Seagrass restoration in Marine Protected Areas

Lessons from Scotland and Italy
EUROPARC Scholarship for Young Professionals
Study visit report 2026

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Seagrass nursery - Wester Ross Fisheries Trust

Executive summary

Having studied in Italy and now working in Scotland, my project focused on learning from seagrass restoration practitioners and protected area professionals in Wester Ross, Portofino, Salento, Venice and Rome. The principal objective was to understand how restoration is planned, delivered and sustained across contrasting ecological and social settings. The visits confirmed that planting is only one element of recovery. Projects also require appropriate site selection, a clear understanding of continuing pressures, suitable permissions and skills, monitoring beyond the funded intervention, and people with a long-term stake in the health of the habitat. By sharing both the lessons learned and the difficulties encountered, I hope this report can support open learning across the restoration community.

The projects differed substantially in their target species, salinity, exposure, funding, scale and surrounding human activity. I therefore present the conversations and site observations as comparative professional learning. Across the visits, several consistent recommendations emerged: report unsuccessful approaches as openly as successful ones, agree long-term responsibilities from the outset, and design community engagement around the specific ways in which each coast is used and valued.

Key Findings

- **Restoration works best when communities are involved early** - Participation should begin when pressures, sites and methods are being discussed, rather than after decisions have already been made.
- **Different people can contribute different knowledge** - Scientific monitoring, local ecological knowledge and citizen observations answer different questions and are strongest when they complement one another.
- **Participation needs proper support** - Volunteer enthusiasm cannot replace specialist skills, safe working practices or long-term funding. Where appropriate, paying local contributors can make involvement more inclusive and sustainable.
- **Citizen science needs a clear purpose** - Projects should explain what information is needed, how records will be checked and what decisions the evidence will inform. Participants should hear what was learned from their work.
- **Communication is part of restoration** - Species identification, local background and visible opportunities to act can build support for protection, but awareness must be linked to practical changes in behaviour and management.

Purpose and approach

My project explored nature restoration in Marine Protected Areas (MPAs), with a particular focus on seagrass. I sought to compare restoration methods and ecological settings, understand how protected area management influences delivery, and examine approaches to monitoring and citizen science. I met project teams and researchers, observed field sites and laboratory facilities, and discussed the practical, ecological and governance challenges experienced by each project. The report draws together these discussions and observations.



Map of the journey

Visit	Focus
Wester Ross Fisheries Trust, Poolewe, Scotland	*Zostera marina* restoration using a nursery and community participation
Portofino Outdoor, Baia di Niasca, Italy	One Ocean - Blue Forest project with *Posidonia oceanica* and visitor pressures
University of Salento, Lecce, Italy	*Cymodocea nodosa* research, INNS and innovative transplant methods
ISPRA, Venice Lagoon, Italy	Lagoon REFRESH, salinity management and community involvement
ISPRA, Rome, Italy	National mapping, monitoring, laboratory work and governance

Lessons from each stop

Wester Ross Fisheries Trust, Loch Ewe MPA - seagrass nursery and community participation



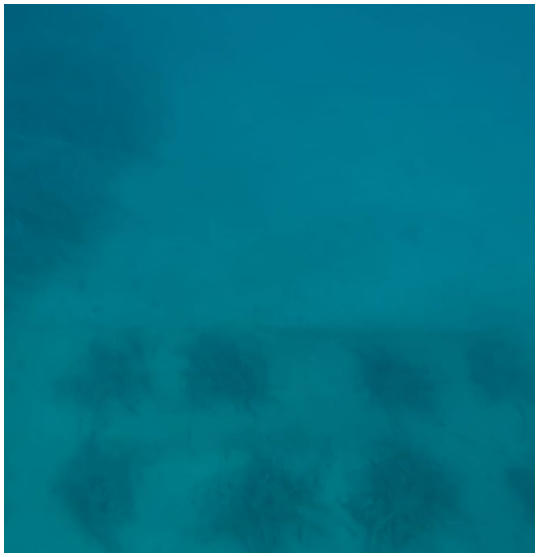
Wester Ross Fisheries Trust Nursery

At Wester Ross Fisheries Trust (WRFT), on Loch Ewe, I discussed an experimental *Zostera marina* programme using hessian bags, rhizome material and controlled nursery conditions. The nursery contained approximately 60 bags, with five plants per bag, alongside trials using seeds and rhizome nodes. The team emphasised that developing better knowledge of the receiving site, and capturing observations consistently, may be more valuable than simply increasing the number of plants placed. Promising early growth was followed by browning after several months. This experience illustrated the importance of seasonal timing and showed how permission and approval processes within an MPA can affect interventions that depend on narrow ecological windows.

The planting work drew on staff and a trusted network of local community helpers, who were paid a standard rate so that participation was financially realistic alongside other employment. This model enabled WRFT to draw on skills within geographically isolated communities and complete work that would otherwise have been difficult to resource. It also helped build local knowledge, belonging and pride in the marine environment. The approach demonstrates that community participation is strongest when it is embedded in long-term relationships, properly supported and treated as a valuable contribution.

Baia di Niasca MPA with Portofino Outdoor and One Ocean - restoration in a popular visitor destination

At Baia di Niasca, I met Portofino Outdoor, which works closely with the community around the bay, and visited the One Ocean Foundation - Blue Forest project for Posidonia oceanica. We snorkelled over the restoration area to observe the coconut-fibre supports and the nearby donor meadow. The work began in 2023 in collaboration with the University of Genoa and includes sites at different depths. Because Posidonia is slow-growing, monitoring over several years is essential. The bay also functions as a lively nursery habitat, where visitors may encounter species including *Sarpa salpa*, seabream and octopus around the meadow.



Seagrass donor bed and coconut fibre nets

The bay made a communication challenge particularly tangible. People were swimming and enjoying the water beside a restoration site without necessarily knowing that restoration was taking place or why seagrass mattered. In a busy visitor destination, where the audience changes daily, signage alone is unlikely to build lasting

understanding. Community support is especially important when managing seasonal moorings and anchoring. Enforcement, communication with operators and direct conversations with visitors must reflect how the bay is used throughout the year, including winter periods when tourism infrastructure may be reduced but the meadow still requires protection. During the visit, discussion focused on a wider need for anchoring rules, enforcement and public messaging to reflect the seriousness of damage to Posidonia. Restrictions associated with protected species can limit volunteer involvement in planting, but visitors and local businesses can still play an important role in awareness and stewardship.

University of Salento, Porto Cesareo MPA – experimental methods and honest reporting

At the University of Salento, discussions centred on *Cymodocea nodosa*, experimental transplant supports and the challenges of working within limited timescales and budgets. We visited the Porto Cesareo MPA and discussed site-specific permissions, ecological assessment and biosecurity. Puglia's position in the central Mediterranean also prompted discussion of invasive non-native species (INNS) arriving through the Suez Canal, including the expanding *Halophila stipulacea*, and the difficulty of separating the effects of restoration from rapidly changing background conditions.

A recurring message was the importance of publishing failures as well as successes and maintaining projects long enough to distinguish short-lived attachment from genuine persistence. Community outreach should be connected to the research itself and evaluated for its effect. Citizen observations can be useful, but engagement must go beyond collecting records: it should help replace damaging established practices with more informed and sustainable ones. This is essential if local communities are to see an MPA as a shared environmental and social asset rather than as an external restriction or inconvenience.



***Halophila stipulacea* in Porto Cesareo**

ISPRA Venice, Lagoon REFRESH - community restoration in an anthropogenic environment

The Lagoon REFRESH visit demonstrated restoration at the scale of water management in the Venice Lagoon and the River Sile. Of the Italian projects visited, it had some of the clearest parallels with Scottish work, including discussion of *Zostera noltei*, *Cymodocea nodosa*, *Ruppia maritima* and *Zostera marina*. The team showed how complex it can be to integrate ecological monitoring with agreements among ISPRA, the Veneto Region, universities, drainage authorities and local government. Delivering restoration in a densely used and highly modified lagoon requires coordination across many moving parts.

The project included the controlled reintroduction of freshwater to part of the lagoon, salinity monitoring at several stations and ongoing relationships with people who use the lagoon, including local recreational fishers who contributed to planting activities. Involving these stakeholders helped build practical knowledge, responsibility and interest in the restoration. This was particularly important because

continuity after a time-limited LIFE project depended on clear local ownership of monitoring, maintenance and the wider environmental benefits.



Info panel (one of many) on the cycle track surrounding the lagoon

ISPRA Rome - governance and the management of MPAs

At ISPRA in Rome, I met researchers for a roundtable and visited laboratories covering geology, benthic ecology, fish, ecotoxicology and chemistry. Discussions ranged from habitat mapping using ROVs and field surveys to national restoration programmes, mooring impacts and long-term monitoring contracts.

The conversations covered a wide range of ISPRA initiatives, including LIFE SEPOSSO, MER, DigitAP, LIFE SeaForest, LIFE REEForest, BARGAIN and LIFE SERESTO, as well as the need to combine ecological indicators with social and governance evidence. Researchers described technical setbacks alongside the difficulty of sustaining specialist staff and cooperation among authorities and coastal users. Climate warming adds further uncertainty to long-term outcomes. Public perceptions of stranded Posidonia leaves, known as banquettes, provided a useful example: meadow, beach and dune form a connected ecological system even where beach management continues to treat this natural material as waste.

Lessons across the visits

Match the method to the site and its pressures



Dreamfish grazing on *Posidonia oceanica* in Portofino

The visits demonstrated why restoration methods cannot be separated from their social and physical settings and the specific needs and challenges of each. The Wester Ross project operates in a remote area with relatively limited direct human pressure and a strong community network, making local participation and practical experience central to delivery. The One Ocean Foundation project sits within a high-profile tourism destination, where the NGO, research partners and local operators must work around intense seasonal use and anchoring pressure. In Porto Cesareo, a PhD-led project is testing innovative approaches within a densely inhabited and heavily used coastal landscape, with limited time and resources and the added uncertainty of expanding invasive species. ISPRA's work in Venice and Rome draws on European and national funding and operates at larger scales, but still has to accommodate fishing, boating, tourism, infrastructure and complex public governance. Each project has therefore developed specific and unique techniques and workarounds. The diversity of approaches observed underscores the importance of objective based decision making, where desired ecological outcomes and the drivers of habitat decline are clearly identified before restoration actions are selected. Restoration should therefore be tailored to local conditions rather than guided by a single preferred technique or model.

Define success beyond the first growing season

Early survival, shoot density, expansion, reproductive capacity and associated habitat use answer different questions. A shared monitoring plan should specify baseline conditions, comparison sites where feasible, methods, intervals and responsibility after the initial grant ends. Funding bodies such as the Scottish Marine Environmental Enhancement Fund (SMEEF) can play an important role by continuing to support smaller community organisations and citizen-science groups, enabling them to gather evidence, make informed decisions and test ambitious new approaches. Small projects should not be expected to carry disproportionate risk alone: appropriate technical support, proportionate permissions and mechanisms for sharing both positive and negative results can turn local trials into learning that benefits restoration at a much wider scale.



Loch Ewe MPA

Treat protected area status as a management tool

MPA designation can provide a framework for zoning, permissions and enforcement, but visitor use and other pressures persist within boundaries. Managers need workable rules for anchoring and fishing, cooperation across public bodies, and enough staff and resources to respond to evidence. Also, highlighting the need for governance and ecology to co-exist and co-support each other.



Cymodocea nodosa in Porto Cesareo

Governance becomes particularly difficult when ecological objectives overlap with powerful economic and social interests. Tourism, boating, fisheries, coastal development and the expectations of local residents can all shape what is politically and practically possible within an MPA. Short-term commercial pressures may favour unrestricted access or highly managed beaches, while restoration requires longer time horizons and, at times, limits on familiar activities. Protected area managers therefore need transparent decision-making, clear responsibilities, consistent enforcement and meaningful opportunities for affected groups to participate. Engagement should inform decisions without allowing the best-resourced or most vocal interests to outweigh ecological evidence or the wider public value of a healthy marine environment.

Build participation that serves the project

Participation should be designed around the project's ecological objectives and the needs of the people who use the coast, rather than treated as an optional outreach activity. Skilled divers can support structured underwater monitoring; fishers and boat operators can contribute knowledge of local pressures and practical solutions; and trained citizen scientists can record seagrass sightings, changes in meadow extent and potential threats using agreed methods. These contributions require appropriate training, accessible guidance, data validation and clear boundaries around activities that need specialist skills or permissions. The Wester Ross experience also shows the value of recognising local expertise through supported and, where appropriate, paid participation. Involving people early in planning helps identify realistic roles and makes it more likely that participation will continue after the initial restoration activity.



Portofino MPA

As one researcher observed during the visit, it is difficult to love or protect something that we cannot name. Helping people recognise seagrass and understand its links to marine biodiversity, fisheries, coastal protection and beaches is therefore part of restoration itself. Citizen science can make these otherwise hidden habitats visible, but asking people to submit observations is only the beginning. Projects should explain how records are checked, what the information reveals and how it informs decisions. Schools, visitor operators, community groups and coastal businesses can help reach different audiences, while regular feedback, shared results and opportunities to contribute to monitoring

can turn initial curiosity into long-term stewardship. Engagement should be evaluated not simply by attendance or numbers of records, but by whether it builds understanding, improves evidence and supports more sustainable behaviour.

Implications for practice in Scotland and the EUROPARC network

For NatureScot and the wider EUROPARC network, a practical priority is to embed community engagement and citizen science from the design stage of restoration projects. Project plans could identify relevant communities, the knowledge they already hold, suitable opportunities to participate, training and accessibility needs, and who will coordinate volunteers or paid local contributors. Monitoring protocols should make clear which observations can be collected reliably by non-specialists, how data will be verified and where it will be stored. Funding arrangements, including those supporting smaller community-led projects, should recognise the time and resources needed for coordination, feedback and long-term participation. Ecological outcomes should be considered alongside social indicators, such as sustained involvement, improved awareness and changes in practices that put pressure on seagrass.

The visits also highlighted the value of exchanging practical experience across the EUROPARC network. A shared case-study format could capture restoration techniques and outcomes alongside the community's role, barriers to participation, methods for validating citizen-science records and arrangements for monitoring after project funding ends. Regular conversations among protected area managers, researchers, funders and local organisations could help teams share unsuccessful approaches as openly as successes. I intend to bring these lessons into discussions with NatureScot colleagues working on marine restoration and citizen science. The central lesson from the scholarship is that lasting restoration depends not only on establishing plants, but also on enabling people to understand, value and help care for the habitats around them.

Sources and acknowledgements

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Primary material: the author's visit notes from Wester Ross Fisheries Trust; Portofino Outdoor and the One Ocean Foundation; the University of Salento; ISPRA Venice; and ISPRA Rome. The views and interpretations presented here are my own. Project details and specific findings should be confirmed with the relevant host teams before being quoted elsewhere.

More information on the specific projects can be found at the following links:
NatureScot and SMEEF: https://www.nature.scot/SMEEF ; https://smeef.scot/
Wester Ross Fisheries Trust: https://www.wrft.org.uk/
One Ocean – Blue Forest: https://www.1ocean.org/projects/blue-forest
ISPRA Projects: https://lifeseposso.eu/ ; https://www.isprambiente.gov.it/it/progetti/cartella-progetti-in-corso/progetti-mare/pnrr-mer-marine-ecosystem-restoration/pnrr-mer-marine-ecosystem-restoration ; https://www.isprambiente.gov.it/en/news/the-digitap-project-results-capture-the-biodiversity ; https://www.isprambiente.gov.it/en/news/life-reeforest-project-monitoring-of-grasslands-in-cystoseira ; https://www.isprambiente.gov.it/en/news/life-sea-forest-posidonia-oceanica-meadows-as-blue-carbon-reservoirs-in-the-mediterranean ; https://www.isprambiente.gov.it/en/projects/sea/bargain
ISPRA Projects in Venice: https://www.isprambiente.gov.it/en/projects/inland-waters-and-marine-waters/lagoon-refresh; https://www.isprambiente.gov.it/en/projects/inland-waters-and-marine-waters/seresto-project; https://www.isprambiente.gov.it/en/projects/biodiversity/life-regrowth

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