REST-COAST

LARGE SCALE RESTORATION OF COASTAL ECOSYSTEMS THROUGH RIVERS TO SEA CONNECTIVITY

# SICILY LAGOON

## RESULTS & ACHIEVEMENTS REPORT



## SUMMARY

The Sicily Lagoon pilot site, centred on the Cuba-Longarini lagoon complex on Sicily's southern coast, covers approximately 182 hectares of interconnected lagoon habitats (Longarini: 122 ha, Cuba: 60 ha, plus 10 ha of fish-farm ponds). The site was subject to a significant ecological restoration programme under the REST-COAST project, complemented by actions funded through the LIFE Marbled Duck project.

Six of eight challenge areas were addressed at 100% of planned actions. A further challenge reached 50% implementation, while the physical degradation of coastal dunes was addressed through modelling and evidence-building, with physical restoration secured under the INTERREG WETWISE project by 2027. Restoration was led by the Pro-biodiversity Foundation SPA (Stiftung **Pro Artenvielfalt)** in partnership with the University of Catania and the Sicily Region.

Funded by the European Union

This project receives funding from the European Union's Horizon 2020 Innovation Action under grant agreement No 101037097.

## THREATS AND PRESSURES TACKLED

- Anthropogenic encroachment and growing human pressure on lagoon habitats
- Pollution-driven spread of invasive species and habitat degradation
- Excessive freshwater withdrawal for irrigation and other water management failures
- Illegal hunting
- Physical degradation of coastal dunes
- Lack of continuous and effective ecological monitoring
- Reduced hydraulic connectivity between lagoons and the sea
- Limited stakeholder knowledge and expertise in lagoon management

## BASELINE CONDITION

The Cuba-Longarini lagoon system had been significantly degraded by a combination of anthropogenic encroachment, water management failures, and inadequate institutional oversight. Hydraulic connectivity between the two lagoons and the wider coastal marine environment was severely compromised, resulting in stagnant water conditions, elevated nutrient concentrations, and declining biodiversity. Coastal dunes were damaged, leaving the system vulnerable to erosion and storm impacts. Illegal hunting and agricultural waste dumping posed direct and persistent pressures on wildlife and water quality. Ecological monitoring was fragmented and insufficient to support evidence-based management decisions.

## RESTORATION STRATEGY SELECTED AND WHY

The project prioritised nature-based restoration interventions aimed at restoring ecological function and hydrological connectivity rather than relying on hard engineering. Two complementary approaches underpinned the strategy:

Restoration of hydraulic connectivity between Cuba and Longarini lagoons through channel dredging, enabling natural water exchange and improving salinity dynamics.

Installation of water-level regulation infrastructure (sluice gate barrier) to manage flooding and freshwater inputs across approximately 88 hectares.

Physical restoration was complemented by targeted biodiversity interventions, including the construction of bird islands and 7 ha of salt marsh restoration within a 300 ha zone of influence, alongside comprehensive site security measures and the establishment of a full ecological monitoring network. Where ground-level works were not yet feasible (coastal dune restoration), the project delivered modelling and evidence-building to secure follow-up by the WETWISE project.

Pre restoration, photo: Stiftung Pro Artenvielfalt

# HOW THE CHALLENGES WERE ADDRESSED AND KEY RESULTS ACHIEVED

## Growing Anthropogenic Pressure

Site security was fully enhanced through perimeter fencing, eliminating direct pressures from agricultural waste dumping and illegal incursion into core lagoon habitats. Access management measures are now in place across the entire site.

## Excessive Freshwater Withdrawal for Irrigation

A sluice gate barrier was installed to regulate water levels across approximately 88 hectares, improving hydrological management and reducing the effects of excessive freshwater withdrawal on lagoon salinity regimes. No dedicated water abstraction interventions were required beyond this infrastructure.

## Physical Degradation of Coastal Dunes

Ground-level restoration works were not implemented within the REST-COAST project modelling, and evidence-building was completed to inform the restoration design, and physical dune restoration has been secured under the INTERREG WETWISE project, with delivery planned by 2027.

## Reduced Hydraulic Connectivity Between Lagoons and the Sea

Channel dredging was carried out to restore hydraulic connectivity between Cuba and Longarini lagoons, achieving an estimated 57% improvement in connectivity. This intervention re-established natural water exchange dynamics and reduced stagnation across the lagoon system.

## Pollution-Driven Spread of Invasive Species

Targeted interventions addressed pollution inputs and conditions favouring invasive species establishment. Water quality and lagoon functioning improved as a result, and the full environmental monitoring network now provides ongoing data to track and respond to invasive species dynamics.

## Illegal Hunting

Site security measures, including perimeter fencing and access controls, eliminated illegal hunting pressure across the site. This represented one of the most significant direct threat reductions achieved under the programme.

## Lack of Continuous and Effective Ecological Monitoring

A full environmental monitoring network was designed and is now operational, covering key biodiversity, hydrological, and water quality parameters. The University of Catania leads monitoring activities, providing continuous evidence-based information for adaptive management.

## Limited Stakeholder Knowledge and Expertise

Stakeholder engagement and capacity-building activities reached 50% implementation. The CORE-PLAT living-lab structure was supported through REST-COAST, facilitating dialogue between the Pro-biodiversity Foundation SPA, the University of Catania, the Sicily Region, and other relevant actors.

# PERCENTAGE OF TARGET ACHIEVED

Six of eight challenge areas achieved 100% implementation of planned actions. Stakeholder knowledge and expertise reached 50%. Coastal dune physical restoration stands at 0% on the ground, with delivery secured under WETWISE by 2027.

# SPECIFIC SOLUTIONS IMPLEMENTED

## Bird island construction and salt marsh restoration

7 ha of salt marsh restored within a 300 ha zone of influence, providing nesting and foraging habitat for priority waterbird species.

## Channel dredging

Restoration of hydraulic connectivity between Cuba and Longarini lagoons, achieving an estimated 57% improvement and re-establishing natural water exchange dynamics.

## Sluice gate barrier installation

Regulation of water levels across approximately 88 hectares, improving hydrological management and reducing the effects of excessive freshwater inputs.

## Site security

Full perimeter fencing implemented, eliminating illegal hunting and agricultural waste dumping pressures.

## Ecological monitoring network

A comprehensive environmental monitoring network is now operational, led by the University of Catania.

## Modelling and evidence-building

Coastal dune restoration design completed, securing follow-on delivery under WETWISE by 2027.

## CORE-PLAT living-lab

Stakeholder engagement platform facilitating co-design and dialogue between conservation managers, researchers, and regulatory authorities.

Connective channel dredging (between Cuba and Longarini), photos: University of Catania

Saltmarsh restoration (Cuba and Longarini), photos: University of Catania

# KEY STAKEHOLDERS INVOLVED AND HOW

The Pro-biodiversity Foundation SPA served as site designer, owner, and manager, leading restoration implementation and stakeholder coordination throughout the project. The University of Catania led the design and operation of the ecological monitoring network. The Sicily Region provided regulatory oversight and institutional support.

Broader stakeholder engagement was facilitated through the CORE-PLAT living-lab structure, bringing together conservation managers, researchers, regional authorities, and local actors to co-design restoration measures and align ecological objectives with local governance frameworks.

Bird islands (Longarini lagoon) pre-restoration, photo: Stiftung Pro Artenvielfalt

Bird islands (Longarini lagoon) post-restoration, photo: Stiftung Pro Artenvielfalt

# INFLUENCE ON DECISION-MAKING

The Sicily Lagoon pilot contributed to restoration governance primarily through technical and scientific channels. Modelling outputs and monitoring evidence directly informed restoration design decisions and supported the case for continued investment in lagoon management. The securing of follow-on funding under the INTERREG WETWISE project represents a direct policy outcome, ensuring that coastal dune restoration will be delivered by 2027. The pilot has also contributed to mainstreaming Nature-based Solutions within regional coastal planning discussions in Sicily.

Bird islands (Longarini lagoon), photos: University of Catania

# RECOMMENDATIONS FOR FUTURE DEVELOPMENT

## Hydraulic connectivity and water quality

Maintain and monitor the restored hydraulic connections between Cuba and Longarini lagoons, and expand water quality monitoring to track nutrient dynamics and lagoon ecological status over time.

## Coastal dune restoration

Deliver physical dune restoration under WETWISE by 2027, and integrate outcomes with broader coastal resilience planning for Sicily's southern coast.

## Biodiversity monitoring

Continue and expand monitoring of breeding bird populations, invasive species, and halophyte habitats to track recovery trajectories and inform adaptive management.

## Site security

Maintain perimeter fencing and access controls to sustain the elimination of illegal hunting and waste dumping pressures.

## Stakeholder capacity

Complete the remaining 50% of stakeholder knowledge and expertise actions, and sustain the CORE-PLAT engagement platform to support long-term co-management.

## Governance

Strengthen institutional frameworks for lagoon management, evaluate ecosystem-service trade-offs, and explore integration with agri-environmental planning in the surrounding landscape.

Connective channel dredging (between Cuba and Longarini)

Gate-barrier (between Longarini and the sea)

# FINANCIAL MECHANISMS USED AND PROPOSED

Restoration actions were funded primarily through LIFE project grants (LIFE Marbled Duck) and EU Horizon 2020 REST-COAST funding. Future restoration works, specifically coastal dune restoration, will be delivered under the INTERREG WETWISE project by 2027.

Potential future financial mechanisms under consideration include tourism-related revenues from the restored lagoon habitats, water purification payments from local farmers benefiting from improved water quality, and carbon credits from restored and expanded lagoon and salt marsh habitats.

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