RESTORING MEDITERRANEAN WETLANDS

The new policymaker's playbook for sustainable management and ecosystem restoration by 2030

WETLAND BASED SOLUTIONS

Restoring Mediterranean Wetlands: The new policymaker's playbook for sustainable management and ecosystem restoration by 2030

This handbook has been prepared in the framework of the project "Strengthening the restoration of Mediterranean Wetlands for nature and people" funded by the MAVA Foundation. It has been coordinated by WWF Spain, MedWet and Tour du Valat in partnership with PIM Initiative and MEDSEA. The project is part of the Wetlands-Based Solutions initiative funded by the MAVA Foundation.

First published by the Wetland-Based Solutions initiative in December 2022

Cover Image: Orbetello. A fisherman cheking the martavello at the end of teli. © M. Cenni

Editorial by Amy Beeson, Design by Divya Venkatesh

Citation
For bibliographic purposes this document may be cited as follows: Wetland-Based Solutions. 2020. Restoring Mediterranean Wetlands: The new policymaker's playbook for sustainable management and ecosystem restoration by 2030. The Mava Foundation.

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1. Why We Need to Restore Wetlands in the Mediterranean

Oristano in coastal Sardinia, Italy. © MedWet

Urgent action is needed to restore our wetlands to survive the climate crisis. It's time to face up to the devastating impact wetlands losses and degradation have created. More and more we are seeing greater volatility in the water cycle which will affect not only our drinking water supply but food security, health, jobs, recreation and tourism.

Through better planning and understanding we can increase wetlands resilience and start improving water quality and restore the wetlands vital ecosystems. By committing to partnerships that use integrated restoration strategies and nature-based solutions, policymakers and funders have the opportunity to shape our future.

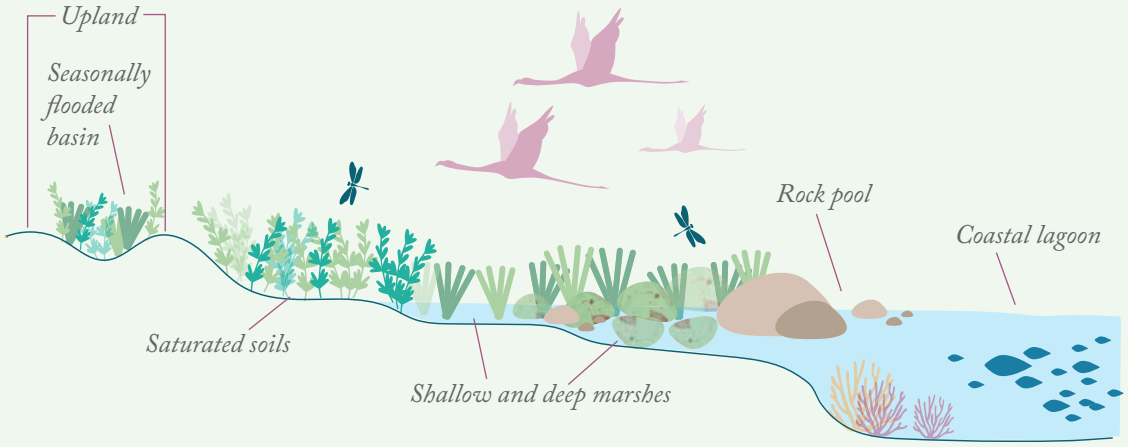
Acting now will help reduce flood peaks and protect us from the misery of the flooding, drought and wildfires that affect communities, the economy, and our environment.

Have you included wetlands restoration in your sustainable management plans?

What is a Wetland?

Wetlands are landscapes that are defined by the presence of water. Many wetlands are transitional zones between upland and aquatic ecosystems, although others are scattered across the landscape in upland depressions that collect water or in zones where groundwater comes to the surface.

There are different types of wetlands with water varying in both quantity and temporality. Some wetlands are permanently flooded, while others are only seasonally flooded but retain saturated soils throughout much of the unflooded period. Other wetlands may rarely flood, but saturated soil conditions are present long enough to support wetland-adapted plants and for hydric soil characteristics to develop.



There are also human-made wetlands, such as irrigated agricultural land, irrigation ponds, artificial ponds linked to water waste treatment plans, as well as golf courses, fish ponds, farm ponds, salt pans, reservoirs, gravel pits, and canals.

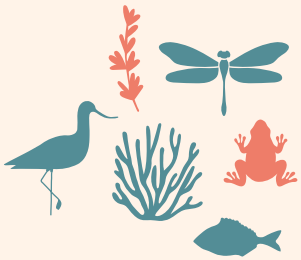
Wetlands provide numerous other ecosystem services including providing food, fuel and fibre, filtering water supplies, flood and erosion protection. They also provide microclimate regulation, ensuring CO2 sequestration and offering opportunities for recreation, education, and cultural enrichment of great social, economic and environmental value.

Wetlands are biodiversity hotspot under threat

Wetlands are a biological super systems and one of the most productive ecosystems in the world. A source of biological diversity, providing water and primary productivity upon which countless species of plants and animals depend for survival.

The Mediterranean Basin wetlands sustain more than a third of all species although they cover just 2-2.5% of the total surface area. The decline of these vital ecosystems will have consequences for us all.

48% of Mediterranean Wetlands have been lost since 1970



36% of Mediterranean wetland species are threatened with extinction - (of which **41%** are endemic)

Remaining wetlands cover approx. **18.5 million ha** and sustains more than **33%** of all the basin's species

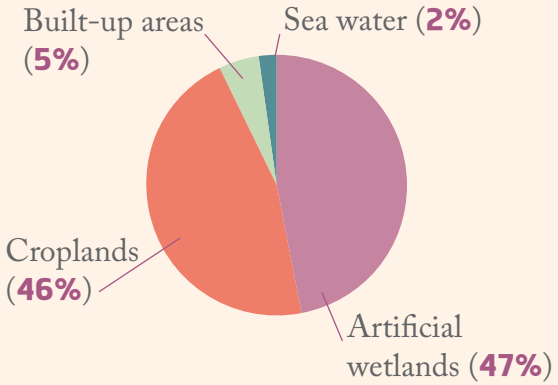
23% of these remaining wetlands are artificial

Coastal and marine vertebrate populations have declined by **52%** since 1993

Key drivers of biodiversity loss in freshwater habitats:

- Dams / water abstractions (**33%**)
- Climate change (**21%**)
- Intensive agriculture / aquaculture (**19%**)
- Urban development (**19%**)

Human populations have increased by **33%** since 1990 and are still growing. As a result the ecology of wetlands have transformed them into:



Since 2010, coastal wetlands have shrunk by **10%**

60% of transitional and coastal waters are failing good conservation status as defined by the European Water Framework Directive

We must act now to stop on-going losses and degradation to our wetlands.

The current level of legal protection (e.g. nationally designated areas and Natura 2000 network) need to be increased.

Could you help find funding for an equivalent analysis including non-EU regions to achieve a regional assessment of the Mediterranean ecoregion?

What is restoration?

Restoration refers to "the process of halting and reversing degradation, resulting in improved ecosystem services and recovered biodiversity. Ecosystem restoration encompasses a wide range of practices, depending on local conditions and societal choice" (UNEP, 2021, p. 7). This is usually reflected in the implementation of concrete actions to assist nature to re-establish its own functionality and to return wetlands to a more natural state (intended as the situation prior to significant disturbances and alterations due to human activities), improving their ecological status.

The objective of restoration is to emulate a self-regulating natural system that is ecologically integrated into the landscape in which it occurs.

Restorations interventions to explore

1 Restoration of former physical conditions

This may require chemical adjustment of soil and water and biological manipulation, including the reintroduction/reinforcement of native flora and fauna or simply the removal of human pressures.

Wetlands are dynamic and resilient environments, where sometimes once human pressures have been removed, restoration can occur naturally without the need for active interventions - this is called passive restoration. In such cases, it remains important to ensure activities related to site protection, control and monitoring are embedded to keep the status quo.

Many wetland areas previously used for recreation have been lost. Encouraging wetland restoration with recreational purposes may be a win/win for the local ecosystem and the local economy.

2 The creation of new wetlands

Areas not previously occupied by these ecosystems can be part of an overall land-use redevelopment strategy. This type of restoration is often spurred by the multiple benefits derived from wetlands, including their ability to perform different functions and simultaneously provide numerous benefits (e.g., as a solution to increase adaptation to climate change).

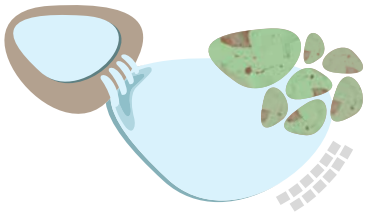
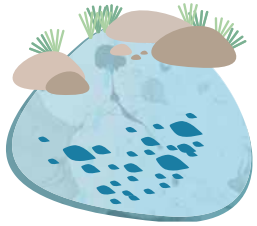
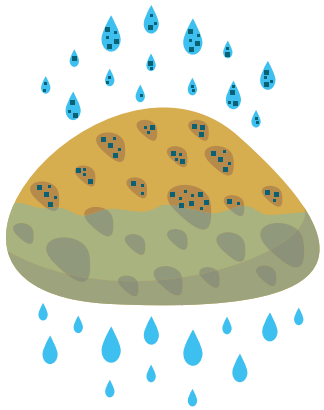
Restoration programmes or projects should emphasize the importance of restoring the ecological integrity and the ecological functions of degraded aquatic ecosystems. We want them to enhance the natural processes and communities that have sustained native ecosystems over time. This includes designing for self-sustainability by understanding the natural potential of the system and by considering reference sites, as well as addressing on-going causes of degradation.

Action should be taken at the appropriate temporary and spatial scale, with clearly developed, achievable and measurable goals. Using the skills and insights of a multidisciplinary team and monitoring and adapting where changes are necessary to create a continuously envolving and integrated partnerships that will solve both environmental and supply problems is essential.

Wetlands restoration can also be linked to compensation schemes, suggesting the creation or enhancement of wetlands to compensate for wetland losses allowed in other areas. The idea behind this concept is to have "no net loss" of wetlands.

Restoration project carried out in the Ticino Regional Park in 2019 by Parco Lombardo della Valle del Ticino Authority. A former artificial poplar grove (Populus x canadensis) (small photo by Beniamino Barenghi), was repurposed into a wetland for breeding herons and other waterfowl (large photo by Marco Tessaro).

Main ecosystem services provided by wetlands, modified by D'Antoni et al., 2011

SUPPORTING		Agriculture, irrigation Livestock, grazing Transport Energy production Human habitation and settlements
PROVISIONING		Water Food Fuel wood Medicinal resources Genetic resources Raw materials
REGULATING		Storage and recycling of nutrients Storage and recycling of human waste Storage and recycling of organic waste Groundwater regulation Natural flood control and flow regulation Erosion control Salinity control Water treatment Climatic stabilisation CO_2 sequestration Habitat maintenance Maintenance of ecosystem integrity Maintenance of biological and genetic diversity
CULTURAL		Research, education and monitoring Cultural and spiritual role Tourism and recreation

Mediterranean wetlands play a particularly important role for:

- ***Food supply, as populations use them for agriculture, livestock and fishing;***
- ***Sustainable management of water resources;***
- ***Mitigation of the effects of extreme weather events;***
- ***Conservation of the aesthetic value of the territories, with positive consequences for tourism***

The cost of ineffective water management

Converting wetlands into other land-uses costs the world US$4.3 – 20.2 trillion per year in damages and artificial solutions. Wetlands offer the opportunity to manage water quantity and buffer extreme weather events such as floods, droughts, and coastal storm surges, which could reduce costs by US$ 51 trillion per year globally.

Wetlands across the globe currently store up to 40% of the world's carbon

Climate change is causing an increase in temperatures and a reduction of rainfall in the Mediterranean region, as well as an increased intensity and frequency of extreme weather events, as assessed by the First Mediterranean Assessment Report on "Climate and Environmental Change in the Mediterranean Basin" (MedECC). The destruction and degradation of wetland habitats is progressively reducing their ability to mitigate the effects of climate change. The conversion of wetlands into other land-uses transforms them from carbon sinks into carbon sources.

Restoring Mediterranean wetlands will help catch more carbon and other pollutants such as agricultural fertilisers and will play a vital role in meeting water-quality targets and reviving degraded landscapes that are crucial to both human and wildlife communities. Thanks to their capacity for improving water quality, recharging aquifers and mitigation of severe flooding events, wetlands constitute a natural, long-term and cost effective choice to tackle to climate change.

2. Using the International Legal Framework for Wetlands Restoration

Gediz Delta. © Helio and Van Ingen, Doğa Derneği Archive

International agreements and policies form part of a constantly growing legal framework of European and local laws that can be used to protect and restore Mediterranean wetlands big and small. They highlight the importance of these habitats as one of the most productive ecosystems, directly supporting the life of millions of people and providing a myriad of ecosystem services.

Policymakers will find below the relevant agreements, policies and strategies that form the Mediterranean and EU approach to wetlands restoration that can be utilised as part of their own strategic plans.

The Barcelona Convention

Due to the agreements adoption of strategies, plans and programmes for the conservation of biological diversity, and the sustainable exploitation of Mediterranean Sea resources, it is an important part of Mediterranean conservation strategy. Accordingly, the Protocol on Integrated Coastal Zone Management (ICZM) requires a specific approach for the restoration of degraded coastal wetlands with a view to reactivating their positive role in coastal environmental processes.

The EU Green Deal

With the vision to strengthen restoration efforts at European and Mediterranean scale the EU Green Deal can be used to protect, conserve and enhance the EU's natural capital, and protect the health and well-being of citizens from environment-related risks and impacts. Particularly in wetlands, the Green Deal states: *"the natural functions of ground and surface water must be restored. This is essential to preserve and restore biodiversity in lakes, rivers, wetlands and estuaries, and to prevent and limit damage from floods".*

The 2030 Agenda for Sustainable Development[1]

The Sustainable Development Goals (SDGs) aim of achieving a balance and integration of economic, social and environmental plans in order to protect the planet against degradation, through the sustainable management of natural resources, calls for urgent measures to mitigate climate change. They are particularly relevant to Mediterranean wetlands restoration in goals:

No. 6: Ensure availability and sustainable management of water and sanitation for all;

No. 13: Take urgent action to combat climate change and its impacts;

No. 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development, and

Specific Objective No. 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

The United Nations Decade on Ecosystem Restoration[2] 2021 to 2030 is raising awareness on successful ecosystem restoration and conservation. It aims to prevent, halt and reverse the degradation of ecosystems worldwide as part of the 2030 Agenda for Sustainable Development alongside other major environmental agreements, such as the Paris Agreement or the Aichi targets.

The United Nations Convention on Biological Diversity

Establishes three main objectives:

1. the conservation of biological diversity;
2. the sustainable use of its components; and
3. the fair and equitable sharing of benefits arising from the utilization of genetic resources.

Particularly relevant is Article 8(f), which states that each contracting party shall, as far as possible, *"rehabilitate and restore degraded ecosystems and promote the recovery of threatened species, including through the development and implementation of plans or other management strategies"*.

1 United Nations General Assembly resolution 70/1 on "Transforming our world: the 2030 Agenda for Sustainable Development.
2 Adopted on 11 March 2019 by General Assembly resolution 73/284.

The Ramsar Convention

The Ramsar Convention adopted in 2015 its 4th Strategic Plan for 2016 - 2024[3] , which sets out the vision that ***"Wetlands are conserved, wisely used and restored and their benefits are recognised and valued by all"***. It is the only international treaty that focuses exclusively on wetlands and is ratified by all the States of the Mediterranean region who have committed to the conservation and wise use of wetlands in their territory. All designated wetlands that meet the criteria are to be included in the Ramsar List of Wetlands of International Importance.

Restoration of welands is most relevant in targets 5 and 12 of the strategic plan:

Target 5: *The ecological character of Ramsar sites is maintained or restored through effective planning and integrated management*; and

Target 12: *Restoration is progress in degraded wetlands, with priority to wetlands that are relevant for biodiversity conservation, disaster risk reduction, livelihoods and/or climate change mitigation and adaptation.*

The Natura 2000 Network

This European ecological network of biodiversity conservation areas, was created in 1992. The aim of the network is to ensure the long-term survival of Europe's most valuable and threatened species and habitats (including wetlands), contributing to halting the loss of biodiversity. Therefore, Natura 2000 is the main instrument for the conservation of nature in the EU.

European Union Nature Restoration Act

Considers legally binding targets for nature restoration for all Member States, with the aim of restoring at least 20% of the EU's land and sea areas by 2030, covering all those ecosystems that need to be restored by 2050.

3 Adopted by the 12th Meeting of the Conference of the Parties, in Punta del Este, Uruguay, 1-9 June 2015, by Resolution XII.2.

Biodiversity Strategy 2030[4] and Water Framework Directive

The Biodiversity Strategy calls all for greater efforts to restore freshwater ecosystems and the natural functions of rivers in order to achieve the objectives of the Water Framework Directive by removing or adapting barriers to migratory fish passage and improving the flow of water and sediment. It set a target that by 2030 at least 25,000 km of rivers should be returned to free flow, by removing essentially obsolete obstacles and restoring floodplains and wetlands. The strategy also affirms that nature-based solutions, such as wetland protection and restoration, are essential for reducing emissions and adapting to climate change, as well as the need to recover habitats and species by extending the network of protected areas. Special attention should be paid to those areas that have a very high biodiversity value or potential, providing them with special care through strict protection. It considers the creation of a new Nature Recovery Plan, to improve the health of currently protected areas and restore a diverse and resilient nature to all ecosystems through the reduction of habitat and species pressures by securing all uses of ecosystems. The Strategy is emphatic that nature-based solutions, such as wetland protection and restoration, are essential for carbon offsetting and climate change adaptation.

The EU Water Framework Directive

Particularly relevant to the protection of inland surface waters, transitional waters, coastal waters and European groundwater, including wetlands, it recognises the important role of wetlands in the protection of water resources, and therefore advocates their wise use and conservation. According to Article 1(a), one of the objectives of the WFD, is to prevent *"any further deterioration and to protect and improve the status of aquatic ecosystems and, with regard to their water requirements, of terrestrial ecosystems and wetlands directly dependent on aquatic ecosystems"*. Also Article 4 establishes the environmental objectives, which include objectives for the protection, improvement and regeneration of all bodies of surface and groundwater, with the aim of achieving good ecological potential, it can be used to highlight a programme of measures for the creation and restoration of wetlands.

The Birds Directive

Aims to ensure the long-term conservation of all wild bird species naturally occurring in the European Union. For this purpose, it establishes a general system for the protection and management of these species, where Member States should take action to preserve, maintain or re-establish habitats for wild birds which idncludes the restoration of wetlands.

4 Adopted in Brussels on May 20, 2020.

The Habitats Directive[5]

Aims to preserve natural habitat types and populations of wild species (except birds) in the EU, through the establishment of an ecological network and a legal system for the protection of species.

You can use legislation other than site protection legislation to protect conservation of wetlands.

The Port d'Andratx marshland (Mallorca, Spain) is a case where an urbanistic regulation from 1991 saved it from tourist urbanisation (Photo: Carlota Viada/WWF Spain)

Case Studies

Most of the large wetlands in the Mediterranean have already been declared protected natural areas. Smaller wetlands that haven't been declared protected natural areas can use non-specific environmental regulations to conserve small areas of great value.

In Spain the destruction of natural wetland on the coast was avoided through the delimitation of the Public Maritime Terrestrial Domain. And in the Balearic Islands the urbanisation of small coastal wetlands was prevented by using Law 1/1991 which was established to protect areas from urban planning.

In Greece, in 2012, a Presidential Decree for the protection and conservation of all small wetlands in the Greek islands had been adopted. Knowing this, in 2015, WWF Greece, with the support of its government, successfully advocated for the adoption of a resolution on "Conservation of wetlands in the islands of the Mediterranean basin" at COP12 of the Ramsar Convention (Resolution XII.14).

The Regional Landscape Plan (Regional Law 8/2004) to preserve, protect and enhance the terriority's historical, cultural and settlement identity for future generations was used **in Sardinia** to identify the coastal strip as a resource for sustainable development. The use of integrated management tools to guarantee proper development to protect the coastal ecosystems and related ecosystem services was used to restore these small wetlands.

5 Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna

3. Creating a Selection Strategy for Wetlands Restoration

Active collaboration of local stakeholders is the basis of the community-based restoration. © Tour du Valat

Understanding the restoration criteria for Mediterranean wetlands will help prioritise where and how to invest funds and help save time and resources.

Start by identifying which criteria they will meet. Priority should be given to wetlands that will have:

☐ Environmental potential

Assess and include the environmental values of the wetland

- Wetland condition: degree of modification of the original habitats/landform
- Threatened species of fauna, flora and habitats present in the area if known
- Interaction with other wetlands
- Current land use in the destroyed/ degraded area

☐ Impact on ecosystem services

- How many ecosystem services does it contribute to?

☐ Feasible restoration activities

Outline the feasibility and sustainability of the restoration in the long-term and include information on:

- Nature protection status: Protection titles can help to ensure continuity, maintenance and long-term sustainability of the restored area
- Managing organisation: Extent to which the long-term management of the restored area is ensured
- Social support for wetland restoration
- Authorities support
- Contribution to different policies, e.g. species conservation, habitat conservation, sustainable agriculture, flood risk mitigation, agriculture origin pollution (nitrates), drought risk, climate change mitigation
- Intensity of environmental threats and pressures
- Visibility of the restored wetland to the general public

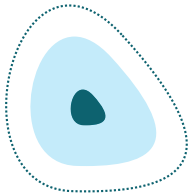
Criteria indicators are designed to give higher scores to less degraded wetlands in order to prioritise the easiest, simplest and cheapest restoration actions.

And finally, are there any other added values that will result from the restoration activity?

Ask yourself what is the level of restoration needed?

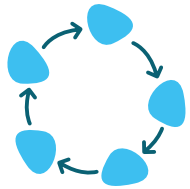
Are the wetlands…

- ☐ Degraded, but still existing wetlands where the main natural functions are more or less altered but could be restored / improved (with relatively low cost efforts)
- ☐ Regained wetlands, that is, habitats that have been lost or where the main natural functions (e.g. hydrological functions) are highly altered but still maintained



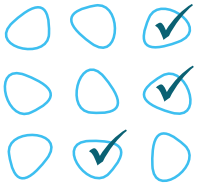
Applying geographic levels

In order to avoid defining different indicators depending on the data at different geographical levels, criteria can be applied at different geographic levels: pan-Mediterranean, national and insular, and do not depend on the scope at which they are applied.



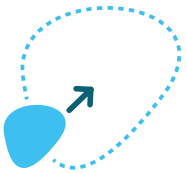
Planning effectively and contributing towards climate change

Actions should be implemented after setting objectives, doing a cost evaluation (using a multi-criteria analysis, a cost-effectiveness analysis or a cost-benefit analysis) and creating a project plan with continuous tracking and evaluation from beginning to end. Restoration should not only address short-term objectives (solving current urgent problems), but also contribute proactively to improving the resilience of habitats to climate change.



How to start listing wetlands on which to run the criteria

Start by applying the criteria to sites in need of restoration to see where there are neither on-going restoration activities nor allocated budget. E.g. A starting list can be selected from the wetlands with poor environmental conditions or those on official restoration lists, or sites with a certain protection title (e.g., Ramsar site, Natura 2000 site).



Upscaling potential?

Will the restored area have upscaling potential to become a larger wetlands or a wetland system in need of restoration? If yes, include this in your strategy and find out more about upscaling on page 44.

Funding priorities

Use the funding criteria to identify restoration projects that are a priority for seeking funds in terms of cost-effectiveness and status/quality of interventions:

1. Will it generate employment and social benefits for the surrounding areas:

- By improving the quality of life and health of the local population: use the number of inhabitants in a 30 km radius who benefit from improvement to environment as an indicator
- By creating employment opportunities: what jobs will be needed during the project, and in the long-term for site management, maintenance and/or public use of the restored wetland?

2. Create a favourable cost benefit analysis by including:

- Cost of the restoration in euros/ha
- Intensity of restoration actions: intensive, periodic, maintenance, passive
- Time needed to undertake the restoration action
- Number of tourists visiting the municipality(ies) or site annually: Potential as a nature tourism destination

Include supporting evidence

Once criteria is established and priorities agreed, include relevant statistics and evidence to support your selection and create a narrative for your strategy.

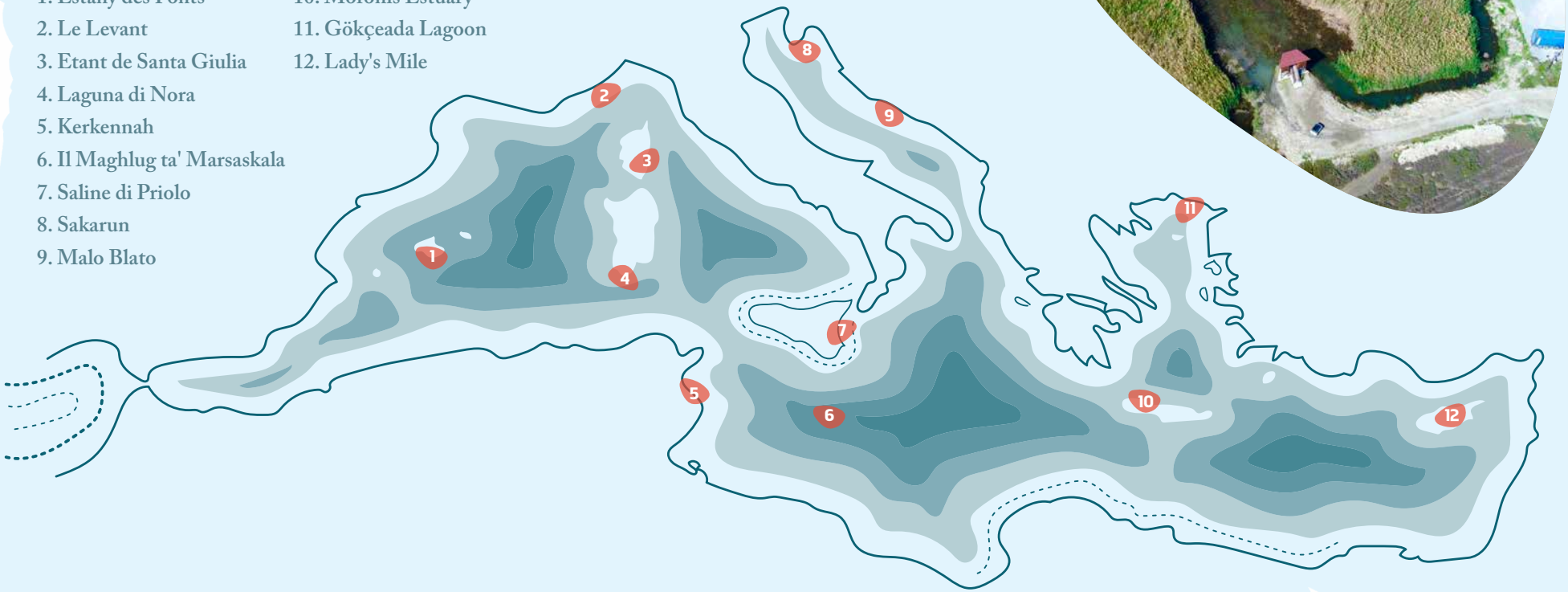
Case Study: Network of wetlands to be restored under the *MedIsWet* project

MedIsWet is a network of NGOs and research institutions from nine countries formed in 2017 in response to Ramsar Resolution XII.14 for wetlands on Mediterranean islands and is part of the M3 Strategy: *Enhancing the conservation of coastal wetlands supported by the MAVA Foundation*.

Eradication of *Acacia saligna* in Saline de Priolo, Sicily (Photo: Unict-LIPU)

Reed cleaning in Lake Makria, Cyprus (Photo: Terra Cypria)

1. Estany des Ponts
2. Le Levant
3. Etant de Santa Giulia
4. Laguna di Nora
5. Kerkennah
6. Il Maghlug ta' Marsaskala
7. Saline di Priolo
8. Sakarun
9. Malo Blato
10. Moronis Estuary
11. Gökçeada Lagoon
12. Lady's Mile



It aims to improve knowledge, raise awareness of the importance of these small, numerous and dispersed island wetlands and to advocate for their improved protection at national and international levels, as well as to promote restoration if needed.

MedIsWet partners completed wetland inventories on the Mediterranean islands to identify priority wetlands for replication of restoration projects and made field visits to over 1,800 wetland sites. The data was uploaded onto open access national databases. Collaboration with other teams who shared objectives and technical practices ensured best known approaches were applied and evaluated using the right assessment criteria for each restoration project.

The response confirmed there was significant interest at Mediterranean basin level for each area. The collection of information on the islands' wetlands has enabled all partners to establish strong links with key local stakeholders in order to create the relationships needed for promoting conservation measures and highlighting priority areas for restoration.

Monitoring in Santa Gilla, Sardinia (Photo: Unica-CCB)

Participatory process with local stakeholders in Mallorca to define the restoration project (Photo: Carlota Viada / WWF).

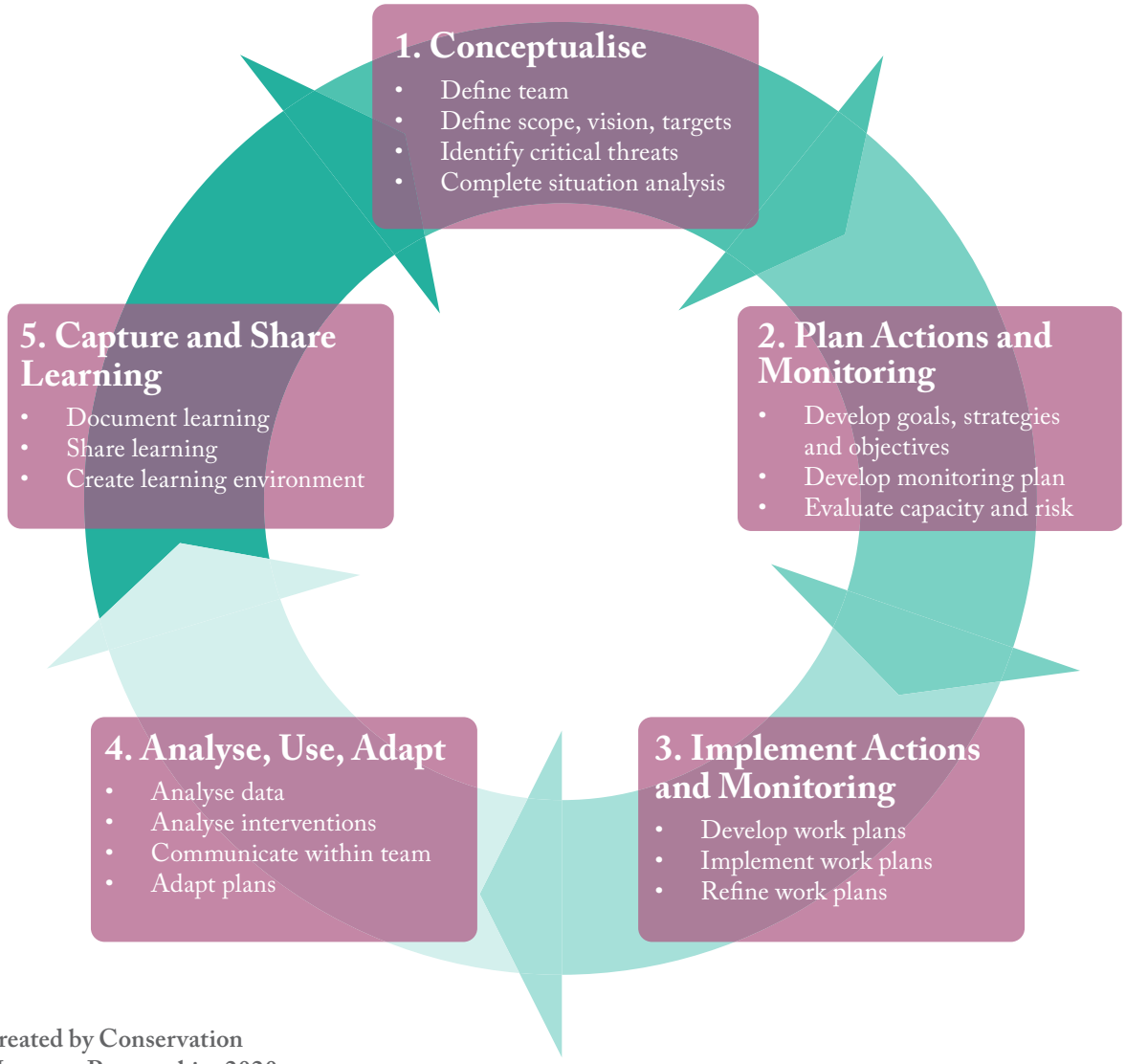
Before, during, and after the restoration of Malo Blato, Croatia (Photo: Hyla Association)

4. Restoration Strategies and Tools

Mediterranean Terns. © Helio & Van Ingen

Use wetlands planning tools to adapt and create a clear restoration strategy for project planning, implementation, monitoring and evaluation.

Five-step wetland restoration project management cycle



Created by Conservation Measures Partnership, 2020

Nature-based Solutions for wetland restoration

Restoration using Nature-based Solutions can either be active or passive. Active restoration is where management techniques such as planting seeds or seedlings are implemented, and passive restoration is when no action is taken except to cease environmental stressors such as agriculture or grazing.

Nature-based Solutions for restoration are: **actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits at a landscape scale** (IUCN, 2020).

Unlike concrete-based structures (grey infrastructure) that can't always adapt and compensate for environmental changes like sea-level rise, river flow alteration, flooding, and extreme climate events, Nature-based Solutions use an adaptive management approach to tackle changes. Whether you're looking at how to prevent climate change and water pollution, or improve food and water security, Nature-based Solutions promote ecosystem services whilst improving biodiversity by using alternative techniques that work with ecosystems rather than relying only on conventional engineering solutions to counteract the forces of nature.

Nature-based Solution diagram (IUCN, 2020)

Grey infrastructure is indirectly associated with the negative impacts related to the extraction and transport of materials. They require high costs for regular maintenance and tend to cause unwanted erosion elsewhere. They add to the fragmentation of ecosystems damaging biodiversity and the quality of life for local inhabitants.

Nature-based Solutions range from fully natural solutions, managed natural solutions and hybrid solutions to environment-friendly structural engineering (Canals and Marin, 2019). It has been shown that these techniques can significantly decrease the effect of exposure to natural hazards by serving as protective barriers or buffers (Maes and Jacobs, 2017).

Wetland restoration with multiple objectives

Wetland restoration can have multiple benefits including biodiversity conservation, human well-being, climate change adaptation and socio-economic conditions. These benefits can be both collective and individual, impacting personal, ecological, cultural and socio-economic values. The type of restoration chosen for each site will be dependent on the actual state of the wetlands, the projected reference state and potential management options.

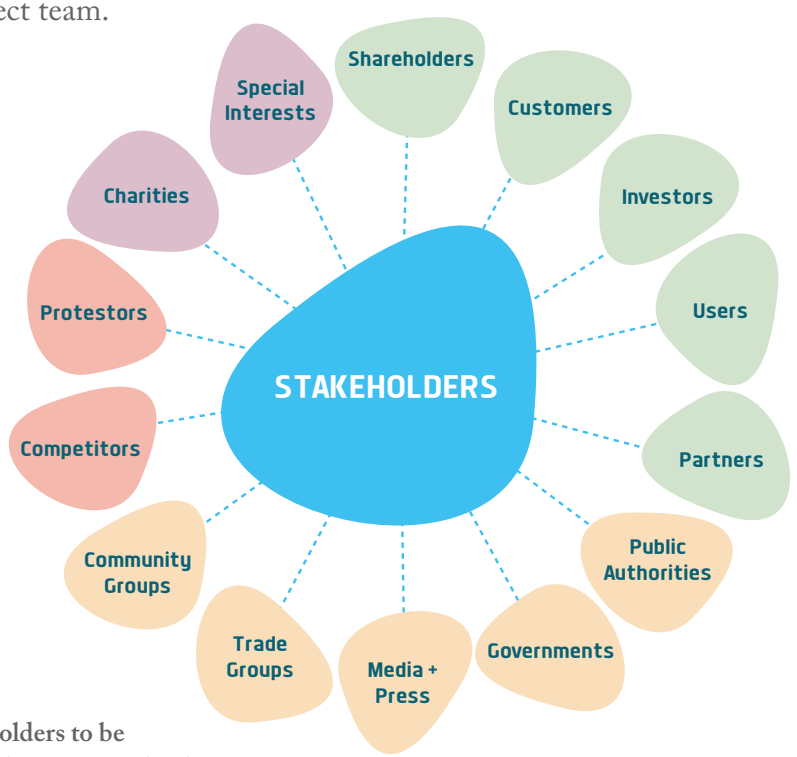
It is important to avoid solutions that increase conflicts between different objectives (e.g. flood mitigation vs. biodiversity) and to ensure that short-term decisions are taken in a long-term perspective.

Communications planning

Communications before, during and after the restoration project is important for creating and maintaining relationships with stakeholders and provides information to reach a larger audience. Good communications in the team ensures a clear understanding of the rationale and objectives of the project. All stakeholders should receive information at the right time and have the opportunity to input and share their ideas. Working in this way creates stronger commitment and resilience within the project team.

Easy steps for effective communications

1. Know the context of the project
2. Know your audience
3. Agree communications objectives
4. Define key messages for each audience
5. Deliver your communications planning
6. Monitor results and adapt where needed
7. Assess and share results

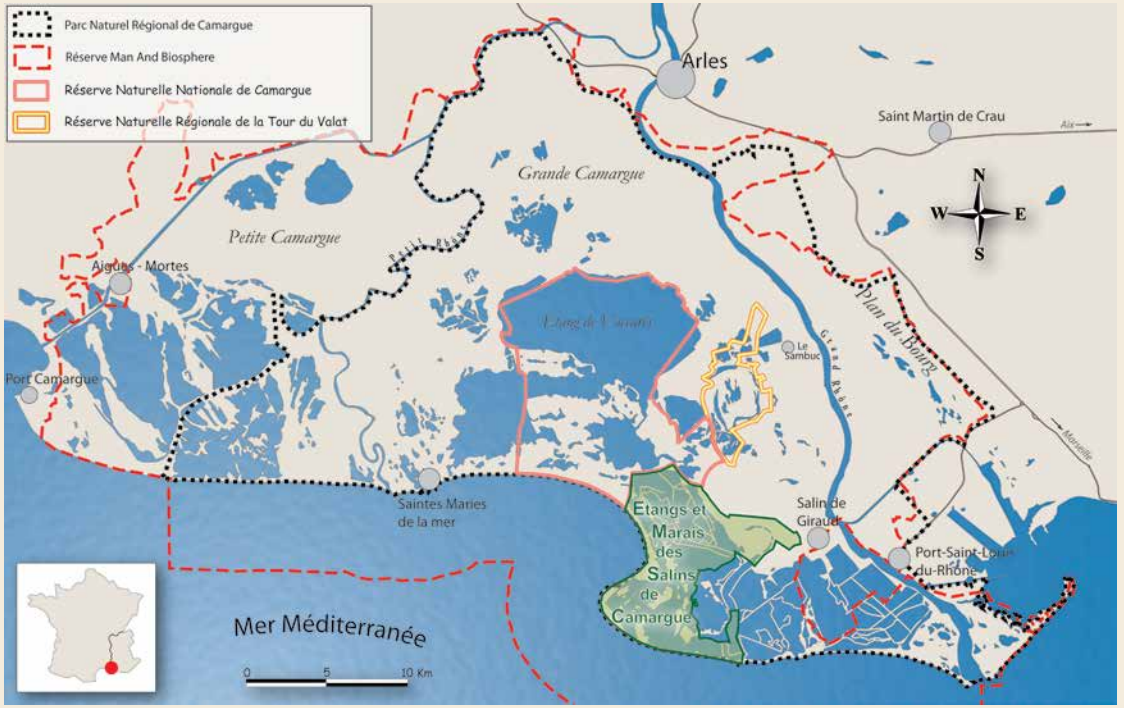


Potential and involved stakeholders to be considered in wetland restoration communication (Source: Warner, 2018).

Case Study: The former saltworks of Camargue

By using active and passive restoration activities the wetlands have been successfully re-naturalised. Developed in the 1960s the former saltworks of the Camargue are a vast coastal area of over 6,500 ha. in the southeast of the Rhône delta, France, within the Camargue Regional Natural Park and the UNESCO's Man and Biosphere Reserve.

The site was modified and managed with a human dominated water cycle for 50 years. In 2011, the Conservatoire du Littoral purchased the site with the main objective to move from salt production to wetland conservation, and restore the wetlands using adaptive management and Nature-based Solutions. The hydraulic and biological connections between the Vaccarès hydrosystem and the sea, via the former saltworks were restored.



Location of the former saltworks of Camargue (Willm-TdV).

Now they are a highly dynamic and functional coastal wetland that reconnects the surrounding aquatic ecosystems within the Camargue Natural Regional Park. There has been a significant expansion of new vegetation and a natural protective defence to reduce wave energy, height and speed induced by sea surge in the coastal lagoons has been set up to reduce the effects of inland flooding.

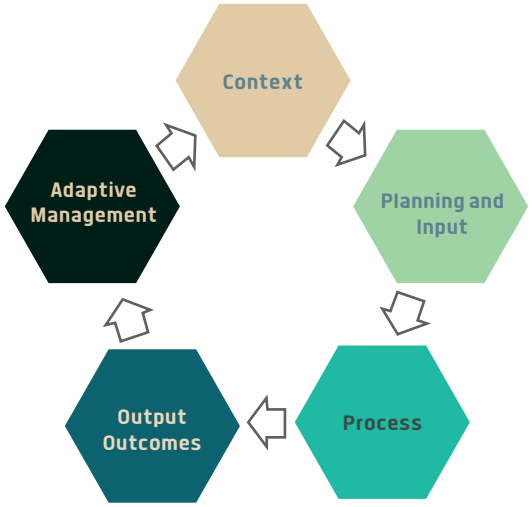
For more information see: **www.tourduvalat.org/en/newsletter-articles/the-restoration-of-the-former-saltworks-in-the-camargue-a-nature-based-solution-to-adapt-to-sea-level-rise/**

Left: The former saltworks of Camargue (photo credit Jean Rocher/TdV)

5. How to Build Your Project

Ortobello. Gill-nets of different shapes and use © M. Cenni

The IUCN project cycle can be followed to create an adaptive management strategy for your project. In each of these phases it is possible to use transdisciplinary approaches and tools, useful for improving decision-making processes and increasing the effectiveness of the project (Battisti, 2018)



Project cycle management (modified by Battisti, 2018).

1. Context: Assessing the landscape for problems

Wetlands can be affected by numerous threats like alteration of biogeochemical cycles, poaching, pollution, alien species and overfishing. Identifying the type of threat, quantifying its local impact on conservation targets (also quantified) allows the problem to be defined and sets the conditions for starting phases of the project to tackle them. Once a problem and solution have been identified, the project team needs to be properly structured to put plans into action. As restoration projects are often long-term due to high ecological and social complexity, the team needs to be multidisciplinary and include strategic, economics and communications experts alongside environmentalists and local stakeholders. Agree the data and research activities needed through the project to feed into decision-making and recommendations, keeping in mind the impact restoration will have on the social, economic, organisational and political landscape as well as the ecological.

A participatory approach

The Society for Ecological Restoration promotes eight principles for effective restoration based on a participatory approach. The first two principles actively search out the participation of stakeholders and the integration of many different types of knowledge including information and experience from scientists, practitioners and local and traditional actors. It is important to consider the governance processes in place, encouraging active stakeholder participation from the initial phases.

Eight principles underpinning ecological restoration (Gann et al., 2019).

2. Planning and input: Being creative and inclusive

Creating the project team's shared objectives, and agreeing on goals, timing, budget and responsibilities is crucial for good team planning and clear communication. Having a mix of creative development techniques alongside analytical approaches may help generate fresh ideas and keep the energy and engagement up within the team. Once ideas have been defined, assess their feasibility as well as the effects on different components and within different scenarios. Use tools like Multi Criteria Decision Analysis which allows a transparent comparison of alternatives, and also quantifies the non-monetary value of targets and can validly support the management of participatory processes. All decisions should include the local community.

What will the restored wetland look like?

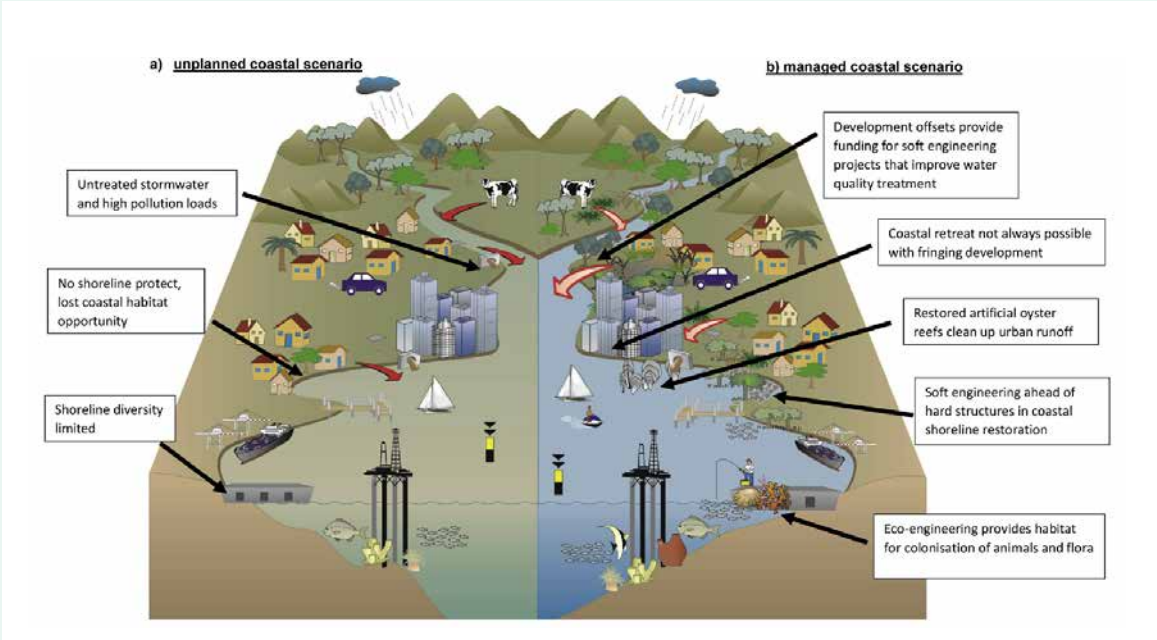
A particularly important aspect is the definition of the reference ecosystem considering environmental change and ecosystem recovery processes. The reference ecosystem concerns the vision of the future of the wetland: what should the site look like, what kind of biodiversity should it maintain, what services should it provide? Deciding on the reference ecosystem is essential before undertaking any type of restoration activity.

What reference ecosystem to use

Decision making tool for identifying the reference ecosystem (Gann et al., 2019).

Decision Tree for Reference Ecosystems

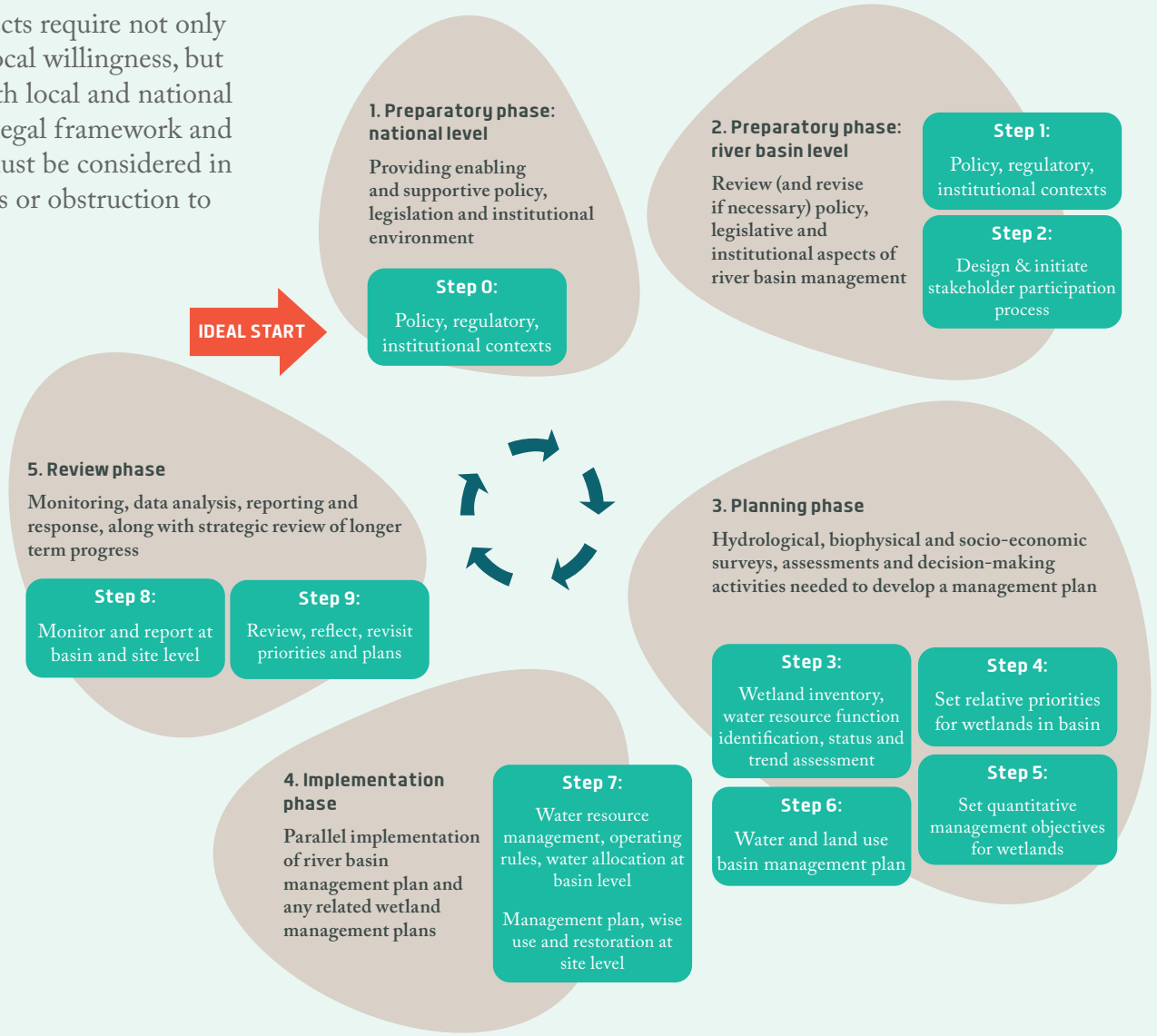
- Are the current site conditions still broadly suitable for the ecosystem that has been degraded? — YES → Use that ecosystem (full or partial recovery)
- NO
- Is this due to an ambient change which is feasable and desirable to amend? — YES → Amend and use that ecosystem
- NO
- Could the conditions suit an alternative native ecosystem that is feasible and desirable to restore? — YES → Use that alternative ecosystem
- NO
- Can the site be managed in some other restorative manner? — YES → Select the most restorative option



Impacts of multi criteria objectives of restoration projects (Dafforn et al., 2015).

Considering the legal framework and authorisation needed

Wetland restoration projects require not only scientific feasibility and local willingness, but respect and alignment with local and national planning and policy. The legal framework and authorisation processes must be considered in planning to prevent delays or obstruction to restoration.



Phases in designing a wetland restoration project (Rebelo et al., 2013).

Including the impact of climate change

Wetland restoration is important for mitigating the impacts of climate change and to help improve resilience for biodiversity and the human population.

Plans need to not only address climate change, but to set realistic goals for restoration, considering that climate change will also affect hydrological regimes which in turn could impact on the sustainability of newly restored wetlands.

Climate change scenarios and new decision-making tools are available to help determine the feasibility of a restoration action and assist in choosing the most adequate possibilities for each site (Lefebvre et al., 2019).

3. Process: Having a working plan

A precise Work Plan must be defined and implemented for the plan to become operational. Each solution requires many actions to be carried out and different stakeholders to engage, with defined times, resources, materials and technology. A clear assignment of responsibilities and a project timetable is essential. If conflicts with social actors occur, it may be necessary to apply win-win negotiation techniques, and revise some aspects of the Work Plan.

4. Outputs and outcomes: Implementation with continuous evaluation

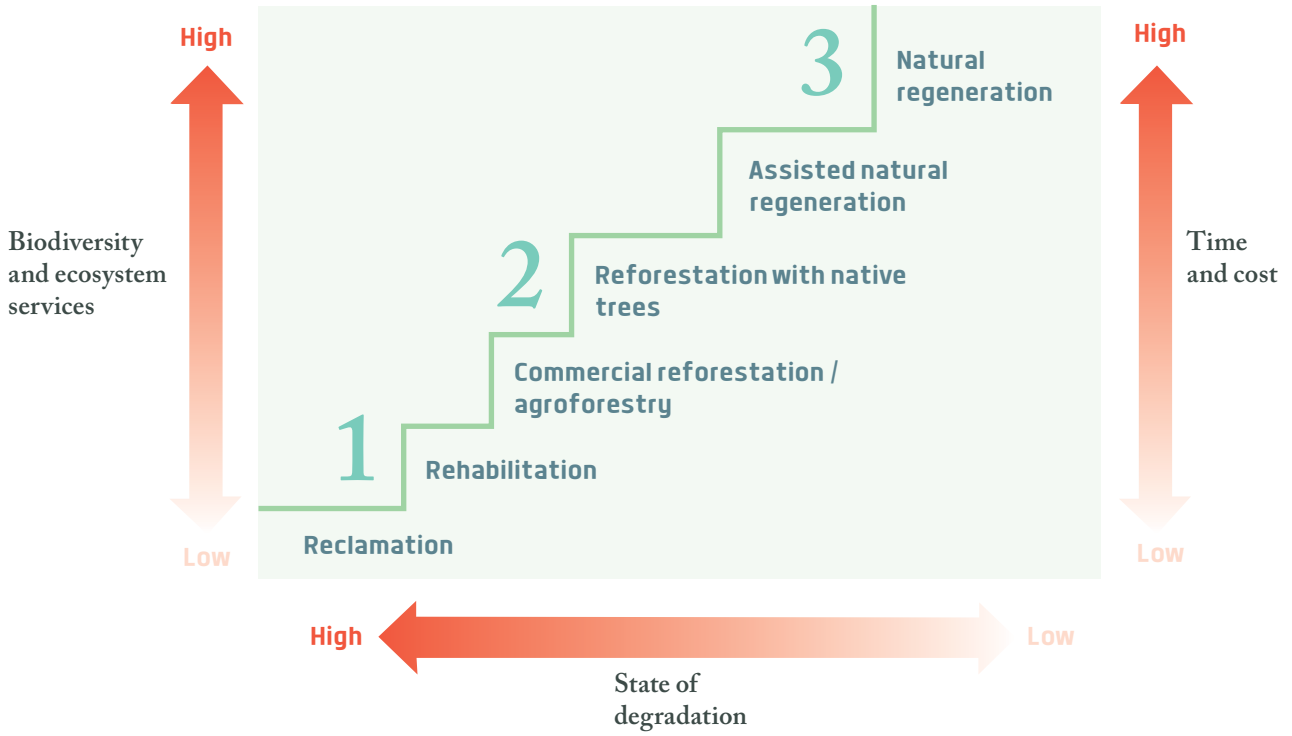
Monitoring and evaluating results can be measured in terms of actions and activities completed, interventions carried out available services (outputs) as well as the effects obtained on the conservation targets initially identified (outcomes). Outputs do not always produce the expected outcomes in the project results, due to both project errors and the occurrence of events outside the project area, which is why adopting a holistic approach to selecting indicators and considering the whole of environmental, social and economic factors is necessary. If the design conditions allow it, one of the different variants of the BACI protocol (Smith, 2013) can be used, which allows an accurate evaluation of the effects of the actions even on specific targets (Muller et al., 2015).

5. Adaptive management: Responding to events

Restoration project managers who use an adaptive management process can assess and respond to a lack of effectiveness or failures by adjusting strategy objectives, solutions and actions. In some cases it may be necessary to reformulate a large part of the project. This decision is very difficult to take when it affects finance, technical development and timescales. Moving away from initial views is never easy which is why continuous monitoring and evaluation provides the evidence needed to ensure a project achieves its goals. Learning from mistakes can increase the resilience of the project, especially in the presence of complex and highly variable ecological systems such as wetlands.

Costs

Restoration activities should not be considered as short-term projects, but should have a mid- to long-term strategy. The strategy will establish the type of site restoration (active or passive restoration) and will largely depend on the state of degradation of the wetland and the desired reference ecosystem. The cost and duration of the restoration project will differ greatly between sites, but generally sites that have more passive restoration and less degradation will be less costly than those that are more degraded and require more active restoration. There is often an economy of scale, with larger restoration sites costing less per hectare than smaller sites (Kusler, n.d.).

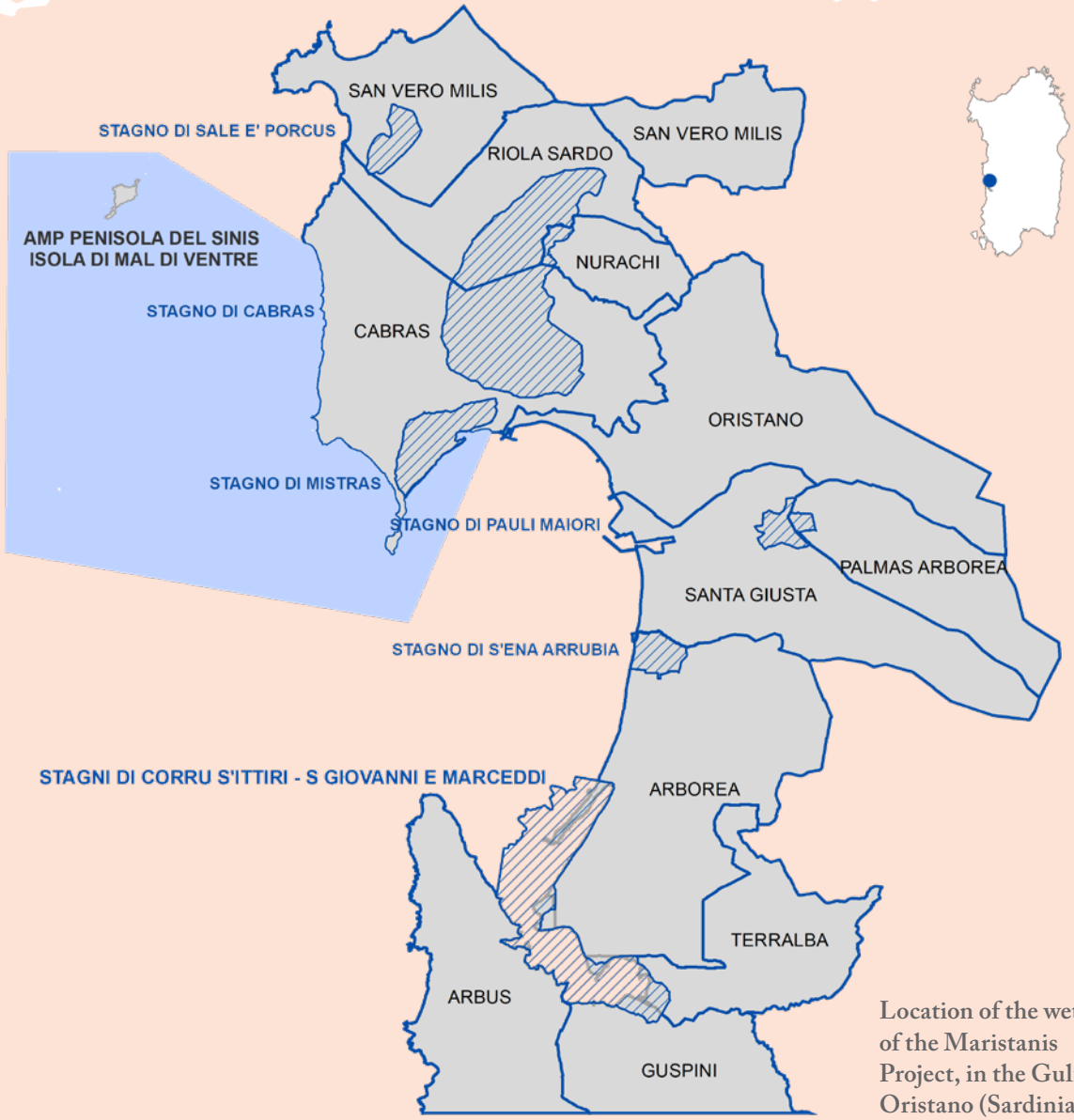


Investment and impacts of wetland restoration (Chazdon, 2008).

Case Study: The Coastal Wetland contract: a voluntary tool to promote a participatory approach in water related ecosystem management.

The Environmental Consolidation Act (Legislative Decree 152/2006) is the formally recognised instrument of River Contracts in Italy, and provides a strategic and negotiated planning instrument with voluntary participation. It is aligned with the Water Framework, the Floods, the Habitats, the Birds and the Marine Strategy Framework Directives.

Wetland restoration activities are included as part of identification and implementation of measures that contribute to the implementation of water and territorial management and to the achievement of the objectives of environmental regulations through a participatory process including both public and private local actors. The aim is to provide protection and proper management of water resources and the enhancement of river territories, together with the protection from hydraulic risks, thus contributing to local development. The tool has been extended to include wetlands, water basins, marine protected areas, and groundwater.



Location of the wetlands of the Maristanis Project, in the Gulf of Oristano (Sardinia), involved in the Coastal Wetland Contract.

Solemn moment of the signing of the Maristanis project's Coastal Wetlands Contract by the mayors of the municipalities involved in February 2021. (Photo: MEDSEA Foundation)

The Coastal Wetland Contract is based on a strong participatory process and cooperation among all relevant institutional, economic, cultural and environmental forces operating, in the case of the Maristanis Project, in the Gulf of Oristano (Photo: MEDSEA Foundation).

In Italy, there are several examples of Coastal Wetland Contracts, such as the Maristanis Coastal Wetland Contract, including 11 municipalities and six Ramsar sites in the western coast of Sardinia, near the municipality of Oristano, supported by the M3 Strategy of the Mava Foundation. Adopting the Coastal Contract and activities in an Action Plan can be supported by the European Union through Programmes for Cohesion and Neighbourhood Policies.

The Maristanis Coastal Wetland Contract was the instrument used to promote shared and integrated planning and management of the six Ramsar wetlands, rivers and streams that feeds into the Oristano gulf and coastline. It provided a strategic and negotiating planning tool of voluntary adhesion for the rehabilitation of wetlands using specific governance instruments.

6. Evaluating Restoration from Beginning to End

Vigueirat marshes © Tour du Valat

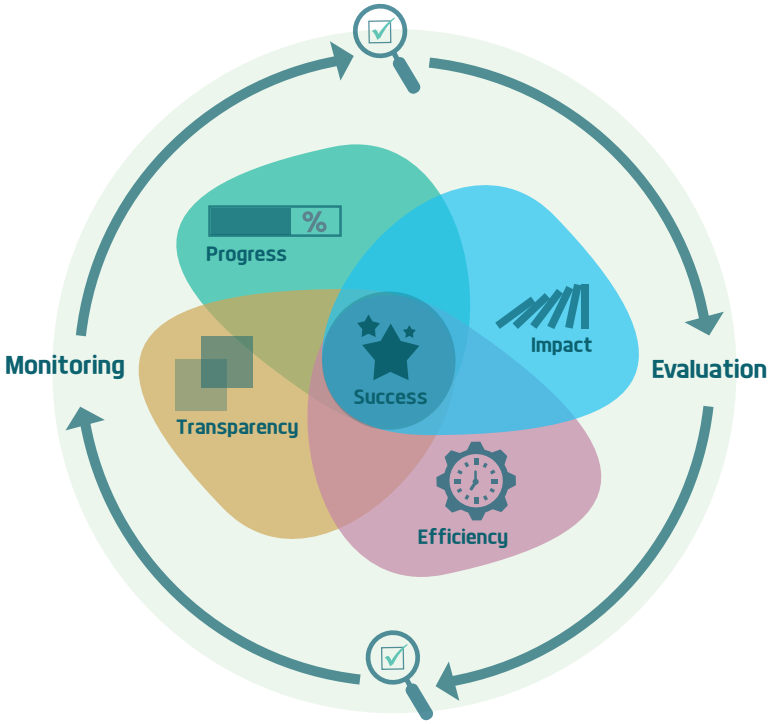
A monitoring system must be established from the development stage and continue throughout the project and beyond. Evaluation should include not only the impact on the biodiversity, but also the impacts on the socio-economic factors in and around the site with well-defined short, medium and long-term objectives and goals.

Monitoring Wetlands Restoration

Monitoring and evaluation are essential to determine whether restoration projects are implemented correctly and performing as expected to achieve the intended benefits.

Once analysed, plans can be adapted to guide and support implementation and provide insight for communicating the results and outcomes of the project. Working on evaluation across the project team will also support sharing and learning between partners.

With the right systems to gather evidence monitoring and evaluation will inform the project team on: transparency, progress, impact, efficient use of resources.



Monitoring plans

Generally, the monitoring plan should include:

- ☐ Goals and objectives of the project
- ☐ Definition of impact indicators
- ☐ Methods to assess and analyse the objectives, goals and indicators
- ☐ Monitoring schedule (duration and frequency)
- ☐ Required resources to implement the monitoring plan

The indicators assessing restoration impact will vary from project to project, but most monitoring schemes will include: ecological indicators (restored habitat, water quality and flora and fauna), socio-economic indicators (economic impact on local activities, tourism, uses) and financial indicators (cost-benefit analysis).

Some themes and indicators for restoration (Afr100, 2018).

	Theme	*Indicator*
Growth	COMMUNITY	Support	People engaged in planning and execution
		Engagement	Level of social cohesion
		Health	Proxy: infant mortality
	MARKET	Income	From restoration activities
		Access	Fair market access (prices)
		Investment	Access to financial services
	CLIMATE	Carbon	Biomass & carbon sequestration
		Adaptation	Impact of natural disasters
		Mitigation	Existing strategy for forest & land use
Quality	SOIL	Quality	Soil organic carbon
		Stability	Soil compaction & permeability
		Management	Use of soil conservation practices
	WATER	Quality	Sediment in water
		Quantity	Seasonal variability of water
		Management	Of priority areas
	BIODIVERSITY	Quality	Species diversity
		Connectivity	Biodiversity corridors
		Protection	To conserve area
Density Management	ENERGY	Supply	Of fuelwood for energy
		Access	To electricity
		Demand	For fuelwood for energy
	PRODUCTS	Yield	Products harvested
		Rights	To products from land
		Regulation	To protect and govern
	CULTURE	Income	For tourist revenue (ecotourism)
		Access	Multiple functions of area
		Protection	Protect culturally valuable areas

Benefits and new opportunities of restoration projects

The Global Restoration Initiative highlights areas where restoration has the potential to

improve food security,

reduce poverty and

mitigate climate change.

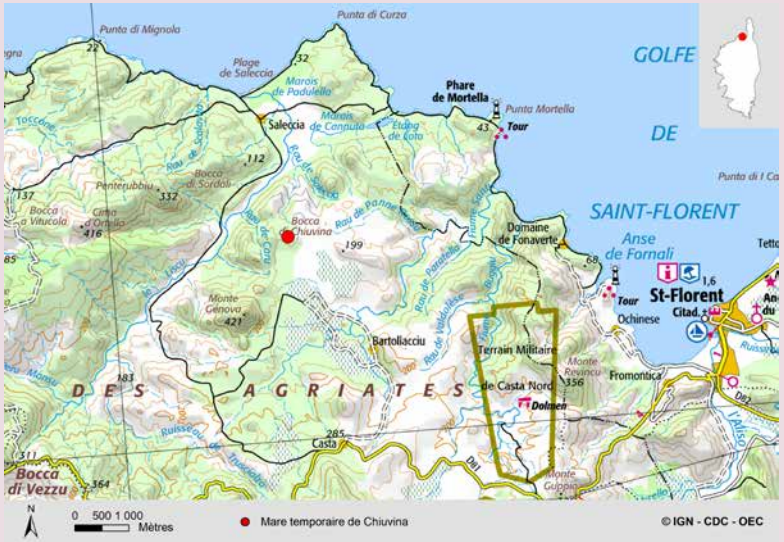
The opportunities provided from restoration can involve benefits to biodiversity, the economy and social sector. The value of the ecosystem services provided by restoration is highly dependent on each specific site and the habitat that has been restored. Indicators for measuring benefits should be identified at the beginning of restoration activity and monitored. Evaluation should be ongoing throughout the different stages.

Evidence suggests that the benefits of restoration outweigh the costs, particularly when considering the full range of ecosystem service values. In addition to improving biodiversity outcomes and the provision of ecosystem services, restoration can generate business and job opportunities.

Case Study: Restoration of Chiuvina pond (Corsica) and long-term monitoring

The temporary pond of Chiuvina (Corsica), located in the Agriate on the commune of Santo Pietro di Tenda, has been colonized for a few years by two invasive plant species (*Dittrichia viscosa*, a native species of the island, and *Paspalum distichum*, an exogenous species) which compete with the characteristic species of the habitat of priority community interest 3170* Mediterranean temporary ponds.

The Office of the Environment of Corsica (OEC) and of the Care-Mediflora program piloted an action program for the conservation of the temporary ponds for several years, in an operation to eradicate *Dittrichia viscosa* and *Paspalum distichum*. The project started in 2018 with the inventories of the species, vegetation surveys, photographic monitoring to define the long-term monitoring and to present the project to the Mayor of Santo Pietro di Tenda.



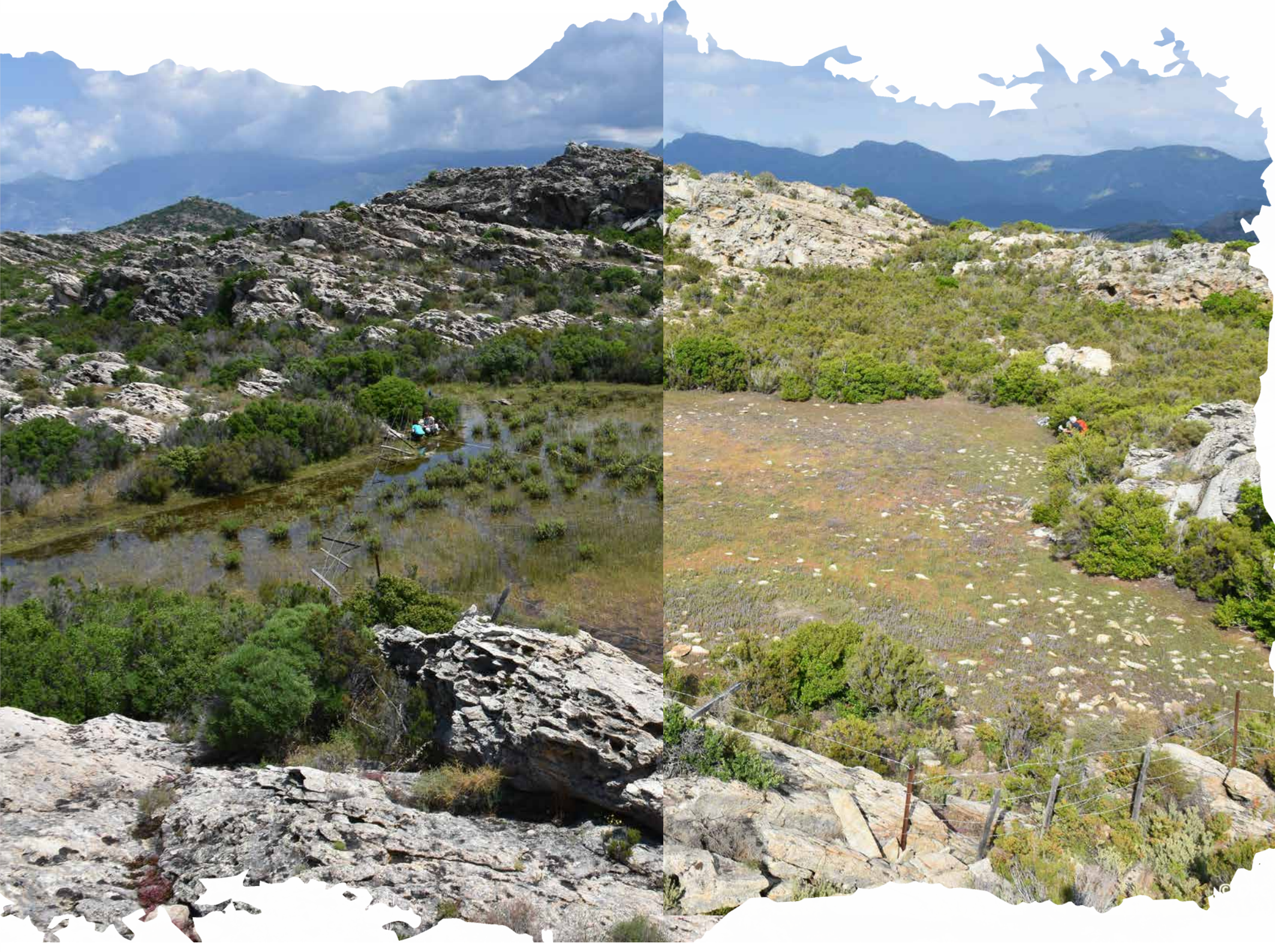
Left: Location of Chiuvina temporary pond, Corsica (France) (Photo : OEC)

Right: General view of the eastern sector of the Chiuvina pond before and after removal of Dittrichia viscosa (Photo: OEC)

The totality of the surface covered by the *Dittrichia viscosa* (approximately 230 m^2) was treated and 120 m^2 of *Paspalum distichum* out of the 390 m^2 mapped were removed. The eradication operation continued in 2019, 2020 and 2021 with an intervention on the *Dittrichia viscosa* and the treatment of 205 m^2 additional for the *Paspalum distichum*.

The project successfully anticipated the importance of the human and financial costs as part of long-term monitoring from the beginning of the project and continued standardized post-restoration monitoring protocols, maintenance and monitoring of the site, ensuring the sustainability of the operation. The work on the Chiuvina is a good example of the need of long-term monitoring to maintain the success of the eradication. A long-term follow-up protocol will be carried out every year by the agents of the OEC to ensure the sustainability of the action in the long-term. Medium and long-term monitoring is often lacking, and the end of the project often means the end of funding, yet the establishment of a management structure is a key to long-term success.

For more information see: **www.care-mediflora.eu/fr/news/one?event=action-of-eradication-of-invasive-species-on-the-temporary-pond-of-chiuvina-corsica-agriate&id=83**



7. Transfer and Upscaling

Aerial view of the newly created Lusore basin © Ivan Mazzon & Consorzio di Bonifica Acque Risorgive

A successful project is often scaled up to adjacent or surrounding plots, so that approaches that have worked well can be replicated and inspire solutions for other wetlands restoration projects.

Why scale up a restoration project?

When selecting restoration sites, consider how the restoration project could have an impact on a larger scale.

Successful restoration projects often do not have a global impact, as they are designed specifically for the site where they are implemented, resulting in localised initiatives, with high transaction costs and insufficient impact to halt biodiversity loss, while degradation and threat factors continue to increase (MAVA & FOS, 2021).

Moving away from this model towards more ambitious, collective and larger scale projects that can replicate and expand success beyond geographical boundaries calls for considering global issues whilst working locally.

Definitions of the concept of transfer and upscaling:

Transferability: capacity of a project to export and adapt its approaches, methods, solutions, finances, skills, labours and results to other regions, countries, or similar habitats, etc. Exploring and learning from other similar projects can increase transferability.

Upscaling or replication is a geographic expansion of an approach or solution, which achieves the same result if repeated exactly. This can be done when moving from a small plot or area to larger and closer restoration initiatives.

What can we do to transfer and replicate our restoration experiences?

Create a clear and sound plan supported by project activities that would allow upscaling and transfer of the implemented solution widely.

A replication strategy includes tasks to multiply the impacts of the project and mobilize a wider uptake during or after the project. This goes beyond dissemination and networking, and involves preparing the ground for implementing the techniques, methods or strategies developed or applied in the project into practice elsewhere.

At the closing plenary of CBD COP11, the Parties adopted Decision XI/16[6] which outlines options for how local, regional, and global partnership can assist countries, corporations, and communities in designing and implementing knowledge based, cost-effective, and participatory restoration projects and programs.

Specific tasks include:

1. ***Capacity building initiatives, which include regional workshops and technical training courses***
2. ***Knowledge sharing through searchable databases, including e-learning modules, case studies and best practice***
3. ***Exchange programs among agencies, restoration practitioners and researchers***
4. ***Awareness raising and communications outreach on the economic, ecological, and social benefits of ecosystem restoration including the general public, policymakers, and environmental managers***
5. ***Integration of ecosystem restoration into broader planning processes***

Seeking strategic alliances to enable individual restoration projects to become more ambitious and larger-scale collective projects creates huge added value.

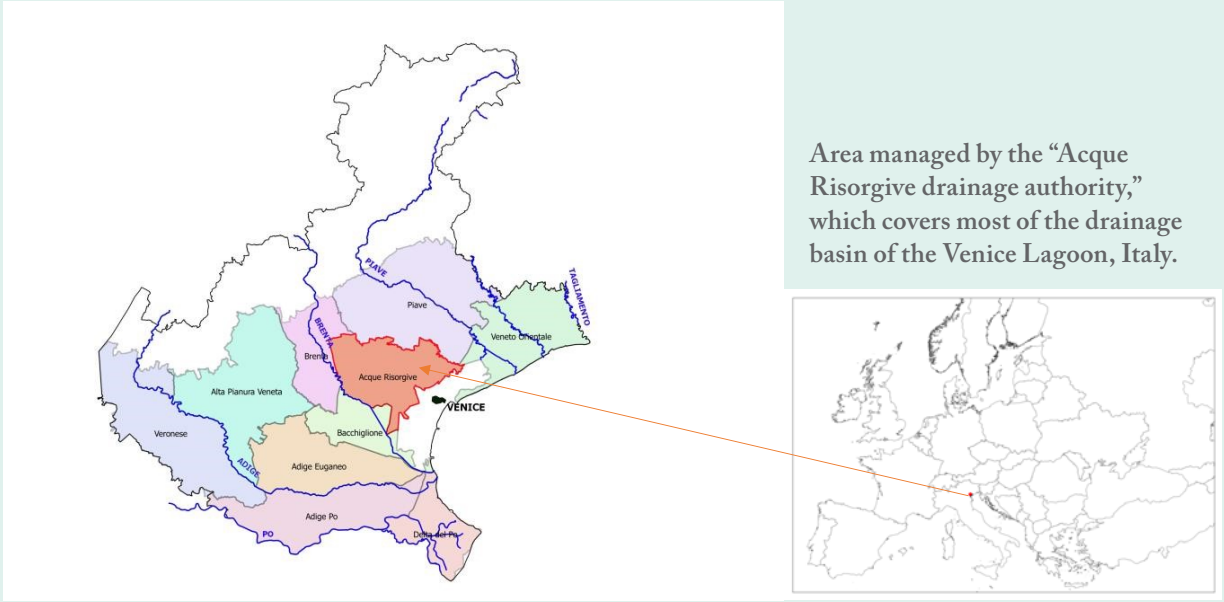
Through cooperation, the effects of a local (individual) restoration project can be replicated at a general (collective) level through the transfer of successful experiences learned, identifying those actions necessary for effective long-term restoration. The implementation of such partnerships often provides a strategic vision, optimises results, shares the benefits and reduces the cost of restoration. They can also influence higher-level strategies, such as regulatory, policy or cultural change.

6 CBD (Convention on Biological Diversity). 2012. COP11 decision XI/16. https://www.cbd.int/decisions/cop/11/16

Case Study: Restoration program of the drainage basin of the Venice Lagoon, Italy

This area is a mosaic of lowland rivers, wetlands and marshes, originally for the drainage basin of the Venice Lagoon. From Roman times onwards, the wetlands were subjected to drainage and reclamation, making the plains more suitable for agriculture and urbanisation, and resulting in a highly artificialized network of irrigation and drainage canals. The Venice Lagoon is subject to eutrophication (with extensive phenomena of algal bloom), thus since the end of the twentieth century, national and regional laws have been set up to create a special regulatory framework to deal with this problem in the area. In 2000, the Regional Director Plan approved clear and quantitative objectives of nitrogen and phosphorus removal for each of the sub-basin draining into the Lagoon. In addition, increasing urbanisation and artificialization of canals, as well as the reclamation of existing wetlands, lead to high vulnerability of the urbanized areas, thus suffering recurring and increasing flooding events.

Aerial view of the newly created Lusore basin (Photo by Ivan Mazzon & Consorzio di Bonifica Acque Risorgive)



Area managed by the "Acque Risorgive drainage authority," which covers most of the drainage basin of the Venice Lagoon, Italy.

The Acque Risorgive Drainage Authority set up some small-scale pilot projects focused on restoration of artificial canals, planting tree buffer zones, restoration or creation of new wetlands and adoption of different practices for the management of aquatic vegetation. These resulted in a successful win-win solution (solving both hydraulic/pollution problems and favouring biodiversity/ landscape), leading the Authority to upscale these pilot experiences. These practices are now consolidated/routinary best practices, applied at basin scale and with a long-term perspective.

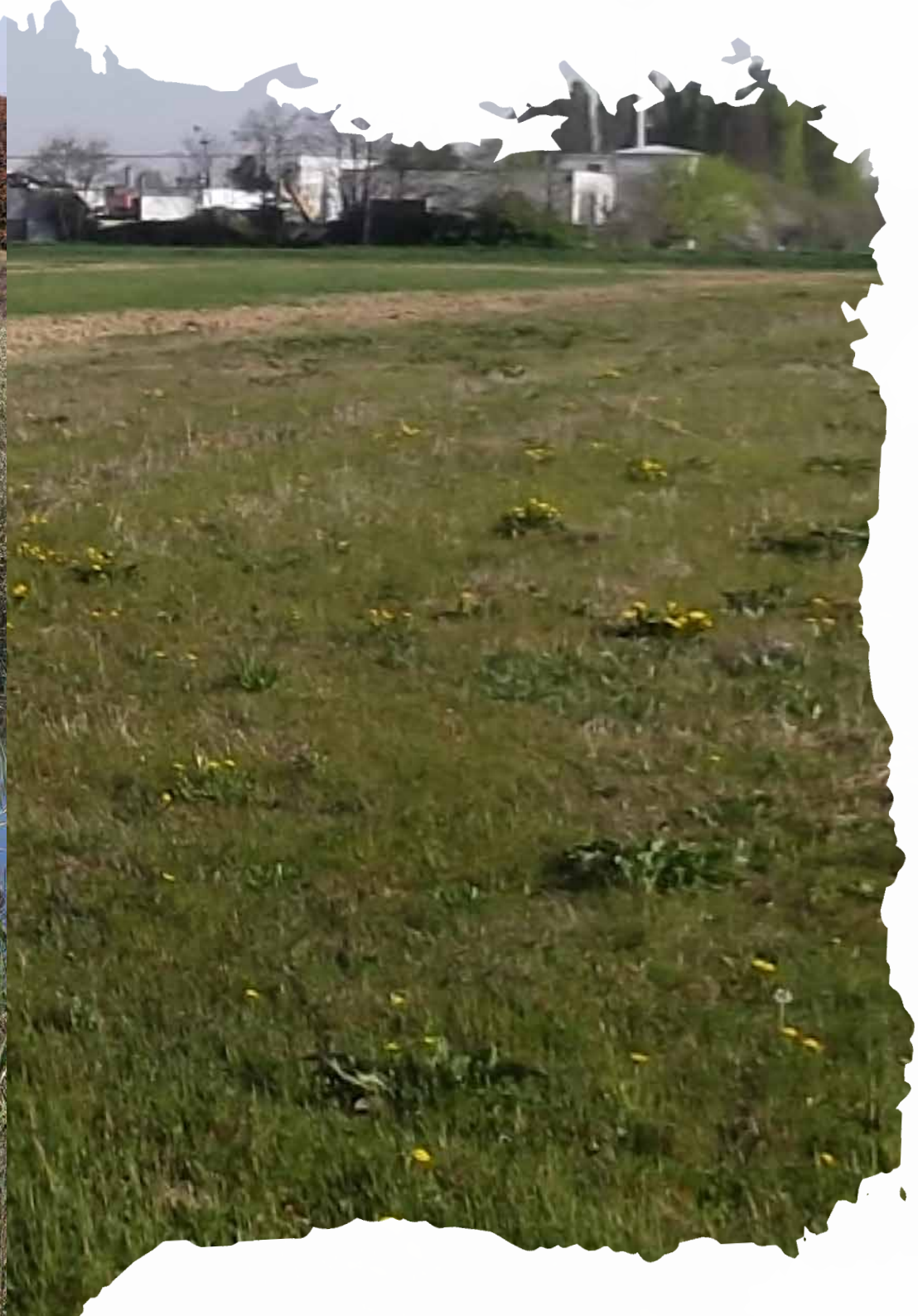
The Venice Lagoon demonstrates upscaling from a small-scale pilot project which from its early development defined the best methodology and practical solutions to obtain the environmental restoration results foreseen in the Regional Director Plan. Once the hydraulic and pollution challenges, landscape and biodiversity regeneration were solved, the experiences were extended to the rest of the site, and have now become consolidated best practice, applied on a catchment scale and with a long-term perspective.

Top replicable results from the implementation of the Regional Director Plan in the Venice Lagoon

During the last two decades, more than 20 existing or newly recreated wetlands have been restored, mainly by the acquisition of agricultural or clay mining areas, in a process of progressive scaling up on the ground. Moreover, a relevant network of natural rivers and artificial canals has been enlarged, by creating buffer strips and in stream wetlands not requiring recurring and highly impacting management practices. The most significant results obtained are summarised right.

Challenge	*Action*	*Benefit*	*Indicators*
1. Nutrient load reduction to the Lagoon	Creating / restoring wetlands acting as *phytodepuration* systems. River restoration. Creation of buffer strips.	Nutrient loads reduction	47-57 t/y of Nitrogen removed 3.5 t/y of P removed
2. Flood risk control	Enlarging river section, reshaping rivers, creating in-line and out-stream wetlands	Increased water retention capacity and peak flow reduction during flooding events	Increased water storage capacity Ca. 1,800,000 m^3
3.Improving natural habitat	Creation of new wet and forest habitats, planting autochthonous species, favouring the natural recovery of habitats. Adopting a "gentle" approach on managing riparian vegetation	Significant increase of natural habitats within a highly anthropized area	223 ha of restored or newly recreated wetlands, 14 Km of buffer strips and 42 km of restored rivers and canals
4. Recreational opportunities	Creation of pedestrian and cycle paths, citizen science and educational activities with schools	Landscape value and recreational opportunities increased	Potential users (R=5km) Ca. 520,000 inhabitants 40 classes of students actively involved

Opposite: Lusore site, an example of newly recreated wetlands (after September 2021 compared with before March 2017) (Photo credits: Consorzio di Bonifica Acque Risorgive)



Successful Wetlands Restoration Case Studies

The following case studies have been collated to demonstration further successful wetlands restoration projects in the Mediterranean where the approach and plan was specific to the local context of the site.

Clockwise from top: View of the Azraq wetland reserve (Photo: Azraq Reserve); Reintroducing Azraq endemic killifish (Photo by Hazem hreisha); Azraq endemic killerfish (Photo by Nashat Hamidan); Drying up a pool and adding some soil to its surface to reduce its depth in Azraq wetland. (Photo by Hazem Khreisha).

Restoration of an oasis in the desert

The Azraq Oasis Wetland Reserve in Jordan (Ramsar site) is a closed isolated desert wetland including marshland, dry marsh, silt dunes and large mudflat.

The main challenges with this site were:

- Conflicting exploitation of water resources for urban and agriculture use
- Hunting
- Its proximity to residential areas

The decision to rehabilitate Azraq wetland habitats was based on a scientific research and discussion through an Azraq killifish survey conducted in the Reserve.

Since 1994, the Royal Society for the Conservation of Nature (RSCN), with international support has undertaken conservation measures including:

- The recovery of the endemic Azraq killfish (*Aphanius sirhani*),
- Restoration of wetland pools (including removal of exotic fauna and flora)
- Promotion of sustainable ecotourism and socioeconomic initiatives (it is now a source for income for around sixty local families)
- Scientific-based monitoring program

The Azraq Wetland Reserve has so far achieved five management plans and the sixth management plan of the site (2020-2024) is now operational. Having a scientific basis for decision-making is proving very important.

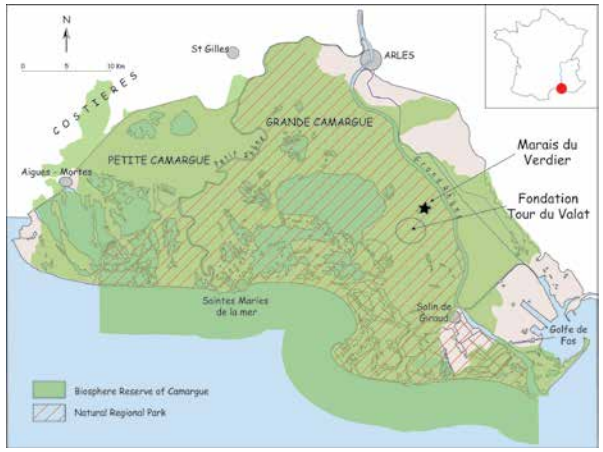
Ongoing Restoration Results:

- c10 % of the original wetland has been artificially restored
- Three pools have been restored

www.medwetmanagers.net/a-success-story-restoration-of-the-azraq-wetland-jordan/

Community Restoration in Verdier Marshes (Camargue, France)

The Tour du Valat (scientists and landowners), with active collaboration of the local community wanted to restore 120 ha of wetlands that were fish farms back to natural wetlands, and to shift from artificial exploitation of the marshes with continuous water levels to a more "natural" management with seasonal fluctuations of water levels.



The Verdier Marshes in the Camargue (France).

The project team found that community-based conservation empowered local people to participate in the management process, through partnerships in planning and implementation, and created greater responsibility and ownership of conservation objectives. Participants were actively involved even in collecting data for scientific monitoring which led to timely management decisions being made and increased social capital for the local community. This approach facilitated problem solving and stimulated creative solutions and provided a solid basis for cooperation and ownership of conservation goals, which became shared, and increased the long-term success of restoration initiatives.

Results of participatory monitoring:

- Return of traditional flora and fauna species
- Recovery of permanent and temporary marshes, reed beds, pastoral vegetation and bush lands.

Active collaboration of local stakeholders is the basis of the community-based restoration (Tour du Valat).

Project evaluation showed stakeholders appreciated their involvement in a co-learning process. The recovered land now hosts a variety of multi-use activities for the villagers including grazing, hunting, fishing, hiking, bird watching and educational visits.

Today, the project is maintained through the investment of the association's volunteers. The involvement of the Tour du Valat remains necessary to provide a framework for implementation activities (the management plan) and to function as a link between the association's volunteers and the owners.

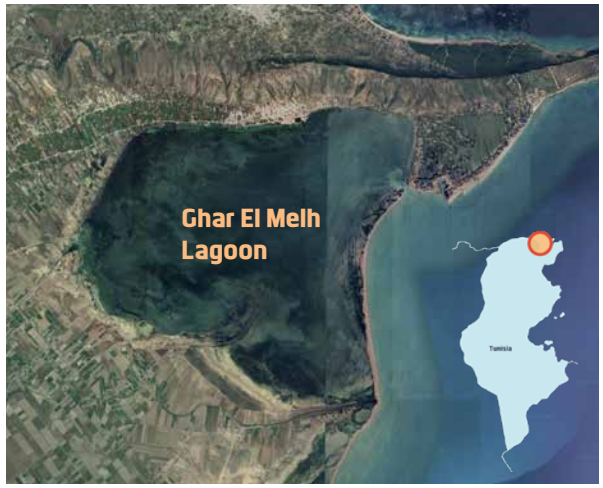
Tip: Keep in mind the facilitation time required to set up such a project and ensure it continues in a more autonomous way.

Restoration of the water flow in the Ghar el Melh lagoon

The Ramsar lagoon of Ghar el Melh has a rich historical, natural, and cultural heritage. The ecosystem provides two main socio-economic services to the local community: artisanal fishing, and the ancestral agricultural practice of "gettayas" – man-made sandy islets irrigated by freshwater brought in on tides and on which farmers grow their crops.

This rich cultural and biodiverse way of life was increasingly under threat from human pressures and infrastructures, which coupled with new conditions linked to the effects of climate change led to the alteration of the functioning of the lagoon ecosystem, severely affecting traditional fishing and the ancestral agriculture. An urgent request to NGOs and stakeholders came from local authorities and communities to conduct a study to identify solutions to improve the flow and quality of water to avoid the disappearance of the Sebkha (salt lake) and preservation of the two ancestral practices. Here the destruction of nature was directly affecting a primary resource, so it was the local authorities and affected communities themselves who promoted restoration of the wetlands by working with expert partners to ensure the sustainability of the project.

The study was conducted within the framework of GEMWET project "Conservation and sustainable development of coastal wetlands with high ecological value" implemented in Ghar El Melh. It was financed by the MAVA Foundation and implemented by WWF-NA in partnership with international and local organisations with the aim of promoting sustainable development around the wetlands.



Location of Ramsar site Ghar El Melh lagoon in Tunisia.

Scenic view of gettayas in Sidi ali el Makki Sebkha and the Ghar E Melh lagoon (photo WWF- North Africa).

The Result

Four restoration scenarios were identified, and a consultation process carried out with the national, regional, and local authorities and the communities to select the best restoration actions. It has benefitted traditional farming and small-scale fisheries locally.

We need to embed sustainability

Further funding is needed to continue the consultation process and to ensure that the current restoration work is conducted with the participation of key stakeholders, including local farmers and fishers.

Osprey artificial nests in Stagno di Mistras (Sardinia, Italy)

The wetlands in the Mistras lagoon (Cabras municipality), between San Giovanni di Sinis (to the south) and Torregrande (to the east) extends over six hundred hectares and is directly connected with the sea by a single opening and does not benefit from significant freshwater inputs. The intiative was part of the Maristanis project, funded by the MAVA Foundation and coordinated by MEDSEA Foundation with the aim to protect birds, in particular in the context of the Mistras lagoon, by creating and placing artificial nests for the Osprey (Pandion haliaetus) in SCI/SPA areas to favour the nesting of the species in order to attract ospreys during their pre-reproductive migration and encourage them to stop and stay.

Restoring a diverse and complete ecosystem, and re-establishing its biological processes by increasing carrying capacity of fauna and flora was needed to improve functionality and increase the wetlands various ecosystem services. The fauna increased the value of the site for neighbours, visitors, and users, which helped to guarantee long-term conservation status.

Ongoing Results:

The Osprey is a protected bird species. Even if the last census confirmed a high presence of Osprey at Mistras Lagoon (17 specimens), no specimen has nested there so far, but their presence in winter continues to attract bird watchers both regionally and internationally

Actions like installing an artificial osprey nest are simple but reliant upon acceptance of the ospreys. Periodic monitoring is recommended to know the success of actions and to modify nesting support location, if necessary. Similar measures like artificial islands for waterfowl breeding, perching poles, nesting boxes for passerines or barn owls are also used.

Top: Osprey in the Mistras Lagoon (photo by Alberto Cherchi)

Right: One of the artificial nest installed in the Mistral lagoon (MEDSEA Foundation)

Restoration and renaturalisation processes in the Sale 'e Porcus Pond (Sardinia, Italy)

The Sale 'e Porcus pond is a temporary basin for collecting rainwater, with no communication with the sea and no intakes, and subject to drying up in the summer. The project was part of the Maristanis initiative funded by the MAVA Foundation and coordinated by MEDSEA Foundation.

Map of the Sale ‘e Porcus pond and location of the intervention.

The aim of the initiative was to improve the health of the habitats present and the conservation status of their ecosystems, reduce fragmentation and increase its use by migratory birds as a feeding area. Action focused on thickening the vegetated along the pond banks, creating a filter zone between agricultural activity and those of higher natural value, acting as a phytoremediation area.

The project focused on a new management model for protected areas based on:

- The conservation of biodiversity and ecosystem functions
- Reconstruction through active protection actions
- Sustainable development through creation of new sustainable economies

Results:

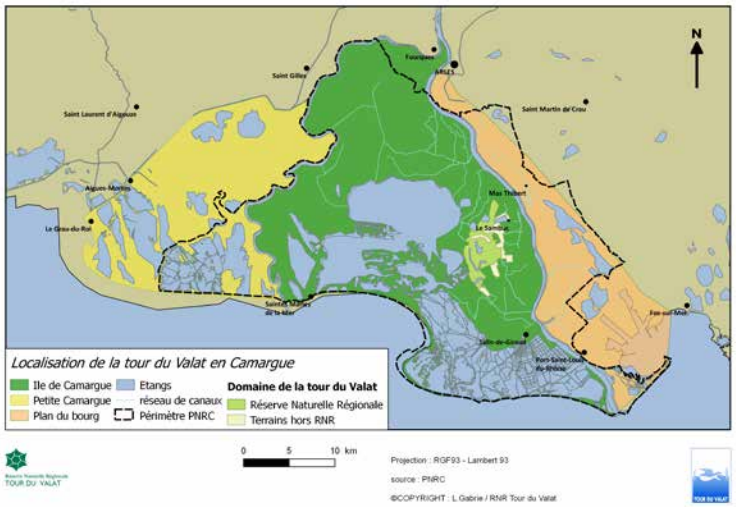
Creation of a new economy through the regulated use and harvesting of the planted species (rush) for the traditional activity of basket making. The experience highlighted the importance of collaboration between local stakeholders and has underlined how multi-objective interventions can be the key to increasing support from local population and administrations as a single intervention that has benefits for different categories of stakeholders and promotes multiple ecosystem services.

Sharing knowledge

A parallel project "IS FAINAS" was developed through the involvement of designers and the training of young artisans.

Left to right: View of the west bank of the pond before intervention; Fence to protect the restored area and b) the new plants after 1 month.

Restoring grazing for wintering waterfowl in Tour du Valat (Camargue, France)



Location of la Tour du Valat in Camargue (France).

Restoring the vegetation using cattle rather than a tractor not only provided food for people and the functional benefits for this herbivores system (e.g., faster nutrient cycling in the system), and is cheaper, but also allowed the Tour du Valat to reduce its dependence on fossil fuels.

The Tour du Valat (Camargue, France) has been one of the main day-roosts for wintering ducks in the Camargue. In the 1950s 1-2 million birda (ducks and coots) day-roosted there but in the late 1970s, use of the marsh was by waterfowl was decreasing due to variable water levels and high vegetation. Wetland restoration started in 1979 with the implementation of more intensive grazing in spring and summer and ensuring flooding conditions from September onwards.

Tour du Valat directly funded the project for three years for about 11,000 euros*. Thereafter, the running costs were about 2,500 euros per year*. The running costs were easily covered by the benefits from the cattle, tourism, and the sale of meat.

In 1982 restoration was considered complete and it was no longer necessary to mow the reed beds. Helophyte vegetation responded rapidly to slight changes in flood duration, depth, and grazing pressure. Adaptive management has since been implemented using grazing pressure and flooding/drying dates as tools to reach the required vegetation structure for wintering waterfowl.

Results:

- Increased day roosting of wintering waterfowl
- 1,000 visitors per year
- Increased capacity for local hunting clubs

Since the percentage of large herbivores in European ecosystems has been strongly reduced by the extinction of all mega- and many of the large herbivores over the last 30,000 years, the restoration contributed to developing the idea that domestic animals can help restore the functions of large herbivores in semi-natural systems.

*Corrected for inflation. For more details please, see Duncan et al. 1982.

The general idea developed at Tour du Valat at that time have been published in Duncan & d'Herbès 1982 (Appendix 1) and Duncan 1992 and contributed to the emergence of a new paradigm in conservation: the rewilding (Schulte to Bühne et al. 2021).

Open waters created by the cattle benefit the waterfowl populations in the wetlands (Photo: Tour du Valat).

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A new guide to help decision-makers and funders restore wetlands

Restoring Mediterranean Wetlands is a new policymaker's playbook for sustainable management and conservation of water by 2030. It is an output of the intersectoral partnerships sharing know-how as part of the United Nations Decade on Ecosystem Restoration 2021-2030.

Coordinated by WWF Spain, MedWet and Tour du Valat in partnership with PIM Initiative and MEDSEA, the playbook is part of the Wetlands-Based Solutions initiative and funded by the MAVA Foundation.

Readers can expect guidance on developing and implementing wetlands restoration initiatives and criteria on selecting sites.

Experts in the field share experiences and case studies of integrated restoration using nature-based solutions and how to set clear objectives, identify priorities and undertake continuous evaluation.

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