flow of springs, rivers and streams. This will be compounded by longer periods of drought (+9 days in 2050, +18 days in 2100).

> A challenge for agriculture

These changes in climate will have an impact on water: they will not only take their toll on the population’s drinking water supplies, but will also very severely affect farming activities.

Agriculture will already be feeling the impact of rising temperatures, which will bring new diseases, fungi and insects, as well as

declining crop yields. However, a drop in rainfall will also have other consequences: the moisture content of soil will drop, making it less fertile, and there will be less water available for irrigation. As it stands, irrigation is the main water consumer in Lebanon (61%). In addition, 70% of irrigation channels are open to the air, making them inefficient.

> Significant institutional and operational challenges

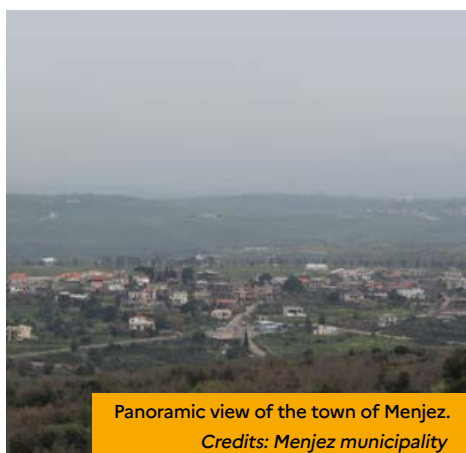
In rural areas, where agricultural activities are still the main source of income for the population, making farming operations more sustainable in terms of water and better adapted to climate change is an essential issue. However, this means addressing a significant number of challenges:

- Transforming existing infrastructure
- Transforming water usage practices as well as agricultural practices
- Ensuring sufficient institutional and financial means to carry out the necessary projects

This is not an easy prospect in Lebanon, which has an outdated infrastructure and where the priority is water supply networks for large towns and cities. In addition, the public institutions responsible for drinking water and irrigation – the Regional Water Authorities – are too weak, both institutionally and financially, to tackle irrigation issues in peripheral rural areas like Menjez. The definition of institutional prerogatives, between water authorities and local authorities, also hinders municipal action on water issues in Lebanon.

> Behind water and irrigation lies an energy challenge

In addition to the availability of water, irrigation based on tapping into groundwater using boreholes also faces energy issues. As the level of the water table falls, pumps need more electricity to extract water, resulting in financial costs and pollution. For this reason, it is necessary to develop a sustainable water-use system based on surface water.



Panoramic view of the town of Menjez.
Credits: Menjez municipality



Menjez lake.



Concrete irrigation canal.



Project spotlight

> Goal:

To use surface water instead of groundwater to meet the village's drinking water and irrigation needs

> Background

Menjez is a rural village covering 6 km², with a population of 800 people. It is situated in the Akkar governorate in northern Lebanon, on the Syrian border. Olive groves are the main agricultural activity in the area, and more recently avocados, carob, etc. Menjez has a wealth of natural resources including woodlands, as well as a rich archaeological heritage: 80 bronze-age megalithic burial monuments, a Roman temple and a crusaders' fort.

Menjez has two main water courses. On one side, the Nahr AlKabir river marks the border with Syria, and on the other, the Menjez river crosses the village. The source of this river has always provided water for the village and to irrigate agricultural areas. However, the river and its source have been polluted for years by the formation of a muddy pond of unhealthy water above the source. This affected both the population's access to water and the village's agricultural activities. Many households and farmers therefore used illegal, unofficial boreholes to pump water directly from groundwater reserves to meet their needs.

Menjez municipality was created in 2012. In a short period of time, the municipality has managed to develop an impressive number of projects covering energy, forestry, tourism, fire protection and agricultural issues. It has however paid particular attention to water issues, with the development of six projects in 8 years.







> Technical description

Although they were not initially designed as one global project, these six, incremental projects now resemble a structured whole that the municipality calls its Action Plan:

- In 2013, the first project aimed to remove the muddy pond, install decantation tanks and a water purification system, and provide drinking water for the whole village with a new 20 km water network.
- Later, due to problems with the purification system, the municipality decided to supply households with non-drinkable water, but only for domestic use. As for drinking water, a reverse osmosis treatment system was installed to supply a water fountain in the centre of the village, near the town hall and school, where residents can come to collect drinking water.
- Three projects focused specifically on irrigation. The first project created a 500 m concrete conduit. The second project

installed 3 km of plastic irrigation pipes to serve two previously irrigated areas of the village. This project also included drip irrigation systems for around twenty farmers. Unfortunately, the main over-ground conduit was damaged and vandalised. This led to a third project, to install a 2 km underground plastic pipeline, which was regularly monitored to manage and maintain it.

- The most ambitious project was the creation of a 60,000 m³ hillside lake to collect rainwater from three road side drainage pipes. The lake then feeds into a 5 km irrigation pipe, enabling water to be distributed to two areas where there was previously no irrigation.
- Currently, the municipality is in the process of preparing a project that will enable the surplus electricity produced by its field of solar panels to be used to pump water from the river to the lake. This will provide water reserves during the dry season. Then, the flow of water can be used to produce electricity.
- In addition to these projects, the municipality has implemented other initiatives including the creation of a water tank for the fire brigade, the distribution of 4 aerators to each household and the installation of a rainwater collection system on the school roof.

 <h3>Territory concerned</h3> <p>Menjez village (rural border area in north Lebanon)</p>	 <h3>Initiative holders</h3> <p>Menjez municipality</p>	 <h3>Partners</h3> <p>International funding partners (EU, USAid, IFAD, GIZ, JICA, Coca-Cola Foundation, etc.), international organisations (UNDP, UNICEF, etc.), universities and local NGOs</p>
 <h3>Calendar</h3> <p>Six projects since 2012</p>	 <h3>Human resources</h3> <p>The municipality has 7 employees, including one full-time employee for water-related issues. Technical experts are called upon during projects. In addition, the Mayor plays a very active role.</p>	 <h3>Financial resources</h3> <p>Total cost: nearly \$800,000, mainly financed with international development funding, with some support from the State and the municipality itself</p>

What are the tangible results?

> Diversification of water resources

The results of the municipality's actions on water issues are clearly visible. For the first time in decades, the village can count on a reliable network that supplies water to their homes 24 hours a day, as well as an irrigation system that satisfies farmers who hold rights to the Menjez source, and extends to new areas that were not previously irrigated. This has all been achieved in parallel to reducing dependence on groundwater.

> Aiming for more complementarity and circular development

The water projects in Menjez, as well as the interactions between the water management system and other sectors (energy, fire protection, tourism, agriculture, forestry, etc.), are contributing to a cross-cutting, circular approach to development.

> New economic opportunities

These projects have made a significant impact on the local economy. Following the development of these water projects, in particular for irrigation, new types of irrigated crops can now be seen in Menjez, especially avocados and carob. The irrigation of new land enables this land to be farmed more intensively. Furthermore, the rainwater collection lake is viewed as an opportunity since it has enabled the development of certain lakeside tourist activities - in fact, there is already a small museum on megalithic burial monuments.

> Less pressure on groundwater reserves

The projects provide the population with an alternative to using groundwater, which means that these reserves can be preserved in anticipation of periods when water shortages may be more severe.

> Strengthening local authorities

These projects have contributed to the successful "in house" management model used by the Menjez municipal authorities. Water management is no longer a problem, but instead provides financial resources that the municipality invests in the education, cultural and social sectors. There has also been a marked increase in local expertise on water-related issues and how to manage them.

> Technical problems cause project delays

During the water projects, the municipality was faced with some bad technical planning, which led to delays and additional expenses. This was the case for the water purification plant in the first project, which did not function correctly, as well as for the over-ground irrigation conduit that was damaged and vandalised.

As a result, this lack of initial planning led to fragmented funding and delays.

> Risk of mal-adaptation due to water-intensive irrigation methods

Although the action taken by the municipality has enabled the protection of groundwater reserves, it has only had a limited effect on reducing water consumption (distribution of aerators, creation of a 60,000 m³ lake). In fact, irrigation is the most water-intensive activity in rural areas, and these projects have increased the area of irrigated land. The implemented projects only enable 20 farmers in Menjez to use drip irrigation techniques, out of a total of 200.

What sustainability?

The municipality has other ambitions for new projects in Menjez. These projects will focus on water that is present in the ground and in the air.

The Mayor admits that groundwater is the missing element in the municipality's action for water in Menjez, despite its importance. The municipality will not be able to envisage sustainable water management if it does not have a clear picture of underground resources and how they are replenished. The municipality is therefore interested in acquiring greater knowledge about groundwater, as well as in projects to send surface water underground to recharge the water table.

Regarding water in the air, the Mayor is soon planning to develop a water recovery project using water condensation in the air.



Reverse osmosis treatment system serving the Menjez public water fountain
Credits: Menjez municipality

What are the conditions for success?

> Key success factors

- Strong backing by the municipality
- An incremental, project-by-project approach, but with an overall vision
- Knowledge on project development and on responding to calls for projects from international funding bodies
- The central role played by the Mayor

> Critical areas

Two aspects will determine whether the municipality's approach will be successful over the long term:

- The municipality's ability to transform current irrigation methods that consume very large quantities of water
- The municipality's ability to independently maintain its momentum, aside from the central role that the Mayor is currently playing, and to build a stronger institutional base.

> Arguments for adaptation

The main connection between the Menjez municipality's water projects and climate change adaptation is the idea that using surface water can reduce groundwater exploitation. However, the key argument used with local actors is financial (cheaper, reliable, more plentiful water), to convince them to stop using unofficial boreholes.

> Useful lessons for similar initiatives

It is important not to consider water management as a problem (demand, pollution, etc.) but instead as an opportunity for the municipal management entity. Water management not only contributes to economic development and living standards, but can also provide financial resources for the municipality.

The Mayor insists that this service must not be free. It must be reasonably priced and proportionate to water consumption, but not free. This is important, both

symbolically and financially. To make the service sustainable, the municipality must design a business model that is also sustainable over time.

Alongside the strategy underpinning access to water resources, there must also be an approach to reduce/limit water needs, so as to avoid a future deadlock or tensions between demand for surface and groundwater, and the effects of climate change.

Contacts

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- <https://menjezmunicipality.wordpress.com/project-in-menjez/>
- <http://www.agriculture.gov.lb/Arabic/NewsEvents/Documents/ARDP%20Newsletter.pdf>
- http://www.lb.emb-japan.go.jp/Previous_Projects.html#2014
- <http://www.eurasia.undp.org/content/dam/RBEC/docs/NewWorld.pdf>



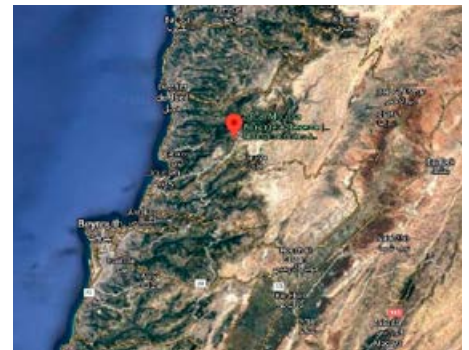
Organisation des Nations Unies
pour l'alimentation
et l'agriculture



Country: Lebanon:

Project managers: United Nations Food and Agriculture Organization (FAO) and Plan Bleu

Climate issue: Forest vulnerability to climate change



How does this initiative contribute to the territory's adaptation to climate change?

> Lebanon is very vulnerable to climate change

Temperatures are projected to rise by 1.7°C by 2050 and 3.2°C by 2100, together with an 11% drop in rainfall, a 70% decrease in snow cover, a 30% increase in flooding, 18 additional days of drought and a 60 cm rise in sea level. This will take an enormous economic toll on the country over the medium and long term.

> The forestry sector is particularly vulnerable

Although forest cover is currently expanding in Lebanon, and the country is still a carbon sink overall, climate change is having a negative impact on its forests: rising numbers of forest fires, greater vulnerability to diseases and infestation by insects, reduction in size and destruction of certain types of forests, erosion. The destruction of forests has an indirect impact on the numerous economic activities that they serve.

> In response to these impacts, the project aims to develop new practices in Lebanon to better understand, use and manage forests

These practices focus on climate change issues and aim to develop and pass on methods: 1) to better understand forest vulnerability, 2) to identify value chains and opportunities to develop forest products, 3) to establish appropriate, participatory governance.

> This initiative aims to make climate change adaptation a mainstream issue in forest management policies and practices, by intervening at various levels and by developing synergies with other ongoing projects on the same theme

In Lebanon, the project will provide working methods and management practices for the Association for the Protection of the Jabal Moussa Reserve (APJM). It will enable the Lebanese Ministry of Agriculture to consider the payoffs and obstacles to

using carbon funding mechanisms, and to assimilate value chain calculation methods that include ecosystem services. For SILVA MEDETERRENEA and the FAO, it will provide an opportunity to revive the Collaborative Partnership on Mediterranean Forests (CPMF) exchange network, especially between southern and eastern Mediterranean countries.

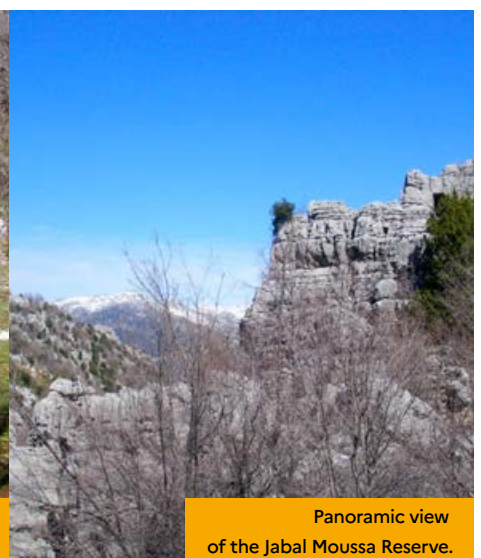
The project was developed in synergy with, and as a complement to the Adaptation au changement climatique des conditions cadres de la politique forestière dans la région MENA (Adapting the conditions governing forestry policy to climate change in the MENA region) project, implemented by GIZ and the same partners from 2010 to 2015.



Entrance to the Jabal Moussa Reserve.
Credit: association for the protection
of the Jabal Moussa reserve



Information panel
in the Jabal Moussa Reserve.



Panoramic view
of the Jabal Moussa Reserve.



Project spotlight

> Goal:

To encourage stakeholders to manage and restore Mediterranean forests, so that they can sustainably supply environmental goods and services, in a fast-changing global context with very high anthropogenic pressure on ecosystems

> Background

The Jabal Moussa Biosphere Reserve is the chosen pilot site in Lebanon for this initiative.

With its surface area of 6500 hectares, the reserve comprises a wide variety of habitats at altitudes ranging from 350 to 1600 m. It is a recognised Lebanese nature reserve, and includes three areas. The central area (1250 hectares) is totally protected to ensure conservation. The buffer zone, which extends to five villages, is for conservation with certain limited activities that are considered ecologically and socio-culturally

sustainable. The so-called transition zone includes 24 villages, and this area allows socio-economic development activities with low environmental impact.

The reserve is managed by an NGO, the Association for the Protection of the Jabal Moussa Reserve (APJM). The following activities are carried out inside the reserve: ecotourism, artisan catering, beekeeping, as well as illegal coal mining and sheep and goat herding. The law imposes a moratorium on cutting down conifers.

Climate change is having a visible impact, causing the decline of several species of trees within the reserve. Illegal coal mining and herding is also contributing to the decline of other species. Soil erosion is exacerbating deforestation and the contamination of rivers and streams. Finally, there is a high risk of forest fires in certain areas.

> Technical description

The project includes five components:

- **Component 1:** Data production and development of decision-making and management tools on climate change vulnerability and adaptation capacities
- **Component 2:** Estimation of the economic and social value of goods and services provided by forest ecosystems
- **Component 3:** Development of participatory territorial governance methods
- **Component 4:** Optimisation of environmental goods and services provided by Mediterranean forests, focusing on the opportunities offered by carbon funding mechanisms, especially REDD+
- **Component 5:** Coordination and communication

 Territory concerned	 Initiative holders	 Partners
<ul style="list-style-type: none"> • For the whole project: 7 forests in Algeria, Lebanon, Morocco, Tunisia, and Turkey. • In Lebanon: the Jabal Moussa Biosphere Reserve and the Bentaal Reserve (only for component 3). 	SILVA MEDITERRANEA (FAO) and Plan Bleu	<ul style="list-style-type: none"> • National Forestry Authorities in the five countries, GIZ, local forestry NGOs. • In Lebanon: Ministry of Agriculture (national), APJM (local)
 Calendar	 Human resources	 Financial resources
Start date: July 2012 Finish date: December 2016	<ul style="list-style-type: none"> • Two full-time staff working for the project initiators. • In Lebanon, two full-time staff at the Ministry and two at the AJPM, as well as specialist consultants for each component. 	<ul style="list-style-type: none"> • For the whole project (all 5 countries): €8.5 million • Funding: €2.6M (FFEM), €4M (GIZ), €1.5M (EU), €0.35M (MAAF)

What are the tangible results?

> A significant contribution to building and transferring knowledge, and to developing national forestry management capacities

- Production and online publication of an extensive bibliography and methodology overviews
- National capacity-building within the partner countries
- Leading and facilitating a dynamic sharing process between Mediterranean countries, relaunching the CPMF platform
- Assimilation of new forestry management methods by local partners
- In Lebanon, the project created momentum to use carbon audit tools and thus support the National Reforestation Programme
- The actions taken during this project indirectly contributed to the GIZ project. One particular example is the establishment of a 2015-2025 National Forestry Programme in Lebanon.

> A limited response to local issues

- For APJM, the databases and analyses produced during component 1 of the project have made a significant contribution to the reserve's management. In fact, this data compensates for the lack of information that was constraining the reserve's knowledge and ability to develop appropriate management tools.

- Although the studies on goods and services have enabled the development of new methods at the Ministry level, they were not sufficiently appreciated locally. For APJM, although the analysis demonstrated the financial returns on developing beekeeping activities (as a priority), ecotourism and thyme cultivation, it did not provide enough practical recommendations for local populations to make better use of the forest's goods and services.

> An effective response to climate issues

- The recommendations produced by component 1 have enabled APJM to rethink its forestry management practices, both to minimise fire risks and to allow endangered species to stabilise or even increase their populations.

> Better environmental resilience and institutional sustainability

- The new forestry management techniques used by the APJM are strengthening the reserve's environmental resilience.
- The Ministry of Agriculture has acquired significant knowledge on climate change issues and possible adaptation measures in terms of forestry management.

> Tense relations between partners and consultants can be a substantial obstacle to the smooth running of the project

Regarding the actions taken during component 3 (participatory governance), interpersonal problems and diverging methodology between the consultant and APJM led to these actions being discontinued on the reserve. These actions had to be carried out on another site (the Bentaël reserve), which resulted in delays and reduced the relevance of the Lebanese project's interlinked components.

> Structural mal-adaptation risks in Lebanon

- The force of the law imposing a moratorium on cutting down conifers has a negative impact on some forests, especially in terms of fire risks.
- The methods developed during this project seem to be particularly appropriate for forest areas where it is possible to develop economic activities and participatory governance. This excludes Lebanese reserves that are specifically classified as conservation areas, which are managed by specific, pre-established commissions/associations.

Words of a participant

"Before, we thought that climate change issues only covered forest fires and insect infestations. During this project, we have learned that climate change adaptation is a framework to seize opportunities for both ecological and socio-economic resilience arising from forestry management." (Director of rural development and natural resources, Ministry of Agriculture)

"We had a severe lack of data on the forest. The project enabled us to create a remarkable database. In addition, the recommendations from component 1 provided us with a new method to manage the forest, which we have implemented." (An APJM representative)

Sustainability of the initiative

Two GEF and IKI projects were developed and launched following this project, with the same partners, to take further steps to protect Mediterranean forests from degradation.



Information panel in a clearing, Jabal Moussa Reserve

What are the conditions for success?

> Key success factors

- Interest from the national governance institution and perception of the project as a learning opportunity on climate change topics
- As well as enabling the compilation of databases, the project provided answers to local and national stakeholder's questions, especially concerning the development of goods and services and their sustainability
- A Mediterranean-wide perspective, which enables networking and experience-sharing

The project concluded that it was necessary to improve forestry governance, and in particular to review forestry policies on resource usage and improve regulatory and administrative procedures. The introduction of some form of compensation for ecosystem services would allow more sustainable management of natural resources.

> Critical areas

- The project mainly includes intangible products (studies) and lacks applied activities, which particularly frustrated local partners and raised doubts on whether recommendations are applicable
- This project shows that a simultaneous drive to study the adaptation of forests to climate change at the local, regional and national level is a winning strategy. This does however require substantial efforts for the various partners to agree on expectations, timelines and actions to be taken.

> Arguments for adaptation

In this project, there are two key arguments to mobilise partners:

- Working on climate change adaptation for forests is a matrix to understand the local forest ecosystem and its vulnerabilities better, as well as to improve the management of its goods and services.

- Taking an interest in adaptation issues can safeguard the sustainability of these goods and services, or even increase it.

> Useful lessons for similar initiatives

- Local partners must be involved earlier in the project, in other words right from the project definition phase. A local perspective is very important since this brings direct, day-to-day experience of the realities of forest management. Furthermore, developing the capacities of local stakeholders is just as important as those of national institutions, to ensure that the approaches implemented during the project will be sustainable over time.
- Carbon funding mechanisms, in particular REDD+, are not necessarily of economic interest within the Mediterranean context. However, further thought on these mechanisms, in order to integrate them into the analysis and development of value-added forest goods and services, could be useful to plan sustainable management of Mediterranean forests over the long term.

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For more information

Website:

<https://planbleu.org/projets/optimiser-la-production-de-biens-et-services-par-les-ecosystemes-boises/>

Technical report:

https://planbleu.org/sites/default/files/publications/rapport_final_foret_libanc2.pdf

FAO study on sustainable forest management:

<http://www.fao.org/3/a-bb123f.pdf>



Country: Morocco
Project manager: Souhad Azennoud, Kissane educational farm, Ariaf Kissane cooperative
Climate issue: extreme weather events (drought and short-lived, heavy rains)



How does this initiative contribute to the territory's adaptation to climate change?

> Extreme weather events are threatening food sovereignty and food security

The Pre-Rif is a very fragile mountainous area, which is suffering from the increasingly marked effects of climate change. Heavy, short-lived downpours are more and more frequent, interspersed with long periods of excessive heat and severe drought.

Plant lifecycles are disrupted by delays in seed planting, and plantations are suffering from water stress, which threatens food security and food sovereignty. It is also important to highlight the deterioration in local biodiversity, as well as high soil erosion, both of which are caused by human and climate-related factors.

> Economic, social and environmental factors are also taking their toll on the territory

Many young people are leaving rural areas: they are turning away from local agriculture and settling in neighbouring cities (Meknès, etc.) or using their agricultural skills on farms elsewhere, since this gives them the opportunity to find paid work. Others are leaving the agriculture sector to work in caftan-tailoring (men and women).

Moreover, agricultural, culinary and craft skills are gradually being lost, while traditional seeds are being replaced by hybrid seeds, which are less resistant to local climate conditions. In addition, the use of chemical fertilisers has greatly increased. These factors, combined with the consequences of climate change, are taking their toll on this territory.

> Agroecology, a form of local resilience

The project focused on sustainable agriculture, without using any chemical products, as the key to resilience in this region, from an ecological (enriching soil, resistance to climate change), social and economic (necessary workforce) point of view. The project also aimed to implement a strategy to involve the region's young people, by capturing their interest and reinstating farmers and agricultural workers in their legitimate roles. In this region where agriculture has been predominant for generations, the farmer's role and knowledge are essential pillars in the local system, although the use of chemical products has cast doubt on these skills. A return to traditional agricultural techniques is therefore necessary, using improved agroecology techniques.



Author: Souhad Azennoud



Project spotlight

> Goal:

To develop the territory using sustainable, resilient agriculture.

> Background

The rural municipality of Kissane is situated in the Moroccan Pre-Rif region. It forms part of the Rhafsai circle in Taounate province.

The region is mostly devoted to farming and olive growing. The municipality is isolated in the mountains, and its local economy is suffering from the increasingly marked effects of climate change. In addition, the region has been affected by severe environmental degradation and many young people have deserted the area in search of opportunities.

This project has several ambitions, including: preserving land, highlighting the value of agricultural products that are disappearing, and encouraging the development of

income generating activities for farmers in the Pre-Rif region. The priority was to train farmers in agroecology, in order to enable them to use these alternative techniques rather than current cultivation methods.

> Technical description

This initiative is an integrated development project, comprising three complementary sub-projects:

- An individual beekeeping project;
- A family project for an agroecology educational farm that aims to achieve food and energy self-sufficiency;
- A community project for an agricultural cooperative focusing on the production of premium quality olive oil, equipped with a two-phase olive-pressing machine, which enables olive oil to be extracted using an environment-friendly process.

At the same time, the project is implementing strategies to:

- Build up the population's capacities (raising awareness, training);
- Promote agro-tourism to develop the territory and make it more attractive;
- Retain young people;
- Create cooperatives;
- Safeguard traditional crops (small spelt and Origanum compactum).

 Territory concerned	 Initiative holders	 Partners
Kissane rural municipality, Taounate province, Moroccan Pre-Rif	Kissane educational farm Ariaf Kissane Agricultural Cooperative	North Morocco Development Agency National Human Development Initiative (INDH) Local farmers Slow Food
 Calendar	 Human resources	 Financial resources
2002: launch of beekeeping project 2006: agroecology education farm 2006: creation of the cooperative 2013: FAO authorisation for organic certification 2017: acquisition of a small spelt dehusking machine	22 cooperative members 8 permanent employees at the farm, as well as seasonal staff	920,000 Dirhams (INDH, Ministry of Agriculture, North Morocco Development Agency, private loans) and own funds

What are the tangible results?

> Measures to foster local biodiversity

The agroecology training provided to women's groups, farmers, beekeepers and plant breeders, both at the farm and at the cooperative, has enabled several types of projects to be implemented, including:

- Planting a wide variety of trees (15 different varieties of fig trees, citrus fruit orchards, carob trees), herbs and medicinal plants at the farm, which are well-adapted to climate change. Seed swapping has enabled varieties from all over the world to be cultivated;
- Propagating *Origanum compactum*, an endemic wild plant that was disappearing from the region, at the farm.
- Planting hedgerows for bees and small animals in the vegetable patches;
- Preserving and highlighting the value of local agricultural seeds, especially small spelt, which is now cultivated by several female seed sowers. This cereal variety is cultivated at the farm, and marketed at the cooperative.

> Promoting a sector that contributes to local vitality

Building the capacity of the local population has reduced the rural exodus and encouraged young people to work locally and innovate in environment-friendly activities. 4 men and 4 women are employed full time at the educational farm, together with seasonal staff.

The Ariaf Kissane cooperative, which brings together 22 people, has helped to increase the employability of young people, since the cooperative's office is managed by young people who have received accounting training, to ensure the organisation's financial sustainability. The cooperative also enables products to be marketed, and has improved their quality.

Cooperative members are proud to be part of the cooperative, and their income has increased by 30-40% on average since they joined. Olive pressing now requires less water. In addition, the resulting vegetable water is not toxic and is used on the farm as bio-fertiliser (following a controlled dilution process). The olive pulp is used for heating or resold if there is a surplus. This method thereby enhances crop fertilisation and reduces waste.

> Prospects: tourism as an asset for agriculture

Local stakeholders agree with the development of agro-tourism in the region, to foster rural development, but for the moment they are facing constraints on accommodation capacity and bathrooms. Tourism could provide additional income for young people and encourage them to settle in the region.

> The need to set objectives for results

Scientific expertise would have been beneficial to support the initiatives carried out, to prove that agroecology is useful and has a positive effect on crop yields, and to democratise these practices.

Words of a participant

"I am 34 years old, I come from a family of farmers, and I have been working on the farm for two years as a "compost master. I have learned several agroecology techniques, which I pass on to others, including my father:"

Driss, a full-time employee at the educational farm



Marketing products at the cooperative

Sustainability of the initiative

Agroecology, and the interest expressed by the local population in this type of agriculture, has prompted the Ministry of Agriculture to stop offering training on chemicals (pesticides) for farmers in the Rhafsai area. Plans to develop agro-tourism in the region (mountain lodges) and recreational water activities on the banks of the Al Wahda dam reservoir, near the farm, are currently under discussion.



The cooperative, a place to raise environmental awareness

What are the conditions for success?

> Key success factors

For this type of project to be successful, the following conditions should be met:

- Know the territory well,
- Do not be afraid of failure, carry out experiments, be dynamic,
- Always seek information on environmentally friendly techniques,
- Build up capacity and pass on knowledge,
- Work as part of a network,
- Be meticulous, keep up to date with accounting and manage the cooperative effectively.

One of the project's strengths is that the initiative holder comes from the region, has higher-education qualifications and has previous experience working in the agro-food industry. She therefore has better knowledge of the territory and its increasing difficulties, and a more precise vision of the region's potential and which projects could achieve local development.

In addition, she also holds a legitimate role among members of the local community, who call upon her for advice. Finally, her experience has provided her with the right arguments for certain fund-raising initiatives, or to complete applications for authorisations.

Moreover, her involvement and work within a network of people who share the same vision and values (Terre et Humanisme, Slow Food) has enabled the following:

- Exchange of expertise, knowledge and skills,
- Communication about the project,
- National and international outreach.

The territory's isolated location is at once a strength and a weakness: although this enables several local crops to be preserved through agroecology, access to education, healthcare and opportunities to sell products are limited.

Finally, there is very little support for "organic" farming from the Ministry of Agriculture. For example, there are no subsidies for this sector, as opposed to conventional agriculture.

> Arguments for adaptation

Agroecology is an effective technique against soil erosion and to improve adaptation to climate hazards. As an integral part of a rural development project, it builds up the local population's adaptation capacities, through sustainable, environmentally friendly activities.

> Useful lessons for similar initiatives

The project is based on personal initiatives, as well as a lot of voluntary work.

The local population has managed to create momentum in the region and is developing action plans to promote their territory both nationally and internationally.

For more information

<https://www.youtube.com/watch?v=rEkV3fv-S5o>

<https://www.youtube.com/watch?v=xFWxFFeL6k4>

<http://www.initiativesclimat.org/Porteurs-d-initiatives/AZENNOUD-Souhad>

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Study carried out by **Zhor Lebbar**, **AGROCONCEPT**



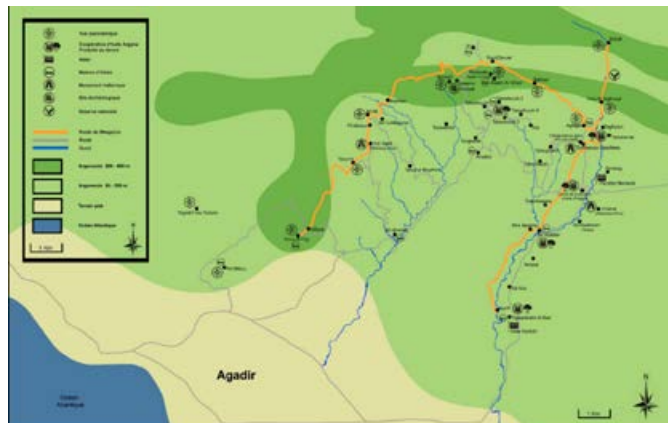
Environment-friendly recreational water activities are planned around the El Wahda dam reservoir. Credit: Jakob Korczyk/Shutterstock.Morocco



Country: Morocco

Project manager: Ibn Al Baytar Association (Rabat)

Climate issue: Increasingly violent and frequent extreme weather events (floods, droughts, heatwaves)



Map of the Mesguina road.

How does this initiative contribute to the territory's adaptation to climate change?

> Extreme weather events are reducing forest cover and putting populations at risk

The following signs show that various parts of the Mesguina territory are under threat from climate change:

- Increasingly violent and frequent floods;
- Lower rainfall and more frequent periods of drought;
- Increasing air temperature and longer, more frequent heatwaves.

These changes are causing forest cover to retreat, and placing greater pressure on natural resources (in particular, the reduction of water resources available for various uses).

> Growing social and gender inequality

Water resources are unevenly distributed throughout the territory, both in terms of timing and location. At the same time, drinking water supplies and water available for irrigation are declining.

Moreover, extreme weather events such as droughts and floods have differing effects on each category of the population. Women are thus more exposed to these risks than men, who leave the area to work in Greater Agadir.

> The argan forest as a solution to adapt to climate change

Adaptation to climate change hinges on reforestation. The argan tree, which is endemic to Morocco, plays a very important socio-economic and environmental role. The argan forest ecosystem can not only be used as an instrument to fight desertification and climate change, because it forms a natural barrier against the desert and can store carbon, but it is also of high value in terms of biodiversity.

> The argan forest as a solution for local development

The economic value of argan trees has raised the local population's awareness of the need to protect them. High-value,

argan-based products can indeed be used in cosmetics or pharmaceuticals. However, to develop the argan forest and implement adaptation measures successfully, it is essential to take into account gender issues, especially in local communities.

The project has provided the following benefits for the local population:

- Promotion and development of the territory
- Restoration of the landscape as well as the local, architectural, historical and natural heritage
- Promotion of social economy systems
- Marketing the cooperatives' products locally
- Development of income generating activities for women
- Training and education for women and girls



Credit: danm12/Shutterstock.com



Credits: Zoubida Charrouf, Ibn Al Baytar Association



Promoting the Arganeraei regeneration project.



Project spotlight

> Goal:

To preserve the Mesguina argan forest by involving local populations and empowering women.

> Background

The Mesguina territory is located in the Souss-Massa region, about 5 km from Agadir, in the foothills of the Western High Atlas, in the Taghzout valley. Mesguina is part of the Arganeraie Biosphere Reserve.

This mountainous site, with its varying landscapes and ecosystems, is valuable. Its natural, cultural and architectural heritage are also valuable.

The overarching problems in this territory are the advancing desert and the effects of climate change. There are also social problems, mainly due to gender inequality, especially regarding access to education and property.

The Mesguina argan forest covers 30,000 hectares of the area surrounding Agadir. This ecosystem is currently under high

anthropogenic pressure and faces some important challenges to achieve sustainable development:

- A relatively high level of poverty,
- Retreating forest cover (due to urbanisation, erosion, desertification, overexploitation, agriculture and land clearing), which is exacerbating pressure on natural resources,
- The prevailing socio-cultural customs, which are hindering the emancipation of women and the organisation of argan production.

These local issues are compounded by the more widespread problems facing the Souss-Massa region, such as desertification and water scarcity.







> Technical description

The project consisted in supporting the creation of women’s cooperatives to promote argan products, then grouping these cooperatives together into Economic Interest Groups (EIG). The association

ensures that the cooperatives receive the tools they need (tracking system, training, monitoring activities, intermediation) to improve their turnover and make their activity sustainable.

In addition, the association is working on initiatives to promote local territorial development and protect the environment, for example:

- Initiating the Mesguina ecotourism route project
- Campaign to vaccinate dogs against leishmaniasis
- Responding to ad hoc requests from the population
- Mobilising the initiators of innovative environmental protection projects, so that they can be tested on site

 Territory concerned	 Initiative holders	 Partners
<p>Mesguina, comprising 13 douars and the argan forest</p>	<p>Ibn Al Baytar Association</p>	<p>Moroccan High Commissioner for Water and Forests German development agency (GIZ) Etc. (see next page)</p>
 Calendar	 Human resources	 Financial resources
<p>1996: Creation of the Ibn Al Baytar Association 2003: First EIG 2011: Obtainment of the "IGP Argane" label 2014: Launch of the Mesguina ecotourism route project</p>	<p>Between 5 and 25 members of staff depending on the project, as well as the association's volunteers, trainees and participating PhD students</p>	<p>Several international development agencies funded various components of this project</p>

What are the tangible results?

> Organising the territory around resilient development projects and the reforestation of the argan forest

A few results are highlighted here, in chronological order:

- 2004: literacy caravan benefiting 2000 women, which led to the development of income generating activities through the creation of around ten cooperatives. These cooperatives were then federated into a union to develop the production and sale of argan oil
- 2006: creation of a production centre meeting HACCP standards (funding from INDH and the Monegasque Cooperation)
- 2011: creation of the Mesguina Association for Argan Tree Rights Holders, to organise the argan production sector in the Mesguina forest. This association brings together local development associations working within the territory. Obtainment of the "IGP Argane" label, which led to an increase in the price of argan oil. It now sells for 250 Dirhams, rather than 40 Dirhams.
- 2011: the Tighanimine cooperative obtained the FairTrade certification
- 2013: A participatory assessment was carried out (funded by the Good Planet Foundation), involving the populations of 13 douars within the project's territory, to identify the environment-related constraints that were limiting development

in the area. This assessment provided a clear picture of Mesguina's potential

- In 2014, the Ibn Al Baytar Association suggested some ideas to develop ecotourism, encompassing the promotion of local products and hand-crafted products, as well as local, architectural, historical and natural heritage. The Association then organised a participatory workshop (funded by GIZ-ACCN) to develop the concept of the Mesguina ecotourism route
- Between 2015 and 2018, 25 hectares of argan forest have been replanted (funded by the Japanese and Norwegian development agencies, and by the High Commissioner for Water and Forests and to Fight Desertification)
- The Association carries out regular training sessions on the regeneration of argan trees and the conversion of waste from the crushing process (charcoal or sale of excess production).

> Continuing to develop tourism

The Association is continuing to work locally, especially on the planned tasks for the ecotourism route around the argan forest and the territory's heritage sites:

- Installation of information panels and signposts for the tourist circuit
- Mobilising travel agencies

- Integrating women's cooperatives along the route

> Risks or difficulties to be addressed

Despite the project's mainly positive results, certain issues still prevail, such as the well-established patriarchy, illiteracy among the local population, waste management and waste water treatment. These issues place limitations on certain development prospects.

Moreover, throughout the country, the argan sector is still opaque and not well organised. This means that, although the commercial success of argan oil has had a positive effect, higher argan oil prices do not seem to have benefited the local population and producers (mainly due to multiple intermediaries and purchasing argan seeds - amandons - at local markets).

Furthermore, there is no information on the success rate of reforestation campaigns (some newly planted trees die because of drought).

Finally, pasture management is also a problem, since the area suffers from overgrazing, which disrupts the natural environment. It is therefore preferable to keep goats away from recently reforested areas, to protect young plants.

Words of a participant

"We are members of one of the most recent EIGs. Thanks to the involvement of the Ibn Al Baytar Association and GIZ, we have managed to form a partnership with the High Commissioner for Water and Forests to regenerate the forest. The argan tree is our heritage, we must protect it. When you join a cooperative that is part of our EIG, there is one unequivocal condition: you must make a commitment to replant the argan forest."

Khadija, a member of the "Ethical Women" EIG

Sustainability of the initiative

By safeguarding local skills, organising the argan sector, carrying out reforestation, providing a decent income and empowering women, these initiatives guarantee the sustainability of argan-related activities, which help to increase the capacity of local communities to adapt to climate change.



25 ha have been reforested.
Credits: Zoubida Charrouf,
Ibn Al Baytar Association

What are the conditions for success?

> Key success factors

Scientific research on the argan tree and its ecosystem is a crucial component in this development process. By studying and shedding light on undiscovered aspects of the tree, this enables the development of technical, institutional, political and organisational solutions to manage the ecosystem sustainably.

The key to the project's success is then the involvement of its beneficiaries. Since the headquarters of the Ibn Al Baytar Association is in Rabat, it therefore relies on their involvement to accomplish projects. In general, local communities have very quickly taken ownership of these initiatives.

Another vital component is the ability to raise funds, in order to enable projects to move forward.

> Critical areas

Lack of structure in the argan sector is leading to increased inequality. A monopoly on these products is currently being organised.

To develop tourism in this area, it is necessary to provide visitors with sanitation facilities and to manage waste. Currently, the beautiful landscape is marred by waste. Regarding sanitation, an ecological liquid sanitation project using argan charcoal will soon be tested, which should eliminate odours and water coloration. This water can then be used for irrigation.

> Arguments for adaptation

Climate change will exacerbate the negative mechanisms that are gradually weakening the territory: desertification, access to water, social and gender inequality. It is important

to anticipate these issues right away, in order to consolidate the resilience of the territory and its communities, while preserving their natural wealth and resources.

> Useful lessons for similar initiatives

The cooperatives must be rigorously monitored (e.g. by requesting regular reports to facilitate remote follow-up).

It is important to make sure that people from all categories of the population participate in these projects, in order to embed traditional skills within society. This is particularly true for women, who rarely participate in community activities without encouragement.

The mobilisation of a large team of experts helps projects to progress and lends legitimacy to their results (and also encourages feedback on field experience).

For more information

<https://www.goodplanet.org/fr/projet/agriculture-foresterie-durable/preservation-valorisation-de-larganeraie-maroc/>

<http://www.initiativesclimat.org/Toutes-les-initiatives/Resilience-de-l-arganeraie-de-Messguina>

<https://www.facebook.com/pg/AssolbnalbaytarMA/about/>

Contacts

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Hassan Aboutayeb, Atlas Kasbah Ecologie
Khadija Saye, president of the Ethical Women EIG

Study carried out by Zhor Lebbar, AGROCONCEPT



Credits : Zoubida Charrouf,
Association Ibn Al Baytar



Country: Morocco
Project manager: International Office for Water, Mediterranean Water Institute (IME)
Climate issue: extreme weather events (floods and periods of drought), aridification, desertification and diminishing water resources



Source : ABHS, 2011.

How does this initiative contribute to the territory's adaptation to climate change?

> The visible effects of climate change in Morocco and the Sebou river basin

Morocco is faced with negative impacts of climate change, including:

- drought,
- land aridification,
- the advancing desert,
- diminishing water resources.

In the Sebou river basin, the Gharb plains are regularly affected by flooding. In addition, periods of drought are also causing water stress.

> The need for data to plan water management for each river basin

Scenarios that project future water supply and demand, and take into account climate change-related parameters (rainfall, temperatures), are necessary to define how to manage and adapt water quantities to multiple constraints. Based on these scenarios, adaptation measures can then be defined.

The Mediterranean Water Knowledge Platform project aimed to contribute to the development of sustainable policies for Integrated Water Resources Management (IWRM) and climate change adaptation by producing a Mediterranean White Paper on water in addition to National Water Information Systems (NWIS). Although water databases do exist, they are very disparate and are scattered throughout various institutions. The NWIS should enable all this information to be standardised and shared by various institutions in participating Mediterranean countries. Today, the White Paper and the platform are not yet available.

> National ambitions still need to be implemented locally

Morocco's National Water Plan (PNE) comprises regulatory and institutional measures to combat vulnerability to natural hazards caused by climate change (flood protection, drought prevention), as well as water-saving and conservation measures for agriculture (monitoring the

use of resources, targeted irrigation, a tariff system to encourage the rational use of water, generalising aquifer contracts for groundwater reserves that are showing stress or are overexploited, etc.). These objectives now need to be implemented in each territory.

> Water planning under review for the Sebou basin

Although certain components of the Water Information System (WIS) to evaluate and monitor water resources are already available for the Sebou basin (e.g. water availability, pollution), other information on usage and pressure on water resources (including climate change impacts) is still to be included. The Integrated Water Resource Basin Master Plan (PDAIRE) for the Sebou basin, which is currently being revised, is however intended to include the impacts of climate change on water resources and usage.



Source: Union for the Mediterranean



Source: Sebou river basin authority



Project spotlight

> Goal:

To set up an operational Water Information System (WIS) to support water management planning in the Sebou river basin, which takes into account the impact of climate change on water resources and defines appropriate climate change adaptation measures

> Background

Covering around 40,000 km², the Sebou basin is one of the largest river basins in Morocco. It currently has a total population of around 6.2 million people (2004 census), which represents about 20% of the country's overall population. 49% of these residents live in urban areas and 51% in rural areas. Its agricultural and industrial economy makes a substantial contribution to the nation's economy.

This basin is facing major water quality issues. Groundwater quality is considered alarming in intensively farmed regions (Gharb, Sais, Maamora) due to increasing







concentrations of nitrates, and surface water quality has deteriorated, especially downstream from major urban areas. In terms of quantity, the basin's water inflows are unevenly spread over the length of the river, and occur at irregular intervals. The upper Sebou above the Allal El Fassi dam is the exception, with a continuous flow due to intakes from water sources. The other tributaries of the Sebou river, especially the Ouergha and the Inaouène, vary according to rainfall, with very high water levels during the rainy season. The basin's groundwater resources supply drinking water and serve industrial water needs for the majority of urban and rural areas.

They also provide water for irrigated areas (small and medium hydraulics systems). These productive aquifers are vulnerable to drought, overuse and pollution.

> Technical description

Morocco is one of the four pilot countries for the Mediterranean Water Knowledge Platform. The Moroccan water department has made a commitment to this Mediterranean experience-sharing approach in order to develop its own system. This long-term project was launched in 2014 (by comparison, the French WIS required 15 years to complete and is still being modified today). 2016 is an important milestone: the WIS was recognised in the Water Law and a decentralised approach to water management was adopted (by river basin), based on basin information systems, and in close contact with local stakeholders and resources.

The European institutional twinning between Morocco, France and Spain (2015-2017) on Integrated Water Resources Management and Governance in Morocco enabled progress to be made regarding the use of data to manage water resources and the definition of the future basin WIS.

 Territory concerned	 Initiative holders	 Partners
4 pilot countries (Morocco, Tunisia, Lebanon, Jordan)	International Office for Water, Mediterranean Water Institute	Moroccan Ministry of Energy, Mines, Water and Environment, Euro-Mediterranean Information System on know-how in the water sector (EMWIS), League of Arab States - Centre of Water Studies and Arab Water Security (COFWS), Plan Bleu - Mediterranean Network of Basin Organisations (MENBO), the Euro-Mediterranean Water Institute (IEA), AGBAR Foundation.
 Calendar	 Human resources	 Financial resources
2013 - 2017	N/A	Total Budget: €9.525 million

What are the tangible results?

> Recognition of the need for transparent information

Several milestones have been passed, including:

- The inclusion of the central, structural role played by effective, coordinated management of water information in Water Law 36-15, which was adopted in 2016
- The gradual development of water information systems within River Basin Authorities (RBA), in coordination with basin stakeholders (public and private actors, elected representatives and civil society organisations working on water issues)
- A national thinktank has been created to support the development of the Water Information System

> Climate change adaptation using PDAIREs

In the Sebou basin, the 2015 PDAIRE is currently being updated, especially the section on the impact of climate change on water resources and the demand for water. This has enabled climate change adaptation actions to be defined, for example: saving and reusing water, using reforestation to counter plans for dams,

water infrastructure, flood defences, aquifer contracts, etc. These measures, as well as their quantifiable targets, will soon be approved with stakeholders.

The implementation of aquifer contracts has already commenced, for example in the Saiss region, to reduce pressure on the aquifer. "Participatory aquifer management contracts", in keeping with Water Law 36/15, are being implemented for aquifers that are running low and/or where groundwater resources are being overexploited. This new groundwater governance method relies on the participation and commitment of local and regional partners to manage these resources using a concerted, participatory approach. This type of contract regulates the extraction of groundwater and restricts the drilling of new boreholes.

In addition, the natural environment's water requirements are taken into account in the PDAIRE update (this specific need is accounted for below every dam), since aquatic ecosystems are particularly vulnerable to climate change. To meet these needs, a minimum water flow is provided. A statutory text relating to ecological flow (the "minimum flow for aquatic life" decree) is currently being drawn up.

> Information channels need to be improved

Data exchange needs to be automated between various national institutions on the one hand (RBA, Ministries – including Industry, Tourism, Agriculture, Interior, National Office for Electricity and Drinking Water, etc.) and EMWIS on the other hand, to streamline information-sharing and improve reporting processes.

However, the fact that the PDAIRE is currently being revised, which entails concertation with the Basin Committee (comprising one-third State representatives and two-thirds local authority and user representatives), has limited access to information on the document's quantifiable targets, proposed measures and the scale of its actions.

Sustainability of the initiative

The fact that a less-endowed ministry (the Ministry of Energy, Mines, Water and Environment), with less political weight than other ministries, is supporting the implementation of Water Information Systems, could affect their sustainability, even though water is a cross-cutting issue. In addition, if the RBAs do not base their PDAIREs on these systems, this could reduce their long-term use within each basin.

Finally, the long-term sustainability of such systems depends on funding for their implementation, operation and future evolution, to enable them to provide the information required and to develop over time.

What are the conditions for success?

> Key success factors

The following factors facilitated the implementation of information systems, both nationally and by river basin:

- An appropriate legal environment (WIS are recognised in national water legislation)
- The legitimacy of RBAs to consult with users and State institutions
- The establishment of Basin Committees, which enable the coordinated development of a PDAIRE
- The acknowledged importance of integrating adaptation measures into the planning process (PDAIRE and PNE)

> Critical areas

However, the following limiting factors were encountered:

- Government restructuring, which slowed down the implementation of national WIS governance

- Lack of funding to implement and operate basin WIS
- Water stress, exacerbated by periods of drought, which made it difficult to maintain a minimum flow. Water availability conditions could be stipulated to cover this situation

In particular, the central issue is how these information systems will be funded (including their operation) in countries where the 'polluter pays' and 'user pays' principles are not yet in force. The challenge will therefore be to invent a mechanism to fund them (for example based on taxing water usage and/or pollution emissions). The arguments to mobilise funding for information systems could be their low cost and their generally very positive return on investment.

In fact, in comparison with other investments in the water sector (infrastructure, sewage treatment plants, distribution networks, etc.), investments in data production and information management are much lower and

can have a very positive impact on decision-making and the allocation of investments.

> Useful lessons for similar initiatives

Identifying issues precisely, based on reliable, confirmed information (using robust methodology), is an essential first step to defining operational measures and allocating funds to them.

It is particularly vital to take into account the current and future effects of climate change on water resources, so as to prevent the deterioration of water resources and aquatic environments, as well as potential conflicts over water usage.

Over the long term, effective information systems can also enable the introduction of charges and taxes on water usage and pollution emissions, like those recommended in the IWRM implementation principles.

For more information

Mediterranean Water Knowledge Platform website:

<http://mwkp.semide.net/index.php/fr/>

Contacts

Eric Mino, Manager and coordinator of EMWIS (Euro-Mediterranean Information System on know-how in the water sector)

Study carried out by Zhor Lebbar, AGROCONCEPT

Country: Palestinian Authority- West Bank, Ramallah

Project manager: Malveena Aljamal, Director of the Health and Environment Department- Ramallah Municipality

Climate issue: Extreme weather conditions including violent winds, torrential rain, heat waves, floods, droughts and air temperatures.

STATE OF PALESTINE



How does this action contribute to the territory's adaptation to climate change?

> Ramallah city prone to diverse risks due to climate change

Ramallah city is increasingly hit by extreme weather conditions that include violent winds, torrential rain, heat waves, floods and droughts. Slow onset events, like changed precipitation patterns and temperature increase, are also expected to affect the city. Overall, the risks induced by climate change on Ramallah city are the following:

- Increased urban heat. Higher number of yearly days of high temperature (daily maximum temperatures above 30°C), acute heat waves, major sand storms, high evaporation rates;
- Desertification;
- Decrease in the annual precipitation (10% by 2020) and change in precipitation patterns;
- heavy snow and rain storms.
- Flash floods;
- Decrease in water availability due to lesser runoff and higher demands;
- Aggravation of runoff flood risk.

> Expected impacts of climate change on socio-economic activities of Ramallah

Extreme weather conditions impact human health and productivity by adversely affecting economy-dependent sectors including agriculture, tourism, and transportation. This is especially true in Ramallah, the central and economic capital of the West Bank. Extreme conditions may also damage property and critical infrastructure, reduce accountable labour hours and alter supply chain operations. Moreover, the energy demand will also increase as power generation becomes less reliable and clean water less available. The scarcity of water resources in addition to the growing food insecurity will result in a noticeable uptick in food prices.

Moreover, irregular precipitation will add to the risk of waterborne and foodborne diseases and allergies and will facilitate propagation of disease vectors affecting vulnerable population (the elderly, children and low-income communities). Not to mention that extreme weather and climate-related natural disasters can also exacerbate mental health issues.

> Planning climate change adaptation to strengthen socio-economic resilience

The resilient Ramallah 2050 strategy represents an ambitious but practical program. It includes actions in which the municipality and other partners can achieve immediate benefits, as well as other longer-term actions that have the potential to be truly transformative.

The City's Strategic Resiliency Plan, of which climate change adaptation is an essential component underlines the interdependency between climate resilience and socio-economic resilience and the importance of co-benefits of adaptation and mitigation measures undertaken.

The implementation of this program started in 2012. Its contribution to the socio-economic resilience of the city is considered clear and significant, especially through the last five years where most of the project components (energy, wastewater, widening of green areas,...) showed concrete results on the ground that improved the quality of life through direct and indirect employment opportunities.



Recyclable household waste
Credit Lightspring/Shutterstock.com



Urban flood
Credit: thanatphoto/Shutterstock.com



Ramallah hills.
Credit: Yacoub Rabah/Shutterstock.com



Project spotlight

> Goal :

Implementing the City's Strategic Resiliency Plan, of which climate change adaptation is an essential component.

The implementation of this plan aims to:

- Protect the environment of Ramallah city through the reduction of the carbon dioxide emissions by enlarging the green areas, encouraging clean production and starting the transition to renewable energy, and invest in sustainable development.
- Reduce the risk of groundwater pollution by wastewater effluent by connecting the entire city to the sewer network. Also reduce the risk of wastewater flooding by replacing all asbestos pipes and treating and reusing wastewater.
- Focus and invest in solid waste recycling projects.
- Enhance community engagement for shared responsibility in climate change adaptation and establish an emergency network with relevant stakeholders to address hazards resulting from extreme weather conditions.

> Background

Ramallah is a hilly city that spreads over an area of 19 km². It functions as the main political, economic, and cultural capital of Palestine. Its population doubles daily as people flock to it to shop and work. The city's main environmental problems can be summarized as follows:

- Increased urban heat and decreased precipitation which results in higher temperatures and lower availability of water resources.
- Change in precipitation patterns resulting in flash floods and desertification.
- Growing issues related to food availability, accessibility, utilization and security. These can be traced to problems in food production, distribution channels and changes in the purchasing power and market flows.
- Finally there are problems linked to human health, in particular via nutrition.

In 2008, the city celebrated its centennial by launching a series of festivities and projects that were a result of a strategic plan, where enhancing the city's environmental status was among its top priorities. This particular project counts among them.







> Description

The project targeted the energy, wastewater and solid waste sectors in addition to the widening of green areas.

The funding of this initiative took the form of external funding of which each component was funded by a different source/s.

An empowerment of each sector has been at the basis of the plan implementation : each sector possessed its own funding source, was in charge of the project team management and of the delivery of project products, notably through a monitoring and control system; which mainly depends on the sector at hand. The progression and completion of the work was directly assessed by the municipality itself or by the beneficiary of the project.

One of the weaknesses of the initiative is that no numbers are available in a centralized way, to give a clear overview of the outcomes. This is notably due the fact that the strategy implementation is made out of many small projects based on different sources of funding and different criteria in the reporting systems.

 Territory concerned	 Initiative holders	 Partners
Ramallah City (Urban area)	Ramallah Municipality	Rockefeller Foundation, Anera (American Near East Refugee Aid), Palestine Investment Fund, Bank of Palestine, Taawon organization
 Calendar	 Human resources	 Financial resources
Start year: 2012 Duration: 7 years	The total number of beneficiaries is around 24,600 (population count of the city).	The total estimated budget is around EUR 1 million.

What are the tangible results?

> Key results arising directly and indirectly from the implementation of the City's Strategic Resiliency Plan

Renewable Energy:

- Started the switch to renewable energy through piloting with solar energy on the roof tops of municipal infrastructure. (Electricity outcome: 70 MW and CO2 emissions cut: 150 tons)
- Invested in power generation from renewable energy to cover the needs of the municipality.
- Replaced conventional streets lighting with low energy-consumption LED lights
- Promoted the continued use of solar water heaters in households, by updating licensing procedures and through environmental awareness initiatives
- Facilitated the installation of electric car charging stations in the city

Sewage Water Network:

- Connected 83% of the city with sewage water network
- Installed an advanced WWTP by MBR technology producing 300-500 M3 of reclaimed water per day with an Effluent BOD: 10mg/L, COD:26 mg/L, TSS: <2mg/L and re-using the reclaimed water.
- Expanded storm water network by 30 km

Promoting pilot system for recycling of solid waste:

- Replaced open community waste collection containers with curbside collection system resulting in 45% waste reduction and increase in solid waste fleet management efficiency by 65%
- Supported the operations of a composting plant in neighboring rural community
- Supported the establishment of small enterprise for plastic recycling.
- Collected paper and cardboard separately in commercial establishments.
- CO2 emissions reduction –not measured

Green areas

- Conducted tree planting campaigns that included planting 15 thousand trees, where the city council endorsed new regulations to ensure completion.
- Included rain harvesting systems in new buildings.
- Increased the number of public parks, with an annual rate of 2 parks per year.
- Operated a nursery that produces fifty thousand plants/year, and replanting all uprooted olive trees in designated locations in the city.

The strategy will allow the local community to deal more effectively with a wide range of challenges associated with rapidly growing cities, as well as building resilience to external pressures (notably climate change) that undermine Palestine's stability and can drive internal migration, increasing overcrowding and socioeconomic inequality.

> An inclusive and participative approach

Ramallah city was the first Palestinian city in 2014 to join an international Network called "100 Resilient Cities" pioneered by The Rockefeller Foundation.

Throughout the development process of Ramallah Resilience strategy 2050, a wide range of stakeholders had participated in shaping Ramallah 2050 vision, which is considered as an institutional commitment from the public authorities. Notably, kids were consulted and included in the selection of environmental actions, through brainstorming workshops conducted in some schools.

This strategy reflects the municipality's success in planning and developing a new non-traditional environmentally-friendly approach.

> Obstacles encountered and levers mobilized

During the operational implementation of climate change adaptation, many factors were found to make it harder to plan or adapt to climate change issues. These commonly include lack of resources (like funding, technology, or knowledge), faulty institutional

characteristics, or lack of connectivity and environmental quality for ecosystems.

A more detailed appraisal follows

- **Knowledge deficit:** Imprecise knowledge mainly affects perceptions of risks, leading to overconfidence in the ability of actors to manage climate risks or their evolution, in turn constraining adaptation.
- **Technical constraints:** dearth of up-to-date technologies, poor capacity to finance technical adaptation projects, limited skills to operate and maintain funded projects, lack of acceptability from users and affected stakeholders; and effectiveness in managing climate risks. The West Bank in general does not possess even the simplest levels of technology in many environmental and climate issues (solid waste is a major example in this area where there is no solid waste landfill in the city of Ramallah and there is no recycling industry in the city).
- **Financial constraints:** Financial capital can manifest in a variety of forms including credit, insurance, and tax revenues, as well as earnings of individual households or private entities. The private sector does not always prioritize environmental funding.
- **Human Resources Constraints:** Human resources provide the foundation for intelligence gathering, the uptake and use of technology, as well as leadership regarding the prioritization and measures of adaptation policies and their implementation. This area is very weak and requires extensive capacity building and enhancement both at the stakeholder level and the decision making level.
- **Social acceptance and constraints:** many issues are still related to public rejection. Changing community behaviour and raising awareness of stakeholders is still a priority (e.g. reuse of the treated wastewater effluent and the separation of the solid waste at household level are two examples on this area).
- **Political constraints:** the Israeli authorities set a major constraint in obtaining a permit for any adaptation option selected by the project.

Words of a participant

"The powerful part of communicating with the school kids is that they think outside of the box. They come up with original ideas that the adults usually miss. The involvement of school kids started from the beginning of planning, through brainstorming workshops. Those kids shared ideas and contributed to the selection of themes and subjects for the environmental protection programs conducted in their schools. The project was successful in involving the young generation on vital and critical issues like climate change and on the importance of finding the most suitable adaptive solutions for a better future. Especially the social media explosion helped in increasing awareness to these issues amongst the new generation."

Rula Hayek- PYP teacher



Works of art created using renewable materials by pupils and teachers from the Amis de Ramallah school

What conditions for success?

> Key success factors

- Design the project's various tasks and components based on the identified needs of the city. This has been a result of prior projects' recommendations (implemented by the municipality and other active organizations), and the expertise gained from the expressed needs of the inhabitants.
- Engage and actively communicate with all stakeholders, local authorities, funding agencies, and NGOs throughout the project lifetime, starting from the planning and ending with sustainability measures. Engaging the beneficiaries from the beginning was very useful especially in selecting the most convenient and practical solutions.
- Securing financial resources is a major factor for success. The size of the activity is generally dependent on the available funds.
- Legal cooperation. This was evidenced by the environmental penalty draft authorized by the ministry of local governance.

> Critical Areas

With experience gained over time in implementing projects related to environmental issues and to climate change, the following points are found critical and attention-worthy at the local level:

- The decreasing precipitation and increasing demands on water is leading to significant water scarcity and pressure on this resource. In addition, the fact that conflicting entities govern the area's resources (Palestine and Israel) significantly increase the issue of water resources sustainable management and the sustainability of the ongoing initiatives.
- Local expertise and technical skills in the environmental field are desperately needed. For example, there is no expertise in the field of energy recovery from waste. The composting unit in the village of Betello is a living example of this: the project was abandoned due to a lack of qualified maintenance capacity, which wasted the money and time spent on its design.
- Private sector interest in the environmental sector must be bolstered.
- The community is the main driver of any project on the field. Therefore, social acceptability is one of the main pillars of success. A lot of work remains to be done to raise public awareness - for example, the public still refuses to treat treated wastewater effluents.
- Although much effort has gone into organizing and allocating funds in the area of climate change or the environment, prioritization and targeting of funds remains chaotic between donors and local authorities.

> Useful lessons for similar initiatives

Raising awareness among community, employees and decision makers is a key step towards the success and sustainability of any climate change adaptation or mitigation project. To this end, the municipality has created dedicated positions and hired permanent employees in its awareness department.

With hindsight, cheaper adaptation actions could be carried out. This includes the transfer of solid waste from Ramallah governorate to Jenin governorate, which started seven years ago. For instance, the operation costs one million dollars per year, which represents up to seven million dollars in total expenditure for the transfer of solid waste to a landfill in another governorate. This money could for example cover the cost of a solid waste disposal project which could cover waste management in the target area over the same period.

> Arguments for adaptation

Local climate change effects are accelerating and seemingly becoming more dangerous. If neglected, the situation will worsen severely and the impacts will soon become unmanageable. Adaptive solutions provide opportunities to mitigate the inevitable. Ramallah city is already suffering from failed monsoons with unsteady, fluctuating rainy seasons in winter, and longer, warmer temperatures in summer. If adaptive solutions are neglected, the first and worst to suffer will be the vulnerable, the poor, and the marginalized. The scarce fresh water resources will keep dwindling while needs rise. And energy and food prices will become unaffordable when compared to the low income rates per capita.

Finding additional sources of water (reclaimed wastewater), fighting pollution of the existing sources (polluting the groundwater aquifers), creating feasible and manageable sources of renewable energy, and raising awareness amongst the community is the main objective of this initiative.

> Sustainability of the initiative

By offering an exchange platform and by building on available financial resources, the idea is that the government, the private sector and the active national and international agencies now work hand in hand with the community members to achieve the current and future planned adaptive solutions in the city.

The implementation of this strategy will help open a new phase of greater investments to deal with natural, climate or human-made shocks and stresses, and to secure wellbeing and safety of the people in all circumstances regarding to climate change adaptation.



Replacement of existing streetlights with low-energy LED bulbs in 2019



Use of purple HDPE pipes for irrigation.



Purple coloured reclaimed water truck.

Contacts

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Investigation by **Shahd Tibi**, independent consultant

Pour aller plus loin

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Country: Tunisia

Project manager: Global Water Partnership - Mediterranean (GWP-Med)

Partner organisations: Tunisian Ministry of Agriculture, Water Resources and Fisheries, Bizerte local authorities

Climate issue: Water stress, flooding, drought and erosion



Source : C. Evain, 2018.

How does this initiative contribute to the territory's adaptation to climate change?

> The impact of climate change on natural resources and habitats

The Douimis basin has a mainly semi-arid climate, with large seasonal fluctuations in rainfall that also vary from year to year. In addition, water resources are currently under pressure both in terms of quantity (increasing demand, limited possibilities for additional surface water resources, overexploitation of groundwater, etc.) and in terms of quality (pollution, saltwater intrusion, etc.). Rising temperatures are also fuelling evapotranspiration and drying out soil and vegetation. Climate change is thus causing increasing weather-related risks of forest fires. Numerous forest fires have been registered in the Douimis area. Climate change is therefore likely to exacerbate current climate variations and their effects on socio-economic systems and ecosystems.

> The impact of climate change on the region's economic activities

Douimis is not the worst affected region in Tunisia in terms of water shortages; however agriculture is an important activity in the region, together with natural areas that require protection. Rising temperatures, decreasing rainfall, increasing evapotranspiration and declining water resources: these factors are all likely to jeopardise yields from irrigated crops (annual crops and orchards) and rain-fed crops in Douimis by the end of the century, threatening the economic sustainability of the agricultural sector.

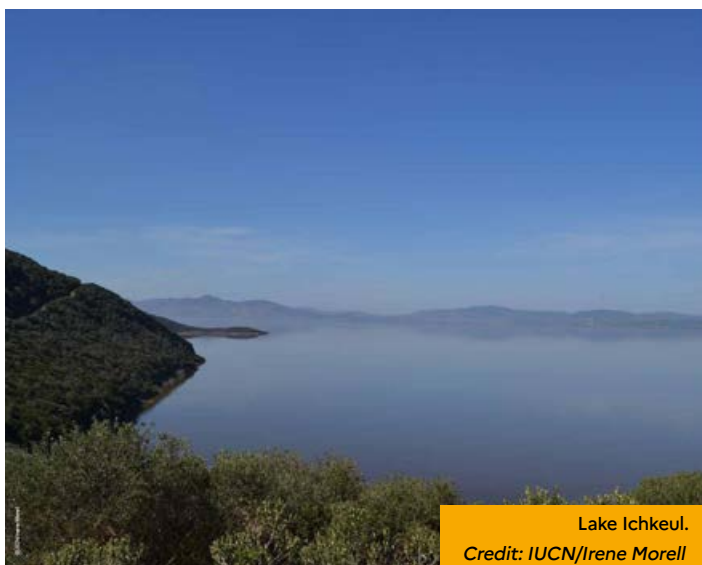
Over the last few years, harvests have tended to be poorer, while new fungal diseases have emerged, affecting all cultivated land. In parallel to these changes, farmers have observed losses in land productivity, which increases the economic vulnerability of the agricultural sector.

> A participatory approach to integrate climate change into territorial planning

The third strategy to develop and conserve agricultural land in Tunisia

entails a territorial approach that focuses on socio-economic development

and inclusion. This approach targets the most vulnerable populations, takes into account gender issues and incorporates additional pressures from climate change. As a practical application of this strategy, a pilot study based on a participatory approach was carried out in the Douimis river basin, in the Bizerte governorate. This project plays a pioneering role, not only by preparing a planning document, but also by developing methodology to guide the integration of climate change adaptation into territorial planning for a whole river basin.



Lake Ichkeul.
Credit: IUCN/Irene Morell



Ichkeul National Park.
Credit: Danita Delimont/Shutterstock.com



Project spotlight

> Goal:

The programme aims to include safeguards for water resources and climate resilience in the development process. It also aims to promote investment strategies and increase the funding allocated to the water sector and climate change adaptation.

> Background

The Douimis river basin covers 9000 hectares, and hosts a rural population of around 2000 people. The basin has been selected as a pilot site due to its economic assets and potential, as well as its environmental vulnerability. The area is characterised by severe erosion and retreating forest cover, which has led to its classification by the Bizerte Commission for Agricultural Development (CRDA) as a priority intervention zone for soil and water conservation work. This situation is

compounded by the region’s precarious socio-economic conditions and its fragile ecological equilibrium.

Within the territory, the Douimis dam is currently under construction; it will represent a capacity of 45 million m3 and serve as a buffer reservoir for the water transfer system between the North, Centre and South of Tunisia.

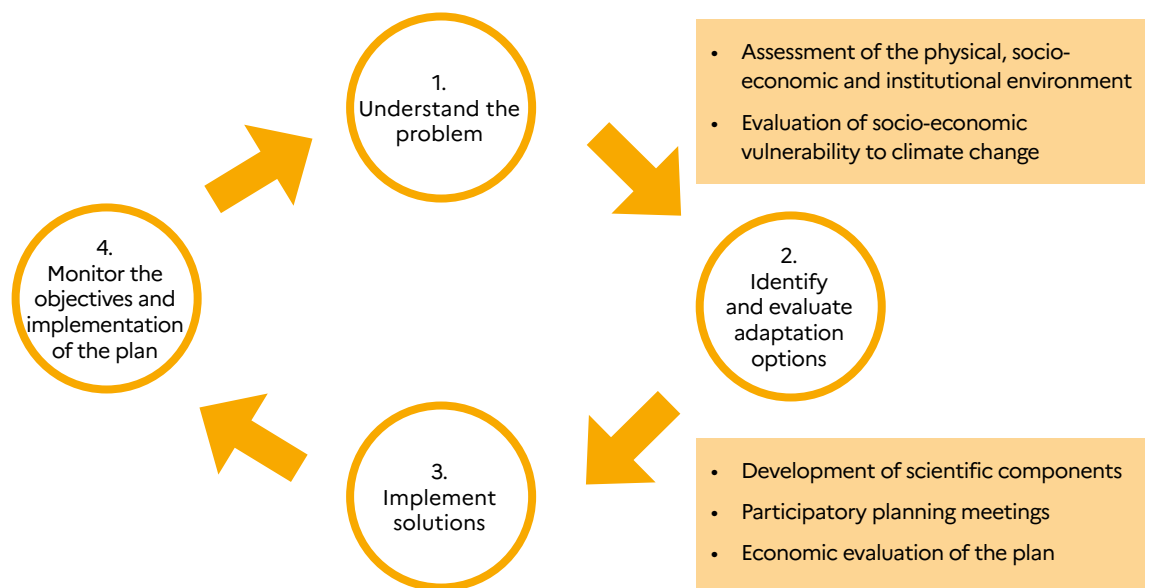
From a national perspective, the ongoing decentralisation of Tunisian institutions in 2014 caused specific issues for interactions between stakeholders, including between the Ministries and local authorities.

> Technical description:

In order to promote economically resilient and socially sustainable development, the Water, Climate and Development Programme (WACDEP) launched a multi-sector (Ministry

of Agriculture, Water Resources and Fisheries, Ministry of Equipment, Ministry of Local Affairs and the Environment, Ministry of Culture, etc.) and multi-level (central, regional, and local levels) process to draw up a territorial development plan for the Douimis river basin. This process was based on a participatory approach to ensure that all stakeholders within the territory could take ownership of the adaptation issues and solutions.

The process used to design the Douimis basin development plan followed the four phases of the African Ministers’ Council on Water (AMCOW) strategic framework for water security and climate change-resilient development.



Territory concerned	Initiative holders	Partners
Douimis river basin	Global Water Partnership Mediterranean (GWP-Med)	Tunisian Ministry of Agriculture, Water Resources and Fisheries, Bizerte local authorities.
Calendar	Human resources	Financial resources
2014-2017	Public and private actors, associations, citizens.	Unconsolidated funding from multiple sources. Estimated budget: €300,000 – €350,000

What are the tangible results?

> Creation of a Climate Change-Resilient Development Plan for Douimis

This project enabled the creation of a Climate Change-Resilient Development Plan for Douimis. This long-term plan also includes short-term adaptation activities, and represents a budget of around €7 million.

The plan comprises three lines of action:

1. Reducing the vulnerability of natural resources to climate change and conserving ecosystem services
2. Adapting infrastructure and living conditions to climate change
3. Integrating climate change adaptation into development activities

> Inclusion in the 2016-2020 Five-Year National Development Plan

One of the programme's achievements is that the plan has been endorsed in high-level planning documents. The plan was approved by the Bizerte CRDA in 2016, and was also included in the 2016-2020 Five-Year National Development Plan,

which was adopted by the Assembly of the Representatives of the People (ARP) in 2017.

> Applying the knowledge and lessons learnt from the Douimis climate change integration model

The knowledge and lessons learnt from the Douimis river basin climate change integration model have been put to work in decentralised planning policies for sustainable, resilient development. This knowledge has already started to be reused. To this end, the Bizerte Conference was organised in March 2017, under the aegis of the Bizerte Governorate, the Ministry of Agriculture, Water Resources and Fisheries and the Ministry of Local Affairs and the Environment, in partnership with

GWP-Med. Over 120 people participated in this conference, representing regional and national ministerial departments, local and regional authorities, profession and civil society organisations, the population of Douimis, technical and financial partners, academics, independent experts and the media.

> Building participatory methodology that can be reused across the country

The programme was based on a participatory approach: throughout the planning process, local representatives were involved in working groups that were designed to facilitate dialogue. In addition to fostering increased involvement and ownership of the plans, this method also raised the awareness of residents and economic actors on local and regional climate change issues. The method effectively demonstrates the benefits of using a participatory approach, and the resulting methodology (types of stakeholders involved, hosting meetings) can be used for other territories.

> Increased recognition of regional and local cooperation

This programme highlights the importance and the effectiveness of a multi-level approach. In fact, governments are increasingly recognising the advantages of regional cooperation to fight climate change, and this point was emphasized at the end of the programme.



Bizerte Conference (2017)

Words of a participant

"Preparing an integrated development plan, with local participation, that takes into account climate change adaptation, is a relevant, useful and essential initiative. The lessons learnt from this experience should be examined so that they may be reused in other locations and territories throughout the country."

Sarra Touzi, Senior Programme Manager, GWP-Med



Conciliation meeting (2018)

What are the conditions for success?

> A social approach is a key factor

This programme voluntarily adopted a social approach, by involving a sociologist to form working groups and facilitate dialogue during meetings. Social acceptance and increased awareness have played a key role in the project's success.

During the initial assessment phase, residents expressed certain reservations: weather-related hazards have existed for a long time and the population did not necessarily understand the need for climate change adaptation. This raised the issue of local stakeholders' understanding and ownership of the programme.

The involvement and continued interest of various local and national actors during the participatory workshops demonstrated an increasing awareness among the various stakeholders in the Douimis river basin. Once this awareness-raising process was complete, the stakeholders' attachment to their territory became one of the project's strengths. In addition, the fact that the project is managed by people who are closely linked with the territory and the approach, rather than by international development agencies, is also a success factor.

> Critical areas: a significant need to build institutional capacities

Climate change adaptation planning in Tunisia generally comes under the national government's mandate, so it is centralised. This unusual approach therefore requires a

lot of interactions between local partners and the national administration.

This unusual approach therefore requires a lot of interactions between local partners and the national administration. Since local actors are not familiar with national policies, this may result in an incomplete framework on which to build local policies.

This observation highlights the need to develop the underlying capacities required for this type of programme, even though this capacity-building does not fall within the bounds of this programme, nor within its financial resources. At the local and regional level, this planning process requires institutional and technical knowledge, as well as the ability to host meetings and facilitate concertation and dialogue. Overall, it is quite a cumbersome undertaking, which requires facilitators, moderators, trained coordinators and educators. This long, meticulous process does however pay off, as has been shown by the development of new territorial planning methodology that takes into account climate change.

> Financial obstacles were overcome but forethought is required

Since the programme is a joint undertaking between GWP-Med, national Ministries and local authorities, it did not receive funding from one single source, but instead benefited from support in the form of mandates from various entities. The coordinators estimate that a total budget of about

€300,000 - €350,000 would be necessary to replicate this programme.

One of the lessons learnt is the importance of identifying – as soon as the project commences – sources of funds that can finance subsequent phases of the project's implementation; this was the reason for registering it in the five-year plan. If it had not been officially registered in this way, this could have jeopardised the implementation of activities, in the Tunisian context.

One of the hopes for this programme was to mobilise the Green Climate Fund (GCF). However, actions are prioritised nationally, and preparation seemed to be lacking in this regard. The fund was therefore difficult to access for this local project, due to complicated application procedures and the specific knowledge required.

> Secondary topics to be included in future projects

As this project was the first of its kind and due to budgetary constraints, the plan does not specifically address gender issues and jobs for young people, which are however prominent concerns in this area.

One of the ways to improve future projects would be to take these topics into account during the participatory process.

For more information

Watch the video presentation on this approach ([link](#))

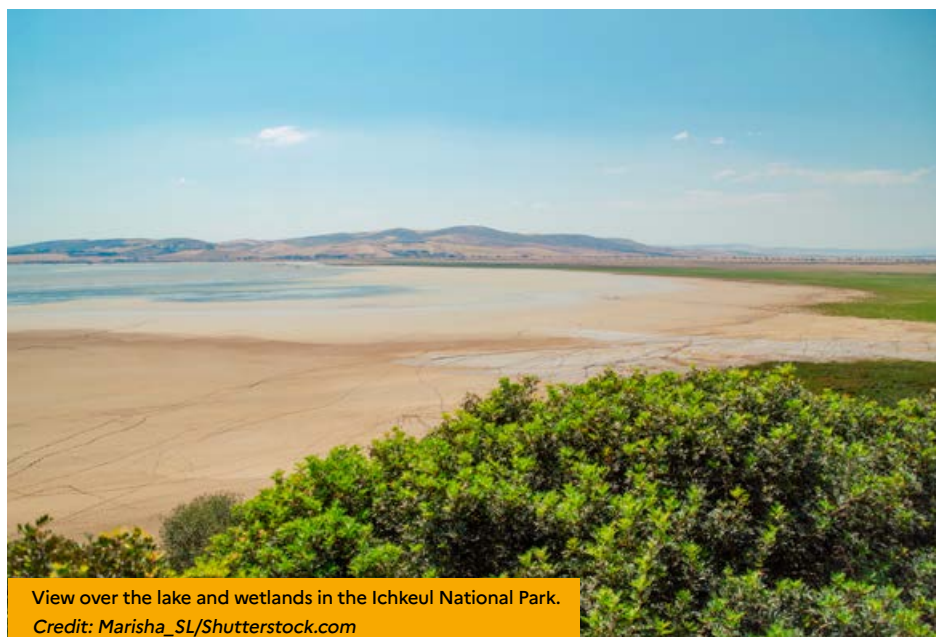
For more information on the WACDEP programme ([link](#))

Contacts

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Coordinator of the territorial planning approach

Bizerte Regional Commission for Agricultural Development (CRDA)
CRDA focal point for the development of territorial plans

Study carried out by **Blandine Arvis, Ramboll**



View over the lake and wetlands in the Ichkeul National Park.
Credit: Marisha_SL/Shutterstock.com

Country: Tunisia

Project manager: Tunisian Coastal Protection and Development Agency (APAL)

Initiative 1 (2014-2015): Integrating climate change variability into the new version of the Integrated Coastal Zone Management plan (ICZM) for the Kerkennah archipelago

Partner organisations: GRID-Geneva, GWP-Med, Plan Bleu

Initiative 2 (2017-2018): Management plan for marine and coastal areas in the northern isles of the Kerkennah archipelago

Partner organisations: UNEP, SPA/RAC

Climate issue: Rising sea levels and coastal erosion



Zones that are potentially vulnerable to rising sea levels in the Kerkennah archipelago.

Source: Coastal Protection and Development Agency (APAL) Credit: Medpartnership

How does this initiative contribute to the territory's adaptation to climate change?

> The Kerkennah archipelago is very vulnerable to rising sea levels

Rising sea levels, in particular due to subsidence, are likely to accelerate the processes that are already visible in the Kerkennah archipelago: saltwater intrusion into the water table, increasing coastal erosion, soil salinisation and the expansion of sabkhas (salt flats). Since the archipelago's 15,300 hectares are flat and include wetland zones, this landform is expected to split into several isles. By 2100, 56% of the island will be threatened by rising sea levels (APAL, 2016).

> Sea-based socio-economic activities are threatened

The main economic activities on Kerkennah are fishing, tourism and agriculture, and these are now threatened by the changing climate. This is particularly true of fishing, which is mainly based on traditional techniques (fishing enclosures known as "charfia" and shore fishing), and is thus severely threatened by rising sea levels.

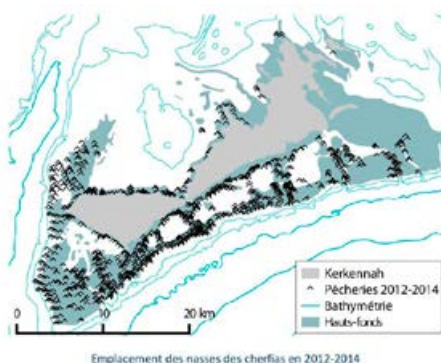
The areas devoted to this activity, which is mainly carried out in the shallow waters of the Kerkennah archipelago, are expected to decrease due to rising sea levels. The fragmentation of the archipelago into a larger number of isles is likely to modify sea currents and uproot Neptune grass meadows, which will jeopardise small-scale fishing and in turn threaten the food security of local island communities.

> Planning must take into account climate change

There is still only limited knowledge about the impacts of climate change on the Kerkennah archipelago. These initiatives aimed to take these impacts into account in planning documents. Although this is crucial to enable adaptive coastal management, many factors still prevent the effective inclusion of climate change in planning (lack of resources for monitoring and evaluation, lack of scientific data to define indicators and carry out assessments, etc.).

> Involvement of the local population in planning and implementation

A participatory approach played a central role in the successive projects carried out in Kerkennah. In 2014-2015, these initiatives aimed to improve the integration of climate change issues into ICZM, and in 2017-2018, they focused on drawing up a management plan to set up a Marine and Coastal Protected Area (MCPA). The continuous involvement of stakeholders enabled the various planning documents to be co-constructed, thus ensuring greater community ownership of the underlying issues and the measures to be carried out. The involvement of various actors, and their level of interest throughout the participatory workshops during which the successive management plans were drawn up, demonstrates increasing awareness about the implications of climate change for coastal planning and the importance of local mobilisation.



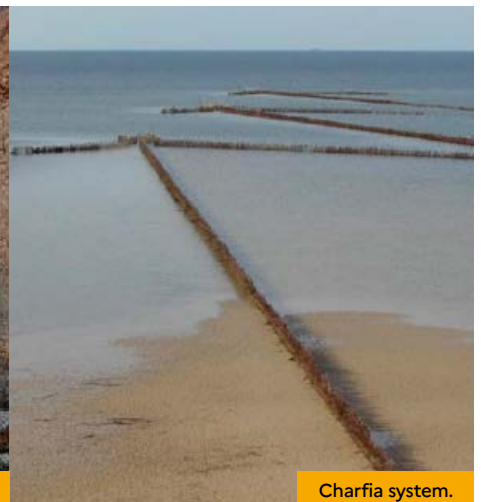
Charfia net locations in 2012-2014.

Author: Bruno Chatenoux
(UNEP/GRID-Geneva)

Credit: Medpartnership



Coastal erosion.



Charfia system.



Project spotlight

> Goal:

To provide the population of the Kerkennah archipelago with the appropriate planning documents and governance to improve their resilience to climate change

> Background

The Kerkennah archipelago, which is situated in the Gulf of Gabès, comprises two main islands, Chargui island (or Grand Kerkennah), Gharbi island (or Mellita), and a cluster of twelve isles. From an administrative point of view, Kerkennah is a delegation within the Sfax governorate.

The main economic activity in the archipelago is fishing, using traditional fish trapping and capture techniques. However, fishery resources and marine ecosystems (Neptune grass meadows) are threatened by illegal, unsustainable fishing practices (trawling). Yet these ecosystem services are of vital importance to the local economy, since they contribute to the population's food resilience. They also play a crucial role in climate change adaptation (Neptune grass meadows stabilise the seabed and the shoreline, which limits the impact of marine erosion). On land, vegetation also plays an important role in limiting marine erosion and soil salinisation.

In addition, the island is also facing waste management and sewage treatment issues, as well as seasonal population pressure due to tourism (15,000 residents in winter and up to 200,000 residents in summer).

> History of ICZM initiatives in Kerkennah

The Integrated Coastal Zone Management plan for the Kerkennah archipelago was updated by the Coastal Protection and Development Agency (APAL) in 2014-2015, as part of the ClimVar project. This regional project to integrate climate change and variability into national ICZM strategies is a complementary initiative to the MedPartnership project, which involves 11

Mediterranean countries and is funded by the Global Environment Facility. In 2017-2018, the preparatory study for the north Kerkennah isles management plan was also carried out by APAL, in partnership with the Regional Activity Centre for Specially Protected Areas (SPA/RAC). This formed part of the umbrella MedMPAnet programme (Regional Project for the Development of a Mediterranean Marine and Coastal Protected Areas Network).

This initiative, which followed in the footsteps of the ClimVar project, mainly focused on drawing up the ICZM plan for the future Kerkennah MCPA (based on the zone identified in the 2015 recommendations). Consultation processes were carried out in the form of 3 participatory workshops in 2014-2015 and 5 workshops in 2018-2019, as well as gatherings, interviews and meetings with local stakeholders.

> Technical description

Several recommendations were made in successive planning documents, which included the following suggestions:

- Control and regulate fishing activities;
- Implement awareness raising programmes for local communities and local authorities on the importance of conserving ecosystems;
- Implement map-based monitoring of the size and status of ecosystems (especially seagrass meadows);
- Create Marine Protected Areas (MPAs) and protected zones;
- Install artificial reefs and anti-trawling devices in sensitive areas, to safeguard the reproduction of marine organisms and protect seagrass meadows from trawling activities;
- Prepare a tourism and ecotourism development plan for the whole territory and for protected areas; etc.

Some of these measures are currently being carried out, mainly thanks to the framework provided by planning documents and the instatement of appropriate governance.

 Territory concerned	 Initiative holders	 Partners
Kerkennah archipelago (island territory)	Tunisian Coastal Protection and Development Agency (APAL)	Initiative 1: GRID-Geneva, GWP-Med, Plan Bleu Initiative 2: UNEP, SPA/RAC
 Calendar	 Human resources	 Financial resources
Preparation of framework documents for planning: Initiative 1: 2014-2015 Initiative 2: 2017-2018	Mobilisation of local stakeholders (civil society and associations), involvement of national and decentralised agencies and institutes (INSTM, ONAS, ANPE, ONTT, INM, INAT, etc.)	Total budget for Initiative 2 (planning study only): €32,000 Implementation of Initiative 2: Currently seeking funds

What are the tangible results?

> Protecting ecosystem services, a strategy to adapt to climate change for Kerkennah

Today, the approaches available to protect the coastline against rising sea levels and erosion include “hard” techniques (rip-rap, dikes, breakwaters) or more “flexible” techniques (sand fencing, beach replenishment, etc.). However, these flexible techniques are not yet used very much in Tunisia and “soft” solutions, like sand fencing, are not feasible in Kerkennah due to strong sea currents that undermine the stability of such structures. For this reason, the definition and implementation of an ICZM plan, in conjunction with the delimitation of a MCPA, are the best methods to protect the services provided by marine ecosystems and thus improve the resilience of Kerkennah’s resident communities.

> Governance to implement the Kerkennah MCPA management plan is currently being set up

A local Consultation Committee, comprising community representatives, NGOs working at the site and professional organisations, is due to be set up by the end of 2020. This Committee will advise the Management Unit on the establishment, revision, amendments and implementation of the management plan.

The Kerkennah MCPA Management Unit, which will be formed by APAL officials, will be responsible for coordinating the stakeholders within this Committee. A co-

management system involving APAL and a local association (ideally a fishermen’s association) is being considered for this Unit, to ensure closer coordination between the Management Unit and the Consultative Committee. To this end, a dedicated APAL unit for the Kerkennah archipelago will open in 2020.

> Priority activities to be carried out

Activities to be carried out before the end of 2020 have been prioritised. These include:

- Marking the outer limits of the whole zone to be protected;
- Launching surveillance activities to prevent trawling;
- Carrying out awareness activities with fishermen (workshops and training);
- Carrying out a feasibility study on the installation of artificial reefs;
- Launching biodiversity monitoring to prepare a marine habitat map (more detailed than the existing map).

> An integrated approach to foster local ownership of measures and to ensure their sustainability

Raising awareness among fishermen is central to both the Kerkennah ICZM plan and, more specifically, to the MCPA management plan, since the archipelago’s economy mainly relies on fishing and sea-related activities, which are now threatened

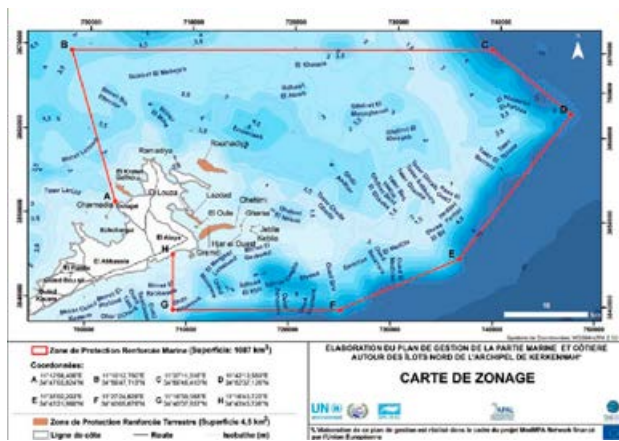
by unsustainable practices and climate change. Workshops and training sessions will thus be organised for all fishermen. In addition, to ensure that future actions are firmly rooted, there are plans to reorganise the structure of fishermen’s groups. These groups are currently organised as Agricultural Development Groups, and the intention is to develop these structures so that they become associations (which would make it easier for them to work with decentralised agencies like the Kerkennah APAL).

> Effective implementation depends on regulations and funding

The MCPA zone has been defined and its management plan has been drawn up. However, obtaining a decree ordering the creation of the MCPA is a long process. In the meantime, certain illegal activities are continuing and non-compliance with existing legislation is still a threat.

In addition, it is currently still difficult to mobilise national funding for environmental and climate-related initiatives, since national policies and strategies sometimes target other sectors. As a result, there is unfortunately a lack of technical resources and staff to effectively implement the northern isles management plan.

Other funding opportunities are currently being investigated to overcome these obstacles.



Zoning map. Producing the management plan for marine and coastal areas in the northern isles of the Kerkennah archipelago. Source: SPA/RAC - UN Environment/WFP, 2019. Management plan for marine and coastal areas in the northern isles of the Kerkennah archipelago - Phase II: management measures By Cabinet Thétis-Conseil, Kheriji A., Limam A., Guellouz S. and Ben Hmida A. Ed. SPA/RAC, Tunis: 86 p.



The future Marine and Coastal Protected Area

The total surface area of the future Marine and Coastal Protected Area is 1091.5 km² (4.5 km² of island land surface and 1087 km² of sea).

What are the conditions for success?

> The involvement of the local population in consultation forums and monitoring and management entities

Through numerous consultation and discussion sessions, a trusting relationship was built between local stakeholders and representatives of regional and decentralised authorities. Initially, the rather isolated population of Kerkennah were suspicious of this kind of planning project and were not keen to cooperate, because they felt “abandoned by the State” and were afraid that “the funds invested would produce no results.” In the end, the organisation of consultation workshops right from the start of deliberations on coastal development created local momentum for the project.

The establishment of a Consultative Committee and a local Management Unit, which enable governance to be firmly rooted locally, should allow more flexibility to mobilise stakeholders, greater responsibility and ownership of issues by local actors and better continuity between planning and the effective implementation of actions. In this isolated island context, it will be important to provide this Management Unit with some independence to take operational and financial decisions.

> National support for local initiatives needs to increase

The ICZM plan is limited by the fact that local initiatives are not systematically integrated into regional and national planning, which would ensure that their implementation is aligned with other territorial objectives (whether these take into account climate change or not). Therefore, it is often the case that no State funding is provided to support the implementation of such initiatives, as they are not included in the priorities set by the government. It therefore seems crucial to clearly define how the project will be incorporated into territorial strategy documents, before it is launched.

> Engage in innovative funding strategies

Funding availability has proven to be the most important factor in the effective implementation of the planned actions in the Kerkennah archipelago. In Tunisia, there is very little national investment in climate and environmental projects.

A MedFund funding opportunity is currently being studied to enable the implementation of the management plan for the future MCPA. This fund, which finances initiatives that are based on co-management with civil society, would be a good fit with the envisaged operational structure (co-management of the MCPA by APAL and a local association).

> Is climate change actually integrated into ICZM plans?

Although the Kerkennah ICZM plan called for greater inclusion of specific climate change issues, the wording relating to climate change in the future MCPA's management plan is still quite vague and unspecific. While the ecosystems protected by the MCPA zone, including the Neptune grass meadows, will directly contribute to reducing the impact of erosion on Kerkennah's coastline and thus constitute a tangible adaptation measure, there still seems to be a limited understanding on how climate change will impact the island's socio-economic activities.

> More research on the local impact of climate change is required

Other than existing models on rising sea levels, there is a lack of scientific data to monitor and evaluate the local impact of climate change. This significantly limits the definition of indicators upon which management plans could be built.

Before starting any form of planning process, it is still vital to carry out assessments, and these should at least be based on qualitative information when there is limited data availability for quantitative evaluations. It is therefore essential to involve climate experts in this type of process.

Words of a participant

“Today, coastal development does not take into account climate risks, since decision-makers do not know how to measure the repercussions of this type of data. Coastal interventions are carried out on a one-off basis, according to circumstances. There is no clear strategy, and yet APAL needs recent scientific information and data that are both reliable and innovative, as well as the skills to analyse this data and incorporate it into strategies.”

Fadhel Baccar (UNDP Tunisia), in an [interview](#) with Maryam Omar, on 3 January 2020

For more information

Publications

Chatenoux, B., Allenbach, K., Peduzzi, P., Lafitte, A., Touzi, S. & Ben Zakour, M. 2015. Integrating climate change variability into national ICZM strategies: Contributing to the new version of the Integrated Coastal Zone Management plan for the Kerkennah archipelago GRID-Geneva, Plan Bleu and GWP Med ([link](#))

SPA/RAC - UN Environment/WFP, 2019. Management plan for marine and coastal areas in the northern isles of the Kerkennah archipelago - Phase II: management measures By Cabinet Thétis-Conseil, Kheriji A., Limam A., Guellou S. and Ben Hmida A. Ed. SPA/RAC, Tunis: 86 pages ([link](#))

Website

Regional Project for the Development of a Mediterranean Marine and Coastal Protected Areas (MPAs) Network by boosting the Creation and Management of MPAs ([link](#))

Contacts

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Study carried out by **Lucie Royer, Ramboll**

This study into capitalising on climate change adaptation practices in the Mediterranean region was supported by our partners in the Mediterranean region, the secretariat of the Union for the Mediterranean and the Plan Bleu Regional Centre of the Mediterranean Action Plan.



Union for the Mediterranean
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Capitalisation on Climate Change Adaptation Practices in the Mediterranean area

*This project portfolio presents the main results of the **case studies carried out between October 2019 and April 2020** by local experts in various Mediterranean basin countries. It illustrates and completes the final report (FR) and the synthesis (FR /EN /AR) available online. The aim of these case studies was to **highlight the success factors and the pitfalls of adaptation initiatives** in specific contexts, to assist in the preparation of recommendations for decision-makers to help them adapt to climate change within their territory.*

*The portfolio comprises twelve 4-page **project profiles** detailing each initiative, which are grouped by country. In each profile, four main categories of information and analysis are presented: the local response to climate change adaptation issues, a detailed description of the initiative, the main results and the conditions for its successful implementation*