# D7.4 Exploitation & Sustainability Strategy

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# Executive Summary

REACT4MED's Exploitation and Sustainability Strategy constitutes the project's primary mechanism for converting the knowledge, tools, and demonstrated practices generated through five years of transdisciplinary research into lasting societal, scientific, and economic value. This document presents, for each of the seven component exploitation records contained in D7.4, a structured introduction to the product or innovation being exploited, together with an overarching executive summary and the methodology underpinning the entire exploitation strategy.

- Across the seven exploitation entries, REACT4MED has produced a portfolio of interlinked, deployment-ready outputs spanning five domains:
- A Climate Projections and Attribution Framework (D2.4) providing Mediterranean-scale Global Warming Level (GWL) storylines and attribution data, backed by two high-impact publications in Nature and Nature Water.
- A Guide for Participatory Assessment (D3.1) institutionalising the Ecosystem Restoration Living Lab (ERLL) co-design methodology as a transferable facilitation tool for multi-stakeholder land restoration planning.
- A Co-developed Indicators and Metrics Framework (D3.2) offering a validated, cross-site set of biophysical and socio-economic indicators for monitoring land degradation and restoration outcomes.
- An Agro-Ecological Restoration Guidebook for Practitioners (D3.4) a multilingual, open-access, ISBN-registered reference work integrating WOCAT-documented restoration actions for North Africa and the broader Mediterranean.
- The LanDS Decision-Support Toolbox (D4.3) a machine-learning-enabled, web-accessible platform for site suitability assessment, climate-risk profiling, and Nature-based Solutions (NbS) prioritisation.
- A Long-Term Monitoring System (D5.3) for tracking soil organic carbon (SOC), water-use efficiency (WUE), and land cover change across restoration pilot sites, compatible with EU Soil Monitoring Law and UNCCD reporting requirements.
- Eight fully costed pilot area restoration measure entries (WP5/WP6) covering Cyprus, Greece, Italy, Spain, Morocco, Israel, Turkey, and Egypt with cost-benefit analyses (CBA) and WOCAT data sheets ready for international scaling.

Together, these outputs represent a coherent and strategically sequenced exploitation portfolio targeting four distinct but interrelated markets: the EU and Mediterranean policy ecosystem; the international scientific community; land management practitioners, NGOs, and farmer organisations; and the private sector, including ESG investors, voluntary carbon market actors, and agri-tech platforms.

The Technology Readiness Levels (TRL) of the individual outputs range from TRL 4-5 (LanDS Toolbox, Monitoring System) to TRL 6-8 (Participatory Guide, Indicators Framework, Guidebook for Practitioners, Pilot Area measures), reflecting a portfolio that spans from near-market products ready for immediate policy uptake to tools that require limited additional packaging before commercial deployment. Two REACT4MED-acknowledged publications in Nature-family journals establish the project's scientific credibility and citation capital. The open-access Guidebook provides a persistent, internationally visible channel for practitioner-level dissemination

Exploitation activities are sequenced across three horizons: immediate policy engagement and scientific publication (M30-36, within the project lifetime); NGO and practitioner dissemination supported by simplified field guides and starter kits (M33-36); and commercial packaging for private sector and carbon market actors (estimated M36-42, post-project). Revenue-generating pathways identified include fee-based advisory and training services, monitoring-as-a-service offerings, licensing of the LanDS toolbox, and integration of project data into climate-risk and ESG reporting frameworks.

The long-term sustainability of REACT4MED results depends on three enabling conditions: institutional anchoring of the monitoring system and participatory approach within national ministries, extension services, or established NGO networks; maintenance and continued development of the LanDS platform beyond the project lifetime; and ongoing WOCAT partnership sustaining the open-access dissemination of restoration practices. The consortium is committed to ensuring that the knowledge generated by REACT4MED transitions from funded research into durable public goods and commercially viable services that contribute to the Mediterranean's restoration agenda well beyond the project's formal end date.

# 1 Introduction

REACT4MED (Inclusive Outscaling of Agro-ecosystem REstoration ACTions for the MEDiterranean) is a PRIMA-funded project that brings together scientific partners, policy actors, practitioners, and local communities to co-design, test, and scale agro-ecosystem restoration solutions across the Mediterranean region. Working across eight pilot areas in Cyprus, Greece, Italy, Spain, Morocco, Israel, Turkey, and Egypt, REACT4MED integrates climate-risk knowledge, participatory governance approaches, monitoring frameworks, decision-support tools, and fully documented restoration practices to respond to land degradation pressures under a rapidly changing climate.

This deliverable (D7.4) sets out the project's Exploitation and Sustainability Strategy the mechanism through which REACT4MED converts its research outputs into scientific, societal, environmental, and (where appropriate) economic value beyond the project lifetime. It includes policy uptake, open-access dissemination, capacity-building and training, operational deployment by public institutions, adoption by practitioners and NGOs, and selected commercial pathways such as advisory services, monitoring-as-a-service, or software-based licensing models. The strategy therefore addresses both impact (who uses the results and how) and sustainability (how key outputs remain accessible, maintained, and continuously improved after project funding ends).

D7.4 is structured around seven exploitation records representing the project's most deployment-ready and strategically important outputs. These span (i) a Mediterranean-scale Climate Projections and Attribution Framework (D2.4) delivering Global Warming Level storylines and attribution evidence; (ii) a Guide for Participatory Assessment (D3.1) institutionalising the Ecosystem Restoration Living Lab (ERLL) methodology; (iii) a co-developed Indicators and Metrics Framework (D3.2) bridging biophysical and socio-economic monitoring needs; (iv) a multilingual, open-access Agro-Ecological Restoration Guidebook for Practitioners (D3.4) linked to WOCAT documentation; (v) the LanDS decision-support toolbox (D4.3), a web-accessible, machine-learning-enabled platform for suitability assessment; (vi) a Long-Term Monitoring System (D5.3) compatible with emerging EU and UNCCD reporting needs; and (vii) eight fully budgeted pilot restoration measure entries (WP5/WP6) supported by cost-benefit analysis and WOCAT-standardised data sheets. Together, these outputs form an interlinked portfolio designed to move from evidence generation to operational uptake and scaling.

The strategy explicitly recognises that REACT4MED results address four interrelated user and market segments: (1) the EU and Mediterranean policy ecosystem (e.g., ministries, regional authorities, and reporting frameworks); (2) the international scientific community (through peer-reviewed publication, open datasets, and reproducible methods); (3) practitioners, NGOs, extension services, and farmer organisations (through accessible guides, starter kits, and training); and (4) private-sector actors (including ESG investors, voluntary carbon/biodiversity market stakeholders, and agri-tech platforms) where evidence-based restoration planning and MRV capabilities are increasingly demanded. Because these segments differ in incentives, constraints, and adoption pathways, each exploitation record in D7.4 articulates a tailored value proposition, dissemination route, and sustainability model.

A central premise of this deliverable is that exploitation must be grounded in readiness. REACT4MED outputs span a range of Technology Readiness Levels (TRLs): some are already near-operational for immediate uptake (e.g., the participatory guide, indicators framework, practitioner guidebook, and pilot measure entries), while others require limited additional TRL improvement or institutional anchoring (e.g., the LanDS toolbox and the monitoring system). D7.4 therefore combines TRL assessment with a parallel market and policy readiness lens identifying what remains to be done to translate each result into a deployable package, whether that involves user testing, simplified communication products, hosting and maintenance commitments, or alignment with specific reporting and regulatory frameworks.

In addition, D7.4 treats intellectual property (IP), licensing, and openness as enabling conditions rather than administrative afterthoughts. Many REACT4MED outputs are designed to be publicly reusable through open-access publication channels and standard licensing approaches, while still allowing value-added services (e.g., training, facilitation, advanced analytics, or tailored advisory services) to provide sustainability or revenue where appropriate. The deliverable therefore clarifies, for each exploitation record, the IP status, ownership considerations, any third-party data dependencies, and the practical steps needed to ensure that open dissemination and longer-term sustainability are achieved without undermining consortium rights or data-use obligations.

Finally, this document provides a roadmap and sequencing logic for exploitation actions across time horizons. Short-term actions focus on immediate policy engagement, open-access dissemination, and scientific publication; medium-term actions emphasise practitioner uptake through simplified materials and capacity-building; and longer-term actions consider commercial packaging and institutional embedding of the most infrastructure-intensive outputs (notably the decision-support and monitoring components). Governance of exploitation is led through WP7, with coordination mechanisms designed to track progress and ensure that interdependent outputs reinforce one another so that, for example, climate storylines and indicators inform decision-support tools, participatory methods underpin indicator legitimacy, and pilot measures provide the empirical evidence base for scaling arguments.

How to read this deliverable. Following this introduction, the document outlines the methodology used to identify exploitable results and to structure each exploitation record. It then presents the seven exploitation entries, each offering a concise description of the output, its primary users and markets, its value proposition, exploitation pathways, IP considerations, TRL/market readiness, and an implementation roadmap. The overall aim is to provide a coherent and actionable strategy enabling REACT4MED partners and the wider Mediterranean restoration community to adopt, maintain, and scale the project's most valuable results well beyond the end of project funding.

# 2 Methodology for the Exploitation and Sustainability Strategy

The methodology for D7.4 was designed to ensure that each research output produced by REACT4MED is systematically evaluated for its exploitation potential and that a coherent, evidence-based strategy is in place to guide its transition into lasting impact. The approach draws on established European Commission and PRIMA guidance on exploitation planning, Technology Readiness Level (TRL) assessment, and intellectual property management, while tailoring these frameworks to the specific context of agro-ecological restoration research in the Mediterranean.

**Step 1: Identification and Scoping of Exploitable Results**

At the outset of the exploitation planning process, a structured mapping exercise was conducted across all Work Packages (WP2 through WP7) to identify the full range of results with exploitation potential. Each WP leader was asked to nominate candidate products, tools, methodologies, data assets, and knowledge outputs meeting a minimum threshold for novelty, applicability, and market or policy relevance. This scoping exercise generated a longlist of candidate entries from which seven priority exploitation records were selected based on their readiness, strategic importance to the project's impact pathway, and fit with identified stakeholder needs established through the Ecosystem Restoration Living Lab (ERLL) co-design process.

**Step 2: Structured Exploitation Record Template**

Each of the seven shortlisted outputs was documented using a standardised Exploitation Record Template developed specifically for D7.4. The template was structured around the following analytical dimensions:

- Product / Innovation Description: A concise characterisation of the output, including its scientific and technical basis, the problem it addresses, and its key distinguishing features relative to the state of the art.
- Market and Stakeholder Analysis: Identification of primary and secondary target groups across four market segments EU and Mediterranean policy actors; research institutions and the scientific community; NGOs, practitioners, and farmer organisations; and the private sector (ESG investors, agri-tech platforms, voluntary carbon markets).
- Value Proposition: An explicit statement of the specific value delivered to each identified stakeholder group, articulating both the functional benefits and the broader societal value of the output.
- Exploitation Pathways: A multi-pathway analysis covering open access dissemination, policy engagement, commercial licensing or service development, and capacity-building routes.
- IP and Ownership: Documentation of intellectual property status, ownership arrangements within the consortium, existing third-party data use agreements, and any barriers to open-access publication or commercial exploitation.
- Technology Readiness Level (TRL): An assessment of current TRL against a defined scale (1-9), with narrative justification and identification of the steps required to advance readiness towards market or policy deployment.
- Revenue and Sustainability Model: Identification of realistic near-term and medium-term revenue streams, including fee structures, licensing models, grant leverage opportunities, and in-kind contribution mechanisms to sustain the output post-project.
- Implementation Roadmap: A phased timeline of exploitation actions linked to project milestones, distinguishing activities to be completed within the project lifetime (M30-42) from those requiring post-project follow-through (M42-48).

**Step 4: TRL and Market Readiness Assessment**

Technology Readiness Level assessments were conducted for each output by the responsible WP lead in consultation with the project coordinator and the WP7 exploitation lead. The TRL framework used corresponds to the standard EU Horizon 2020 / Horizon Europe scale (TRL 1-9), adapted where necessary to

reflect the nature of social-ecological research outputs (e.g., participatory tools, indicator frameworks, and guidebooks) for which conventional engineering TRL criteria require contextualised interpretation. Market readiness assessments were conducted in parallel, evaluating the gap between the current state of each output and the requirements for engagement with each of the four identified market segments. Key dependencies blocking readiness advancement such as pending stakeholder validation, journal submission, or regulatory alignment are explicitly documented within each exploitation record.

**Step 5: IP Mapping and Open Access Planning**

An intellectual property mapping exercise was carried out in parallel with the exploitation record development. This involved reviewing all third-party data sources incorporated into project outputs, checking data use agreements and licensing conditions, and confirming consortium IP ownership arrangements in line with the REACT4MED Consortium Agreement and PRIMA grant conditions. Open-access publication plans were developed for all major outputs, with primary deposition channels identified (Zenodo, WOCAT, project website, institutional repositories) and licensing frameworks specified (predominantly Creative Commons CC-BY 4.0). The IP mapping identified no major third-party conflicts at the time of drafting; however, partners are advised to obtain written confirmation of data use permissions from all external data providers prior to formal open-access publication.

**Step 6: Integration into the Sustainability and Scaling Strategy**

The individual exploitation records were synthesised into an integrated sustainability and scaling strategy that considers the interdependencies between outputs. The climate projections framework (D2.4) and the indicators framework (D3.2) provide foundational evidence layers that inform both the LanDS toolbox (D4.3) and the monitoring system (D5.3). The participatory guide (D3.1) provides the methodological backbone for the ERLL co-design process applied across all pilot areas and documented in the practitioner guidebook (D3.4). The eight pilot area entries (WP5/WP6) constitute the empirical test-bed validating all upstream methodological outputs. This integrated framing ensures that exploitation pathways are mutually reinforcing rather than isolated, and that the portfolio as a whole offers a compelling case for follow-on funding, policy adoption, and commercial investment.

**Step 7: Exploitation Sequencing and Governance**

Exploitation actions are sequenced across three-time horizons. In the short term (M30-36, within the project lifetime), priority actions include scientific journal submissions, WOCAT data sheet completion and upload, policy brief preparation for EU and national audiences, open-access data deposition, and ERLL final validation workshops. In the medium term (M33-36 to M42), actions include ISBN registration and print-on-demand activation of the Guidebook, LanDS toolbox public release and user guide publication, launch of monitoring starter kits, and initiation of post-project commercial service negotiations. In the longer term (M42 onwards), the focus shifts to institutional anchoring of the monitoring system, commercial licensing of the LanDS toolbox, and integration of REACT4MED data into regional and global land degradation monitoring platforms. Governance of the exploitation strategy is led by WP7, with six-monthly progress reviews coordinated by the project coordinator.

# 3 Exploitable entries of each work package

The following sections provide a structured introduction to each of the seven exploitation records comprising D7.4. Each introduction situates the deliverable within the REACT4MED project, describes its scientific and practical significance, and highlights its primary exploitation potential.

## 3.1 Climate Projections and Attribution Framework (WP2)

Understanding the climatic drivers of land degradation is a prerequisite for designing effective, climate-informed restoration interventions. Deliverable D2.4 addresses this need by developing a Mediterranean-scale climate projections and attribution framework that links observed trends in temperature, precipitation, drought frequency, and extreme events to land degradation processes across REACT4MED's eight pilot areas. The framework employs a Global Warming Level (GWL) scenario architecture examining outcomes at +1.5 °C, +2 °C, and +3 °C above pre-industrial temperatures to produce site-specific climate storylines that are directly actionable in restoration planning and policy design. Its scientific foundation is established through two REACT4MED-acknowledged publications in high-impact journals: Vicente-Serrano et al. (2025) in Nature and an earlier contribution in Nature Water (2023), both of which contextualise Mediterranean aridity and drought dynamics within the broader global climate change narrative.

The exploitation value of D2.4 spans multiple target audiences and markets. For the scientific community, it provides a validated, open multi-model climate dataset accessible via Zenodo under a CC-BY licence, enabling meta-analysis, model benchmarking, and future attribution studies. For EU and national policy actors including those engaged in UNCCD National Adaptation Plan (NAP) reporting, the EU Adaptation Strategy, and CAP agri-environment programming the GWL-based climate storylines offer a ready-to-use evidence base that meets the increasing demand for spatially and temporally resolved climate risk information. For land managers and restoration practitioners, the pilot area climate profiles translate complex multi-model projections into accessible, actionable guidance on anticipated shifts in growing seasons, drought risk, and extreme weather frequency. Longer-term, the framework positions REACT4MED consortium partners as credible providers of climate-risk advisory services to private sector clients including ESG investors, agricultural insurers, and agri-tech platforms, once appropriate commercial packaging is completed.

### 3.1.1 Tools and Innovations

Past and Future Drivers of Change - Climate Projections and Attribution Framework (D2.4)

- Historical climate attribution analysis (1901-2019) using ERA5-Land reanalysis for 8 Mediterranean pilot areas
- Multi-model ensemble projections (ISIMIP 2b/3b, 5 GCMs) under SSP2-4.5 and SSP5-8.5 for 2041-2060 and to 2100
- Global Warming Level (GWL) scenario-independent tipping-point framework
- Counterfactual (no-climate-change) attribution methodology isolating anthropogenic climate signal
- Pilot-area-specific future climate storylines: temperature, precipitation, aridity index (UNEP), soil erosion (RUSLE), primary soil salinity, soil salinisation (CMIP6)
- Cross-site synthesis for 8 sites: Several high-impact REACT4MED-acknowledged publications

### 3.1.2 Description

D2.4 presents a comprehensive assessment of historical and projected climate change conditions for all 8 REACT4MED pilot areas. Using ERA5-Land reanalysis data, ISIMIP Phase 2b/3b multi-model ensembles (5 GCMs), and CMIP6 soil salinity projections, the deliverable (i) attributes observed historical climate change (temperature, precipitation, aridity, soil erosion) to anthropogenic forcing via a counterfactual framework, and (ii) projects mid-century (2041-2060) and end-of-century (to 2100) future conditions under two SSP scenarios.

The work introduces a Global Warming Level (GWL) framework providing scenario-independent tipping-point thresholds directly relevant to EU and IPCC reporting. Key findings include: strong warming trends across all sites (up to +3.0°C historical in Cànyoles/Spain); a general shift towards increased aridity across the Mediterranean; contrasting precipitation trends that align with the high natural variability documented by the acknowledged REACT4MED Nature publication (Vicente-Serrano et al. 2025); and future projections of up to +4.6°C temperature increase by 2100 under SSP5-8.5 with intensified aridity and elevated soil erosion risk.

### 3.1.3 Exploitation Methods

Multiple complementary exploitation pathways have been identified:

| # | Exploitation Method | Rationale / Value Proposition | Revenue / Sustainability Model |
|---|---|---|---|
| | | | |
| 1 | Climate storylines service for restoration planning | Package GWL-based future storylines and counterfactual attribution methodology into a replicable decision-support service for restoration planners and land managers. Bundle with LanDS dashboard (WP4) and D3.2 indicator framework for an integrated site-specific climate and restoration assessment. | Fee-for-service site-specific climate assessment; annual subscription for updated scenarios; licensing to NGOs and development agencies. |
| 2 | Integration into national and EU adaptation planning frameworks | Propose formal uptake of pilot-scale climate profiles and attribution methodology into national agri-environment monitoring, EU Adaptation Strategy, Common Agricultural Policy, UNCCD National Action Programmes, and IPCC AR7 regional synthesis. Demonstrate alignment with Copernicus/ERA5 and ISIMIP/CMIP6 frameworks already used by EU bodies. | No direct revenue; high policy impact. Creates long-term demand for REACT4MED expertise and follow-on contracts. |
| 3 | Training and capacity-building service | Deliver workshops and e-learning modules on interpreting and applying climate projections (SSPs, GWLs, aridity trends) for restoration decision-making. Target: extension services, local authorities, agri-consultancies, water managers, NGOs. Co-develop curricula with TUC, HMU, CIHEAM Bari. | Training fees; EU-funded capacity-building projects (LIFE, Erasmus+, PRIMA follow-on); certification programme potential. |
| 4 | Commercial climate-risk advisory service for NbS investors and insurers | Offer attribution and projection methodology as a rigorous, multi-site validated climate-risk assessment tool for private restoration funders, voluntary carbon markets, ESG investors, and agricultural insurers requiring site-level climate risk profiles under multiple warming scenarios. Leverage REACT4MED's unique cross-country validated dataset and GWL-based scenario architecture. | Project-based consulting fees; premium for scenario downscaling and uncertainty quantification. High growth potential given expanding NbS and climate-risk disclosure markets (TCFD, TNFD, CSRD). |

### 3.1.4 Potential Users / Target Groups

Eight primary target groups have been identified, each with distinct needs and interests:

| Target Group | Key Needs / Interests | Actions Already Performed | Actions Planned |
|---|---|---|---|
| National & regional environmental / agricultural agencies (Ministries in Cyprus, Greece, Italy, Spain, Morocco, Israel, Turkey, Egypt) | Locally validated historical climate baselines and attribution for national land degradation monitoring; future scenarios compatible with UNCCD NAPs, SDG 15.3, CAP agri-environment reporting; cost-effective downscaling methodologies. | Pilot-area climate profiles co-developed with local data from all 8 countries; agency representatives participated in ERLL workshops where D2.4 findings were presented; results shared via public D2.4 report. | Targeted policy briefs translating attribution and projection findings; bilateral meetings with ministry focal points; proposal of climate scenario integration into national agri-environment schemes during WP6. |
| NGOs and civil society organisations (WWF MedPO, IUCN Med, CIHEAM network) | Credible climate scenario narratives to demonstrate urgency and support fundraising; participatory methods that translate complex projections into locally relevant storylines | D2.4 future storylines structured as narrative scenarios (SSP2-4.5 / SSP5-8.5) to facilitate non-technical communication; pilot-area specific profiles available for | Disseminate open-access D2.4 pilot atlas; co-develop simplified 'climate storyline' briefing cards per pilot area; explore joint funding bids (LIFE, Green Deal partnership calls). |

| | | | |
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| | accessible without heavy technical infrastructure. | direct use in grant applications. | |
| Private sector: agri-consultancies, land management firms, ESG investors, voluntary carbon / biodiversity credit market actors, agricultural insurers | Scientifically robust, multi-site validated climate risk profiles under multiple warming scenarios for NbS project design and verification; attribution for ESG disclosure (TCFD, TNFD, CSRD); scenario analysis aligned with Verra, Gold Standard, SBTi. | No direct commercial engagement yet; D2.4 methodology assessed for alignment with ISIMIP-based climate risk frameworks used in insurance and investment contexts. | Develop commercial climate-risk service offer; engage with voluntary carbon market standard bodies; present at AgriInvest and ESG-focused investment forums; explore licensing with agri-tech and climate analytics platforms. |
| Research institutions and universities | Peer-reviewed methodology for Mediterranean climate change attribution; | Methodology fully documented in public D2.4 report; two REACT4MED-acknowledged high-impact publications; further publications planned. | Submit additional peer-reviewed articles |
| Farmers, pastoralists, and rural communities (direct end beneficiaries) | Simple, locally relevant climate trend information demonstrating impact of climate change on livelihoods; tools to support planning for more resilient land management and access to climate adaptation funding. | Climate storylines developed at pilot-area scale; ERLL workshops used D2.4 findings to contextualise observed changes (temperature rise, aridity increase) as part of visioning for 2043. | Develop simplified one-page 'climate outlook' cards per pilot area in local languages; use D2.4 attribution results to support subsidy and adaptation payment applications. |
| Extension services and agricultural advisory bodies | Practical, field-applicable climate information on how temperature, precipitation, aridity and erosion risk are changing at local scale; scenario-based planning tools compatible with advisory service workflows. | Extension officers included in ERLL stakeholder groups; D2.4 climate storylines presented at pilot-area workshops as context for restoration actions. | Develop training workshops and e-learning content; pilot capacity-building programme in 2-3 pilot areas; explore Erasmus+ or PRIMA follow-on funding for formal Mediterranean climate literacy programme. |

### 3.1.5 Actions Already Performed (cross-cutting)

- Historical climate attribution analysis completed for all 8 pilot areas using ERA5-Land reanalysis (1901-2019) and counterfactual (no-climate-change) model runs.
- Multi-model ensemble climate projections (ISIMIP 2b/3b, 5 GCMs) completed for 2041-2060 under SSP2-4.5 and SSP5-8.5 scenarios.
- CMIP6 soil salinisation projections produced for all pilot areas.
- GWL-based scenario-independent tipping-point framework developed and applied.
- Pilot-area-specific climate storylines documented in public D2.4 deliverable
- D2.4 climate indicators cross-referenced with EU open data sources
- Indicators used as input to WP3 indicator co-development (D3.2), WP4 LanDS dashboard, and WP5 biophysical effectiveness assessments.
- Several REACT4MED-acknowledged peer-reviewed publications in high-impact journals-
- D2.4 findings presented at ERLL stakeholder workshops to contextualise restoration challenges in the context of observed and projected climate change.

### 3.1.6 Actions Planned

- Publish open-access D2.4 climate atlas (web-based or Zenodo dataset) with full metadata, scenario descriptions, and pilot-area tagging.
- Develop simplified 'climate outlook' cards per pilot area (in local languages) for extension services, farmers, and NGOs.
- Submit additional peer-reviewed journal articles on aridity trends, soil erosion projections, and counterfactual attribution for Mediterranean pilot areas.
- Present D2.4 findings at other conferences.

- Develop training and capacity-building programme on applying climate storylines for restoration advisory services.
- Explore bundling of D2.4 climate projections with LanDS dashboard (WP4) and D3.2 indicator framework for an integrated restoration assessment service.

### 3.1.7 Potential IP Issues

IP Status: The D2.4 climate projection and attribution framework is a public (PU) output of the REACT4MED consortium (TUC, lead - Tsilimigkras, Grillakis, Koutroulis). The following issues and considerations should be managed:

- Ownership: D2.4 is publicly released (PU status). The report, methodology, and derived pilot climate datasets are consortium IP (TUC lead). Any transition to fully open data release of raw derived outputs requires agreement among all consortium partners.
- Third-party data and model licensing: D2.4 uses ISIMIP Phase 2b/3b multi-model ensembles, ERA5-Land reanalysis, and CMIP6 projections. These are publicly available for scientific research; commercial use of derived products must comply with applicable data licences (ISIMIP terms of use; Copernicus licence). Consultant packages built on D2.4 must distinguish consortium methodology (IP) from underlying third-party model outputs.
- Open-access versus commercial tension: The pilot climate atlas and storylines should be published open-access to maximise scientific and policy impact. Premium commercial services (site-specific downscaling, uncertainty quantification, NbS risk certification) can be built on this open foundation without IP conflict, provided value-added services - not raw methodology - are the commercial offering.
- Attribution of peer-reviewed publications: The two published REACT4MED-acknowledged papers (Vicente-Serrano et al. 2025, Nature; Gnann et al. 2023, Nature Water) involve broad author consortia. Care must be taken to accurately represent the scope of REACT4MED-specific contributions in any commercial or policy communication.
- Commercial exploitation agreements: Prior to engaging private sector clients (ESG investors, insurers, NbS project developers), a formal IP agreement between consortium partners should confirm exploitation rights, revenue-sharing arrangements, and conditions for sub-licensing of D2.4 methodology and derived datasets.
- No existing third-party IP conflicts identified. Partners are advised to document all data source licences and model use permissions before commercial release of any climate-risk service built on D2.4 outputs.

### 3.1.8 Technology Readiness Level (TRL)

**TRL 4-5 - Technology Validated in Relevant Environment**

The D2.4 climate projection and attribution methodology has been validated across 8 real-world Mediterranean pilot sites using observed station data, multi-model ISIMIP ensembles (5 GCMs), ERA5-Land reanalysis, and CMIP6 forcing. The approach is fully documented in the public D2.4 deliverable and further validated through acknowledged publication in Nature (2025) and Nature Water (2023). The methodology is replicable and site-independent. Delivery of fully operational site-specific commercial services will require additional packaging (TRL 6-7) by project end.

### 3.1.9 Market Readiness & Key Dependencies

- Policy market: Ready for immediate engagement - climate profiles and GWL-based storylines are sufficiently mature to feed into EU and national adaptation policy consultations and UNCCD NAP reporting.
- Scientific market: Two REACT4MED-acknowledged publications already in high-impact journals (Nature, Nature Water); additional journal articles in preparation. Scientific credibility established.

- NGO / practitioner market: Ready after production of simplified climate outlook cards and open-access pilot atlas (planned M30-36).
- Private sector / commercial market: Requires additional packaging (climate-risk service offer, pricing model, alignment with TCFD / TNFD / carbon market standards) - estimated readiness M36-42 (post-project).
- Key dependency: Full stakeholder validation of pilot climate storylines must be completed (3rd ERLL workshop) before claims of full co-validated scenario acceptance can be made.

## 3.2 Guide for Participatory Assessment (WP3)

Effective ecosystem restoration cannot be achieved through technically optimised interventions alone; it requires the active engagement of local communities, land users, and institutional stakeholders throughout the design, implementation, and monitoring of restoration actions. Deliverable D3.1 responds to this need by producing a structured, replicable Guide for Participatory Assessment through the Ecosystem Restoration Living Lab (ERLL) methodology. The ERLL approach operationalises the co-design principle by convening multi-stakeholder facilitated workshops at each of the eight REACT4MED pilot areas, enabling participants to jointly define restoration priorities, select and adapt interventions, and co-develop the indicators and governance arrangements required for long-term monitoring. The guide documents the full facilitation process from pre-workshop stakeholder mapping and consent procedures through structured deliberation formats to post-workshop validation and action plan compilation in sufficient detail to enable its replication in analogous restoration contexts across the Mediterranean and beyond.

The exploitation potential of D3.1 is primarily positioned in the policy and practitioner markets. As a standalone methodology guide, it addresses the growing demand from EU Member States, UNCCD parties, and international development organisations for structured, evidence-based approaches to multi-stakeholder land restoration governance. The guide is sufficiently generic to be applicable across diverse agro-ecological and socio-institutional contexts, making it a valuable tool for capacity-building programmes, professional training, and institutional adoption by national ministries, extension services, and restoration NGOs. Its open-access dissemination ensures broad reach, while targeted capacity-building workshops delivered in partnership with CIHEAM and other consortium members represent a viable fee-based exploitation route. The ERLL approach also offers a replicable template for future Horizon Europe restoration research projects, positioning REACT4MED partners as recognised methodological leaders in participatory restoration science.

### 3.2.1 Tools and Innovations

**Guide for Participatory Assessment (D3.1)**

- Complete participatory methodology guide for implementing Ecosystem Restoration Living Labs (ERLLs) in eight Mediterranean pilot areas: Cyprus, Greece, Italy, Spain, Morocco, Israel, Turkey, and Egypt
- Stakeholder analysis framework (Pilot Area Leader survey, tiered engagement mapping, stakeholder selection criteria covering gender, age, decision-making level, and sector)
- System knowledge toolkit: rich pictures for joint problem definition; stakeholder feedback methodology; co-design approach for LanDS dashboard requirements (1-2-4-All facilitation method)
- Target knowledge toolkit: guided visioning to 2043 (positive futures for agro-ecosystems), participatory indicator selection and validation workshops, social justice enquiry (6×4 matrix of costs and benefits across stakeholder groups)
- Transformational knowledge toolkit: backcasting methodology linking desirable 2043 visions to concrete restoration outscaling actions
- Documented cross-site results from 6-8 pilot areas for each methodology including exemplary rich pictures, stakeholder vision boards, indicator tables, and social justice matrix outputs
- Delivered as a confidential (CO) consortium report by Osnabrück University (UOS); lead authors: Lukat, E. & Ulbrich, R.

### 3.2.2 Brief Description

D3.1 is the core methodological guide underpinning the participatory dimension of REACT4MED. It establishes how the eight Ecosystem Restoration Living Labs (ERLLs) were designed, structured, and implemented to co-produce knowledge with farmers, land owners, water managers, extension officers, policy-makers, and local researchers across the Mediterranean.

The guide is structured around three types of knowledge necessary for transformative sustainability transitions: (i) System knowledge - jointly defining the land degradation problem situation across stakeholder perspectives (rich pictures, LanDS co-design); (ii) Target knowledge - co-constructing positive visions of sustainable agro-ecosystems in 2043 and selecting participatory indicators to track progress toward those visions, including a social justice enquiry to assess distributional effects of restoration actions; and (iii) Transformational knowledge - backcasting from desirable futures to identify which restoration actions and conditions are needed to achieve them.

The participatory indicator selection process is of particular strategic relevance for exploitation: it provides the methodological 'engine' that ensures the biophysical indicators developed in D3.2 (and subsequently used in WP4 LanDS dashboard and WP5 monitoring) are co-validated by the communities they are meant to serve. This directly addresses the core requirement of the EEA Regional Adaptation Support Tool (RAST) Step 6.2, which states that adaptation MEL indicators must be both quantitative and qualitative, and validated through stakeholder engagement to ensure their relevance.

### 3.2.3 Strategic Market Context & Regulatory Driver

The EEA RAST Step 6.2 compliance gap - the key market opportunity:

The EU Mission on Adaptation to Climate Change requires regional and local authorities to develop Monitoring, Evaluation and Learning (MEL) frameworks under their regional adaptation plans. EEA RAST Step 6.2 explicitly requires authorities to select 'a mix of indicators or criteria - using both quantitative and qualitative methods' and to validate their relevance through stakeholder engagement. It explicitly warns that 'measurable indicators appeal to policymakers' but that 'validating quantitative data with stakeholder views allows for a more comprehensive understanding, delving into the how and why questions.'

However, most public institutions lack the in-house methodology and facilitation expertise to conduct this participatory validation rigorously. The D3.1 ERLL participatory toolkit - field-tested across 8 culturally and institutionally diverse Mediterranean sites over 36 months - directly fills this gap. It provides what RAST Step 6.2 requires: a structured, iterative, stakeholder-engaged process for co-defining indicators that are both technically valid (linked to biophysical indicators in D3.2) and locally meaningful (anchored in community visions and social justice concerns).

### 3.2.4 Exploitation Methods

Five complementary exploitation pathways have been identified:

| # | Exploitation Method | Rationale / Value Proposition | |
|---|---|---|---|
| 1 | **Open-access methodological guide for participatory indicator co-development** | Publish D3.1 as a fully documented, open-access participatory methodology guide covering: stakeholder analysis frameworks, ERLL workshop design (rich pictures, visioning to 2043, backcasting, 1-2-4-All facilitation), participatory indicator selection and validation with local stakeholders, and the social justice enquiry matrix.<br>Directly addresses the EEA Regional Adaptation Support Tool (RAST) Step 6.2 | Open access (free); sustained via REACT4MED project website, Zenodo, and partner institutional repositories (Osnabrück University / UOS). DOI-citable under CC-BY licence. Long-term hosting proposed via EU Mission on Adaptation portal (Climate-ADAPT) or EEA Urban Adaptation resources. |

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| | | requirement that MEL indicator selection be validated with stakeholders to ensure relevance - providing a tested, cross-Mediterranean methodology that public authorities can adapt for their own adaptation monitoring plans. | |
| 2 | **Participatory MEL framework service for public institutions and regional authorities implementing the EU Mission on Adaptation** | Package the D3.1 ERLL methodology as a facilitated service to help public institutions (regional/local authorities) design and run stakeholder engagement processes for Monitoring, Evaluation and Learning (MEL) under their regional adaptation plans - specifically fulfilling RAST Step 6.2 which requires selecting a mix of quantitative and qualitative indicators co-validated with stakeholders.<br>The D3.1 methodology combines visioning (desirable 2043 futures), problem mapping (rich pictures), participatory indicator selection (stakeholder validation workshops), and social justice assessment - exactly the qualitative and participatory dimensions that the EEA/CDP-ICLEI frameworks require but that most public authorities lack the in-house expertise to design and facilitate. | Fee-for-service facilitation contracts with regional or local authorities; consultancy packages bundling workshop design, facilitation, and documentation of participatory indicator frameworks. Strong alignment with EU Mission on Adaptation Region-by-Region support programme. |
| 3 | **Integration into national NAP and regional adaptation plan M&E methodological guidance** | Propose formal adoption of the D3.1 participatory indicator co-development methodology into national adaptation plan (NAP) guidance and regional adaptation monitoring frameworks across the 8 partner countries (Cyprus, Greece, Italy, Spain, Morocco, Israel, Turkey, Egypt).<br>The D3.1 ERLL framework operationalises exactly what RAST Step 6.2, UNFCCC NAP guidelines, and OECD MEL frameworks call for: iterative, stakeholder-engaged, contextually relevant indicator selection that combines quantitative outputs with qualitative outcome criteria. | No direct revenue; high policy impact. Creates durable demand for REACT4MED consortium expertise and follow-on technical assistance contracts with national ministries, EU bodies (EEA, DG CLIMA), and international organisations (UNFCCC NAP Global Support Programme). |
| 4 | **Training and capacity-building service for facilitation of participatory processes in agri-environmental monitoring** | Develop and deliver training workshops and e-learning modules teaching the D3.1 ERLL participatory toolkit: stakeholder analysis methodology, rich pictures for problem definition, visioning and backcasting facilitation, participatory indicator validation, and social justice enquiry design.<br>Target: extension service officers, regional authority staff, NGO facilitators, and university researchers working on adaptation monitoring, agri-environment schemes, and Nature-Based Solutions programmes. The D3.1 toolkit was successfully deployed across 8 culturally diverse Mediterranean pilot areas, giving it proven cross-context adaptability. | Training fees; EU-funded capacity-building programmes (Erasmus+, LIFE, Horizon Europe); CIHEAM network certification potential; PRIMA follow-on calls targeting transdisciplinary research capacity. |

| | | | |
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| 5 | **Scientific publications and methodological citation leverage** | Publish peer-reviewed articles on the D3.1 transdisciplinary Living Lab methodology, cross-pilot comparison of stakeholder-validated indicators, social justice enquiry results, and the integration of participatory processes with biophysical restoration monitoring.<br>Position the REACT4MED ERLL approach as a validated, Mediterranean-specific contribution to the broader transdisciplinary and participatory research canon (Jäger et al., Wiek & Lang, Young et al. 2023, Hebinck et al. 2018 frameworks referenced in D3.1). | No direct revenue; builds reputational capital for Osnabrück University (UOS) and HMU as leaders in participatory agri-environmental research. Citation leverage supports future funding bids and partnership recognition in Horizon Europe and PRIMA calls. |

### 3.2.5 Potential Users / Target Groups

Six primary target groups have been identified:

| Target Group | Key Needs / Interests | Actions Already Performed | Actions Planned |
|---|---|---|---|
| **Regional and local public authorities implementing adaptation monitoring (EU Mission on Adaptation target regions; municipalities in Cyprus, Greece, Italy, Spain)** | A tested, facilitation-ready methodology to run stakeholder workshops for co-selecting relevant adaptation monitoring indicators - as required by EEA RAST Step 6.2. Authorities need both quantitative and qualitative MEL indicators validated by local communities to satisfy EU reporting obligations and ensure indicators are meaningful to affected populations. | D3.1 ERLL methodology deployed across 8 Mediterranean pilot areas (EU and non-EU); rich pictures, visioning workshops, and participatory indicator validation sessions conducted with farmers, land owners, water managers, policy makers, and NGOs. Results documented in D3.1 and further applied in D3.2 (indicator framework) and D3.3. | Develop a stand-alone 'MEL facilitation package' for regional authorities citing D3.1 methodology; present at EEA/EU Mission on Adaptation Community of Practice events; explore embedding in Region-by-Region support programme; target Barcelona, Antwerp, and Helsinki-type city climate plan processes (cited in RAST Step 6.2) as reference cases. |
| **National ministries responsible for NAP implementation (Ministries in Cyprus, Greece, Italy, Spain, Morocco, Israel, Turkey, Egypt)** | Participatory methodologies to ensure national adaptation plan M&E frameworks capture local community perceptions of climate risk, desired futures, and indicator relevance - as required by UNFCCC NAP guidelines and OECD MEL frameworks for climate risk management. | D3.1 methodology deployed in partner countries' pilot areas; stakeholder engagement process documented for all 8 sites including country-specific adaptations; social justice enquiry conducted in 6 of 8 ERLLs. | Prepare country-specific briefing notes on how the D3.1 participatory indicator methodology can complement national statistical indicators in NAP monitoring reports; engage UNFCCC NAP Global Support Programme; share results at national adaptation forums. |
| **EU institutions (EC DG CLIMA, EEA, EU Mission on Adaptation secretariat, JRC)** | Validated examples of participatory MEL frameworks that operationalise Step 6.2 of the EEA Regional Adaptation Support Tool; methodological models for integrating qualitative stakeholder perspectives | D3.1 provides precisely the kind of mixed-methods, multi-actor MEL methodology called for in RAST Step 6.2, the OECD MEL framework, and the European Committee of the Regions' 2022 guidance on performance measurement for | Submit D3.1 methodology overview to Climate-ADAPT resources section and EU Mission on Adaptation Community of Practice; propose it as a reference case in EEA Urban Adaptation Report 2026; |

| | | | |
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| | into formal adaptation monitoring and reporting. | adaptation. Methodology documented and available for EU scrutiny. | engage DG CLIMA Just Resilience workstream. |
| **NGOs, civil society, and extension services working in climate adaptation and land restoration (WWF MedPO, IUCN Med, CIHEAM network, national agricultural advisory bodies)** | Practical, tested facilitation tools for running participatory processes that give communities agency in defining what sustainability and restoration success means to them; accessible methodologies that do not require advanced research skills to implement. | D3.1 methodology written in practical, step-by-step format with exemplary results from 8 pilot areas; PAL (Pilot Area Leader) implementation model designed to be adopted by NGO and extension service practitioners without deep research background. | Develop simplified 'D3.1 facilitation toolkit' cards in local languages for NGO and extension service use; co-design capacity-building workshops with CIHEAM Bari and HMU; explore LIFE and Erasmus+ funding for a Mediterranean participatory monitoring literacy programme. |
| **Research institutions and universities (transdisciplinary research, sustainability science, rural sociology, agri-environmental policy)** | A documented, multi-site validated example of transdisciplinary Living Lab methodology for agri-environmental contexts; a comparable cross-country dataset of stakeholder-validated restoration indicators and social justice assessments for meta-analysis. | D3.1 grounded in established transdisciplinary research literature (Young et al. 2023, Hebinck et al. 2018, Willow 2022); methodology deployed across 8 culturally diverse Mediterranean sites; social justice enquiry conducted using validated matrix methodology; rich pictures, visioning outputs, and indicator validation results documented. | Submit peer-reviewed articles on cross-site comparison of stakeholder visions (2043 futures), social justice results, and participatory indicator validation; present at ISEE, IALE, ESRA, and sustainability science conferences; make D3.1 methodology dataset available via Zenodo under CC-BY. |
| **Farmers, pastoralists, and rural communities (direct beneficiaries and knowledge co-producers)** | Assurance that restoration monitoring indicators reflect what matters to them - their livelihoods, income stability, water access, soil health, and community well-being - and not just what is measurable from satellite imagery; recognition of their experiential knowledge in formal monitoring frameworks. | Farmers and land owners included as primary co-designers of indicators and visions in all 8 ERLLs; rich picture problem mapping, visioning sessions (2043), and stakeholder feedback exercises conducted with rural communities; common priority issues identified (extreme weather, high costs, lack of knowledge, soil erosion) and used to anchor monitoring indicators. | Share validated indicator framework results back with ERLL communities in accessible formats; develop participatory monitoring 'scorecards' that allow farmers to self-assess restoration progress against indicators they co-defined; use D3.1 social justice results to inform subsidy equity assessments (WP5 / D5.2). |

### 3.2.6 Actions Already Performed (cross-cutting)

- Complete ERLL participatory methodology designed and documented in D3.1 (Osnabrück University / Lukat & Ulbrich); covers stakeholder analysis, system knowledge, target knowledge, and transformational knowledge phases.
- Stakeholder analysis conducted in all 8 pilot areas using tiered PAL survey methodology; stakeholders mapped by sector, decision-making level, age, gender, and ERLL role.

- ERLL Workshop Series 1: rich picture problem definition sessions conducted in all 8 pilot areas; common cross-site problem issues identified (Table 1, D3.1).
- ERLL Workshop Series 2: stakeholder feedback on REACT4MED project activities gathered using structured feedback methodology; LanDS dashboard co-design requirements collected via 1-2-4-All method.
- ERLL Workshop Series 2: visioning workshops (positive futures for 2043) conducted in 6 of 8 pilot areas; vision elements documented and clustered by domain (community, agriculture, markets, environment, education, technology, regulation).
- ERLL Workshop Series 3: participatory indicator selection and validation workshops conducted; stakeholder-endorsed indicator shortlists used as direct input to D3.2 indicator framework.
- ERLL Workshop Series 3: social justice enquiry (6×4 matrix) conducted in 6 of 8 pilot areas; results reported in D3.3 and D5.2.
- Backcasting methodology implemented in pilot areas to link 2043 visions to concrete near-term restoration outscaling actions.
- Participatory indicator results used as foundational input to WP4 LanDS dashboard (D4.1) and WP5 monitoring system (D5.1-5.3), ensuring biophysical monitoring indicators are grounded in stakeholder-validated relevance criteria.

### 3.2.7 Actions Planned

- Publish open-access D3.1 participatory methodology guide via Zenodo and REACT4MED project website with DOI and CC-BY licence; submit to Climate-ADAPT resources section as reference case for RAST Step 6.2 implementation.
- Develop a stand-alone 'Participatory Adaptation MEL Facilitation Package' based on D3.1, specifically framed around RAST Step 6.2 compliance needs of public authorities: stakeholder workshop templates, facilitation guides, indicator validation worksheets, and social justice enquiry tools.
- Present D3.1 methodology at EU Mission on Adaptation Community of Practice events, EEA Urban Adaptation workshops, and UNFCCC NAP Expo.
- Submit peer-reviewed articles on: (a) cross-site comparison of 2043 stakeholder visions across Mediterranean ERLLs; (b) participatory indicator validation methodology and results; (c) social justice enquiry outcomes and implications for adaptation equity.
- Develop simplified facilitation toolkit cards (per pilot area, in local languages) for extension services, NGOs, and community facilitators to conduct basic participatory monitoring sessions independently.
- Explore fee-for-service contracts with regional/local authorities and NGOs needing RAST Step 6.2-compliant participatory MEL facilitation; develop commercial service packaging with HMU and UOS.
- Contribute to UNFCCC NAP M&E guidance as a tested participatory methodology example for Mediterranean agri-environmental contexts; engage UNCCD stakeholder participation workstream.
- Explore Erasmus+ or PRIMA follow-on funding for a formal Mediterranean participatory monitoring and adaptive management capacity-building programme targeting extension services and public authority staff.

### 3.2.8 Potential IP Issues

IP Status: D3.1 is a confidential (CO) consortium deliverable led by Osnabrück University (UOS). Key IP considerations:

- Ownership: D3.1 methodology and documentation are consortium IP (UOS lead). Any transition to open-access publication requires agreement among all consortium partners; transition is strongly recommended to maximise policy and societal impact and is consistent with the CC-BY permissions already granted for third-party use of properly attributed documents.
- Third-party methodological references: D3.1 draws on established participatory and transdisciplinary research frameworks (visioning: Young et al. 2023, Hebinck et al. 2018; backcasting: Willow 2022; living lab concept: established literature). These are academic references, not IP-protected tools. Commercial application of D3.1 workshops requires no licensing of these underlying frameworks.
- Social justice enquiry IP: The 6×4 social justice matrix methodology was co-developed with WP5 (D5.2). Joint attribution with CIHEAM Bari and other WP5 partners is required in any commercial or scientific publication of the social justice assessment results.

- Pilot area data and stakeholder confidentiality: Stakeholder-generated outputs (rich pictures, vision statements, indicator preferences) were produced under research consent conditions. Commercial use of identifiable pilot-area-specific stakeholder data requires explicit participant consent. Anonymised or aggregated methodological outputs (indicator lists, common problems table, cross-site vision themes) can be freely shared under consortium permission.
- Attribution in commercial facilitation services: Any commercial 'participatory MEL facilitation package' built on D3.1 must prominently attribute the REACT4MED project and the Osnabrück University team. Revenue-sharing arrangements between UOS, HMU, and other involved partners should be defined before commercial launch.

No third-party IP conflicts identified. The D3.1 methodology is original consortium development; no proprietary tools or licensed content are embedded.

### 3.2.9 Technology Readiness Level (TRL)

**TRL 5-6 Technology Validated / Demonstrated in Relevant Environment**

The D3.1 ERLL participatory methodology is a social innovation tool rather than a physical technology. Assessed against the TRL scale applied to social/methodological innovations: the methodology has been fully designed, documented, and deployed across 8 real-world Mediterranean pilot areas in 8 countries over 3 years (TRL 5-6). Workshop facilitation methods (rich pictures, visioning, participatory indicator validation, social justice enquiry, backcasting) were adapted to diverse cultural, linguistic, and institutional contexts, and implementation experience has been documented and reflected upon in D3.1. The methodology is ready for replication by trained facilitators with access to the D3.1 guide. Full institutionalisation as a standard public-authority MEL service (TRL 7-8) will require further packaging, training programme development, and pilot adoption by public authorities in new contexts.

Market Readiness & Key Dependencies

- Policy market (EU Mission on Adaptation, EEA RAST): Ready for immediate engagement - D3.1 can be submitted to Climate-ADAPT resources and the EU Mission Community of Practice now. The RAST Step 6.2 compliance gap is a live, documented demand.
- Scientific market: Ready - methodology documented; journal article submissions in preparation. Cross-site comparison dataset (visions, indicators, social justice results) is a strong scientific contribution.
- NGO / practitioner market: Ready after production of simplified facilitation cards in local languages (planned M33-36). PAL implementation model provides a strong template.
- Public authority fee-for-service market: Requires packaging as a stand-alone 'RAST Step 6.2 compliance service' with clear scope, deliverables, and pricing - estimated readiness M36-42 (post-project).

Key dependency: The most critical bottleneck is facilitator capacity. The D3.1 methodology is proven but facilitation-intensive. Scaling beyond REACT4MED consortium partners requires a structured training programme and a certified facilitator network. This is the primary investment needed for commercial scale-up.

## 3.3 Co-developed Indicators and Metrics Framework (WP3/7

Robust, agreed metrics are the cornerstone of credible land degradation assessment and restoration monitoring. Deliverable D3.2 presents a co-developed, cross-site indicators and metrics framework that synthesises biophysical and socio-economic parameters validated through the ERLL participatory process across REACT4MED's eight pilot areas. The framework is structured around four thematic domains soil health, biodiversity and vegetation cover, water-related functions, and socio-economic and livelihood outcomes and provides for each indicator a standardised definition, measurement protocol, data source specification, and interpretation guidance calibrated to Mediterranean dryland and agricultural landscape conditions. Crucially, the indicators were not developed through purely expert-driven processes but emerged

from a co-design dialogue between scientists, farmers, land managers, and local authorities, ensuring that the framework reflects both scientific rigour and practical relevance for on-the-ground monitoring.

The indicators framework occupies a strategically important position in the REACT4MED exploitation portfolio because it serves as a connective layer between upstream climate and diagnostic outputs (D2.4, D4.3) and downstream monitoring and reporting activities (D5.3). Its policy market readiness is high: the framework is sufficiently mature to feed immediately into EU consultations on the Soil Monitoring Law, UNCCD Land Degradation Neutrality (LDN) target-setting, and CAP agri-environment monitoring requirements. For the scientific community, a peer-reviewed journal article presenting the cross-site indicator validation methodology is planned for M36. For practitioners and NGOs, an open-access indicator repository and a simplified field guide are scheduled for release at M30-36, enabling direct adoption without specialised technical capacity. The longer-term commercial pathway involves packaging the framework as a monitoring-and-evaluation service offering for NbS project developers, ESG investors, and voluntary carbon and biodiversity credit market actors.

### 3.3.1 Tools and Innovations

D3.4 - Guidebook for Practitioners: Agro-Ecological Restoration Actions for the Mediterranean

- Practitioner-oriented guidebook covering 8 restoration actions across 8 Mediterranean pilot areas (IT, TR, EG, ES, CY, MO, GR, IL) Published in 5 languages: English, Arabic, Greek, Italian, Spanish - one of the few Mediterranean restoration resources available in Arabic for North African and Middle Eastern audiences.
- Real farmer narratives as role models (Diomede family IT, Kostas Karatzis GR, Yuli and Nitzan Betzer IL, Asensi family ES, Mehmet TR, and others).
- Implementation steps grounded in multi-year field research; climate projections per pilot area (cross-referenced with D2.4); economic context derived from D5.2 CBA.
- All 8 restoration measures also documented in the WOCAT global SLM database, creating a bi-directional link between the narrative Guidebook and WOCAT's technical database layer

### 3.3.2 Brief Description

D3.4 is a practitioner-focused, open-access guidebook presenting the eight agro-ecosystem restoration actions developed, tested, and validated by the REACT4MED project across Mediterranean pilot areas in Cyprus, Greece, Italy, Spain, Morocco, Israel, Turkey, and Egypt. It is explicitly not a scientific report: the foreword describes it as a working manual for everyone committed to restoring Mediterranean lands and livelihoods at scale.

The Guidebook's structure is deliberately accessible: each of the eight chapters opens with a climate change context specific to the pilot area (drawing on D2.4 projections), profiles the local farming landscape, presents a named farmer's story as a tangible role model, provides step-by-step implementation guidance, lists measurable benefits, and provides direct contact information for local advisors and organisations. A concluding chapter introduces the LanDS decision-support dashboard (WP4) as a complementary digital tool for land managers.

Published in English, Arabic, Greek, Italian, and Spanish, D3.4 is one of the few Mediterranean restoration resources accessible to Arabic-speaking practitioners across North Africa and the Middle East, as well as to farming communities in all pilot area countries in their native languages. This multilingual reach, combined with the integration of real farmer stories and practical implementation guidance, gives D3.4 a unique market position among Mediterranean agricultural restoration publications.

The Guidebook is conceived as the foundation of a potential annual practitioner series, co-branded with WOCAT, that would extend its reach and sustainability well beyond the REACT4MED project lifetime.

### 3.3.3 Exploitation Methods

| # | Exploitation Method | Rationale / Value Proposition | Revenue / Sustainability Model |
|---|---|---|---|
| 1 | ISBN-registered open-access publication (Vol. 1) | Register individual ISBNs for each of the 5 language editions through the lead partner's national ISBN agency (OU → MVB Germany; or HMU → EKT Greece). Assign a Zenodo DOI for open-access deposit. Register with WorldCat, OAPEN, FAO AGRIS, and OpenAIRE for maximum global library discoverability. Print-on-demand via WOCAT or national library print services for practitioners without digital access. | Open access (free to all readers); production and dissemination costs covered by remaining REACT4MED project budget; print-on-demand at cost price; no commercial price point. |
| 2 | Annual Mediterranean Restoration Practitioner Series | Transform the Guidebook into Volume 1 of an ongoing annual series, co-branded with WOCAT. Apply for a Series ISSN. Each annual volume features 15-20 WOCAT-validated SLM practices from the Mediterranean and dryland regions, with the same accessible practitioner format. Source technologies from WOCAT database, REACT4MED alumni, PRIMA-funded successor projects, and open submissions from contributing institutions. | Publication costs covered by editorial board member institutional contributions, PRIMA Section 2 / LIFE follow-on grants, or FAO/WOCAT co-publication budget. No pay-wall. Revenue is generated indirectly through institutional positioning and follow-on advisory contracts. |
| 3 | WOCAT co-branding and database integration partnership | Formalise a partnership with the WOCAT Secretariat (Berne) to co-brand the annual series. WOCAT already co-publishes SLM handbooks (e.g. WOCAT Global Overview of SLM, CTA 2011, ISBN 978-92-9081-469-5). Each D3.4 chapter would be formally linked to its corresponding WOCAT database entry. WOCAT's distribution network (100+ countries, UNCCD and FAO institutional relationships) provides unparalleled global reach for the annual series. | Co-publication agreement (cost-sharing between REACT4MED/HMU and WOCAT); WOCAT handles ISBN registration and library distribution for co-branded volumes; REACT4MED provides Mediterranean content pipeline. |
| 4 | EU Farm Advisory Service (FAS) and extension training material | Propose D3.4 as a standard reference resource for EU Farm Advisory Services (CAP Art. 15 - agricultural advisory systems). Develop a companion 'Trainer Edition' with facilitation guides, assessment tools, and links to WP6 Policy Briefs, for use in national agricultural advisory service training programmes across EU pilot area countries. | Trainer Edition production funded via PRIMA or EIP-AGRI Operational Group grants; adoption by national FAS bodies provides sustained reach and institutional embedding. |
| 5 | Physical print distribution to ministries and libraries | Print and distribute physical copies of D3.4 to: agricultural ministries and national libraries in CY, GR, IT, ES, MO, IL, TR, EG; UNCCD secretariat (Bonn); FAO Rome headquarters; CIHEAM (Bari, Montpellier, Zaragoza, Chania); Mediterranean agricultural university libraries. | One-time cost from project budget. High policy impact physical presence in ministry and library collections ensures long-term discoverability beyond the digital sphere. |

### 3.3.4 Target Users / Target Groups

Target groups, needs, and specific actions per group:

| Target Group | Needs / Interests | Actions Performed | Actions Planned |
|---|---|---|---|
| Farmers, pastoralists, smallholders | Practical, locally relevant guidance in own language; real farmer stories as role models; implementable step-by-step descriptions; contact information for local support. | D3.4 Guidebook available in 5 languages; distributed at ERLL stakeholder events in all 8 pilot areas; farmer stories featured (Diomede family IT, Karatzis GR, Betzer family IL, Asensi family ES, Mehmet TR). | Distribute physical copies via national extension services; develop e-reader and audio versions for low-literacy contexts; promote via WOCAT farmer network; produce country-specific condensed field cards. |
| Agricultural extension officers and advisors | Evidence-based, field-tested restoration measures; implementation checklists; climate context per region; contact networks for peer learning. | Guidebook presented at ERLLs; D3.4 directly usable as advisory reference material; WOCAT database entries linked. | Training workshops for extension officers using Guidebook as primary reference; translate key sections into national advisory service materials; propose as standard reference for EU Farm Advisory Service training (CAP Art. 15). |
| Policy makers and government officers | Menu of shovel-ready, costed interventions with measurable co-benefits (carbon, biodiversity, yield, water) for agri-environment scheme and Nature Restoration Law implementation planning. | WP6 Policy Briefs prepared alongside D3.4; Guidebook foreword explicitly addresses policy audiences; distributed at project dissemination events. | Deposit with agricultural ministries in 8 pilot countries; propose as reference for UNCCD National Action Programme updates; present at EU Green Week and PRIMA annual conference. |
| Research institutions and universities | Replicable methodology; interdisciplinary synthesis of agronomy, hydrology, economics, and social science; citable open-access reference with DOI. | D3.4 publicly available (PU); authors from 11 institutions; cross-disciplinary approach documented in Executive Summary and Foreword. | Register with WorldCat and FAO AGRIS; deposit in OAPEN and OpenAIRE; assign DOI per chapter for granular citation; submit to CIARD (Coherence in Information for Agricultural Research for Development) registry. |
| International development organisations (FAO, IFAD, UNCCD, GEF) | Portfolio of Mediterranean restoration practices validated | Measures documented in WOCAT SLM database (used by FAO and UNCCD as authoritative source); D3.4 available in Arabic. | Distribute through FAO AGRIS, UNCCD Library, and GEF-LDN programme; propose |

| | | | |
|---|---|---|---|
| | across 8 diverse sites; CBA data integrated; multilingual accessibility; replicable for programming in Mediterranean and dryland MENA contexts. | | joint distribution with WOCAT; explore translation into French for North African extension reach. |
| Private sector (agri-food, ESG, agrotourism) | Evidence-based, accessible documentation of restoration practice co-benefits (soil, water, biodiversity, carbon) for supply chain sustainability reporting and NbS investment due diligence. | Guidebook features real commercial farm cases (organic table grapes IT, premium wine CY); economic co-benefits described accessibly. | Develop a targeted 'business edition' supplement highlighting economic indicators and ESG relevance per measure; promote at AgriInvest and ESG-focused investment forums. |
| Global WOCAT audience | Access to Mediterranean SLM practices validated through multi-year research; integration with WOCAT's global SLM documentation and discoverability infrastructure. | REACT4MED measures already documented in WOCAT database; D3.4 provides the practitioner-facing narrative layer. | Formalise WOCAT co-branding; link each WOCAT database entry to corresponding D3.4 chapter; promote annual series through WOCAT's 100+ country network. |

### 3.3.5 Actions Already Performed

- D3.4 Guidebook for Practitioners drafted in English and finalised (OU lead; editors Lukat and Ulbrich; contributing authors from 11 consortium institutions).
- Versions in Arabic, Greek, Italian, and Spanish produced with native language review by national pilot area partners.
- Guidebook presented and distributed at ERLL stakeholder workshops in all 8 pilot area countries.
- All 8 restoration measures documented in WOCAT SLM database, establishing the technical foundation for WOCAT co-branding discussions.
- D3.4 Guidebook structure designed to be practitioner-accessible: real farmer stories (named individuals), step-by-step implementation, climate context, contact information.
- Design completed by Danai Kalergi; professional publication-standard layout ready for ISBN registration.
- LanDS dashboard chapter (Section 3) integrated into D3.4, demonstrating synergy with WP4 digital tool.
- D3.4 registered as a public (PU) deliverable under the REACT4MED Grant Agreement; third-party reuse permitted with attribution.

### 3.3.6 Actions Planned

- Assign ISBN to each of the 5 language editions of D3.4 through national ISBN agency (OU via MVB Germany, or HMU via EKT Greece / National Documentation Centre).
- Assign Zenodo DOI and deposit D3.4 (all 5 language editions) as open-access PDF in Zenodo, OAPEN, OpenAIRE, and FAO AGRIS.
- Register with WorldCat for global library discoverability.
- Complete D3.4 back matter (WP7) including acknowledgements, partner logos, and dissemination channels.
- Print and distribute physical copies to agricultural ministries, UNCCD secretariat, FAO Rome, CIHEAM institutes, and Mediterranean university libraries.
- Open formal discussions with WOCAT Secretariat (Berne) on co-branding the D3.4 Guidebook and a proposed annual Mediterranean Restoration Practitioner Series.
- Apply for Series ISSN for the proposed annual publication series.
- Develop a brief proposal document for the annual series (scope, governance, content pipeline, cost model, WOCAT partnership terms) for presentation to PRIMA programme office and potential FAO co-publishing partners.
- Explore development of a companion 'Trainer Edition' of D3.4 for EU Farm Advisory Service training, with facilitation guides and assessment tools.
- Investigate print-on-demand arrangement via WOCAT or a Mediterranean university press for physical copies on request.
- Develop French translation of D3.4 for expanded North African extension service reach (Morocco, Tunisia, Algeria) - explore co-funding via AFD or CIHEAM Montpellier.

Potential IP Issues

- Copyright: D3.4 is copyright © 2022 REACT4MED Consortium (OU lead). Third-party reuse is explicitly permitted provided REACT4MED project and document are properly referenced. This open-attribution licence is compatible with ISBN registration and WOCAT co-branding.
- ISBN registration: ISBNs are assigned per format (PDF, print) and per language edition. Each of the 5 language editions requires a separate ISBN. Registration is free through national ISBN agencies; no commercial exclusivity is implied by ISBN assignment.
- ISSN registration: A series ISSN for the annual publication can be applied for via the ISSN International Centre (Paris) or a national ISSN centre. The series ISSN does not restrict open-access distribution.
- Farmer story rights: Named individuals (Diomede family, Kostas Karatzis, Yuli and Nitzan Betzer, Asensi family, Mehmet) have been featured with consent in D3.4. Any commercial adaptation of the Guidebook (print for sale, adapted editions) should verify that consent extends to the new format.
- WOCAT co-branding agreement: A formal co-publication agreement with WOCAT should specify: copyright ownership (consortium IP, with WOCAT distribution rights); co-branding terms; revenue and cost-sharing for print editions; editorial governance for annual series volumes.
- Third-party imagery: Any photographs or figures in D3.4 sourced from outside the consortium should be verified for licence compatibility with open-access publication (CC-BY or equivalent) prior to ISBN registration.
- National partner contributions: Authors from 11 consortium institutions contributed content. No IP conflicts identified, but a formal statement confirming that all contributing authors consent to open-access CC-BY-style publication is recommended prior to final Zenodo deposit.
- No existing third-party IP conflicts identified. The REACT4MED consortium's open-attribution copyright statement is the strongest basis for open-access publication and WOCAT co-branding.

### 3.3.7 Publication Roadmap

The following roadmap covers both the immediate ISBN registration of D3.4 Vol. 1 and the medium-term development of the annual series:

| Phase | Timeline | Actions | Partners / Channels |
|---|---|---|---|
| Phase 1: Finalise & Register | M33-M36 | Assign ISBN through lead partner institution (Osnabrück University via MVB Germany, or HMU via EBOOK GR / National Documentation Centre, EKT). Register DOI via Zenodo. Finalise English edition with back matter (WP7). Submit to Zenodo and REACT4MED website as open-access PDF. | OU (lead), HMU, WP7 dissemination team; national ISBN agency; Zenodo |
| Phase 2: Multilingual Open-Access Release | M34-M36 | Release Arabic, Greek, Italian, Spanish editions with individual ISBNs per language edition. Deposit all language editions in OpenDOAR-compliant open-access repositories (Zenodo, OAPEN, OpenAIRE). Register with WorldCat for global library discoverability. | OU, HMU, national partners (CIHEAM Bari, UV, INRA, UH, PDS); OAPEN; OpenAIRE |
| Phase 3: WOCAT Partnership Formalisation | M34-M42 | Open formal discussions with WOCAT Secretariat (Berne) to co-brand the annual series. WOCAT already co-publishes SLM handbooks with ISBNs. Propose REACT4MED Guidebook as the inaugural volume of a jointly branded annual Mediterranean Restoration Practitioner Series. Establish editorial board with WOCAT, FAO, and PRIMA representation. | HMU, OU; WOCAT Secretariat; FAO Land and Water Division; PRIMA programme office |
| Phase 4: Annual Series - Volume 2 | M43-M54 (post-project) | Source contributing technologies from WOCAT database (15-20 validated SLM practices per issue). Commission case study contributions from REACT4MED alumni pilots and new Mediterranean contributors. Apply for ISSN for the series (in addition to per-volume ISBN). Explore co-publication with a Mediterranean-focused open-access university press or CGIAR publishing platform. | HMU (series editor), WOCAT, FAO, PRIMA, UNCCD secretariat; open-access university press (e.g. Göttingen University Press, OpenEdition) |
| Phase 5: Institutional & Policy Uptake | Ongoing | Distribute physical copies to agricultural ministries and extension services in all 8 pilot countries. Deposit with UNCCD Library, FAO AGRIS, and national agricultural libraries. Propose use in CAP advisory service training programmes (EU Farm Advisory Services). Pursue listing | HMU, OU, national partners; UNCCD; FAO AGRIS; DG AGRI; national extension bodies |

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| | | in Mediterranean environmental education curricula. | |

### 3.3.8 Annual Mediterranean Restoration Practitioner Series - Business Model

The table below compares the current D3.4 Volume 1 with the proposed annual series model:

| Element | Current Volume (Vol. 1 - REACT4MED) | Future Annual Volumes (Vol. 2+) |
|---|---|---|
| Series Title | Mediterranean Agro-Ecosystem Restoration Practitioner Guidebook | Mediterranean Agro-Ecosystem Restoration Practitioner Guidebook (Annual) |
| Scope | 8 restoration actions across REACT4MED pilot areas: CY, GR, IT, ES, MO, IL, TR, EG | 10-20 validated SLM practices per volume, drawn from WOCAT global database and new field-validated cases |
| Languages | English, Arabic, Greek, Italian, Spanish (5 editions) | English + up to 5 regional languages per volume, depending on featured practices |
| Format | Open-access PDF (Zenodo, OAPEN, REACT4MED website); print-on-demand via WOCAT / national partners | Open-access PDF + print-on-demand; potential e-reader edition; possible Spotify/podcast companion for non-literate audiences |
| ISBN / ISSN | Individual ISBN per language edition (5 ISBNs total for Vol. 1) | Per-volume ISBN + Series ISSN; DOI per chapter for granular citation |
| Editorial Governance | REACT4MED consortium (OU lead editors: Lukat, Ulbrich) | Joint editorial board: HMU, WOCAT Secretariat, FAO Land and Water, PRIMA, UNCCD; rotating regional guest editor per volume |
| Technology sourcing | REACT4MED pilot area research and field validation | WOCAT-validated SLM database; REACT4MED alumni; PRIMA-funded projects; submitted case studies from global contributors |
| Revenue model | Open access, free to all; costs covered by project budget | Publication costs covered by editorial board member contributions, PRIMA/LIFE grant funding, or article-processing charge waived via WOCAT/FAO partnership; no pay-wall |
| Distribution | REACT4MED website, Zenodo, OAPEN, OpenAIRE, WorldCat, FAO AGRIS, WOCAT | All above + UNCCD library, Mediterranean agricultural ministry libraries, EU Farm Advisory Service networks, national agricultural university libraries |
| Monitoring | Downloads, citations, WOCAT database entry referrals | Annual download statistics (Zenodo), citation tracking (OpenCitations), practitioner uptake survey |

### 3.3.9 WOCAT Partnership Proposal

A formal partnership with WOCAT would create a synergistic co-publication model with established global credibility:

| | | |
|---|---|---|
| Partnership Dimension | 8 fully validated SLM practices with CBA data (D5.2), biophysical indicators (WP3), climate context (D2.4), and social justice analysis; multilingual practitioner-friendly narratives with real farmer stories | Global SLM database (>6,000 documented practices); standardised SLM documentation methodology; quality assurance process; global credibility with UNCCD, FAO, and national governments |
| Publishing infrastructure | Multi-language editorial capacity (OU editorial team); EU open-access | Co-publication track record (WOCAT Global Overview of SLM - published by CTA with ISBN); established ISBN/ISSN |

| | | |
|---|---|---|
| | compliance (Zenodo/OAPEN); REACT4MED branding and design | registration; international distribution network; WorldCat and library indexing |
| Networks | PRIMA programme, Horizon 2020 alumni network, Mediterranean research institutions, EU policy networks (DG AGRI, DG ENV) | UNCCD secretariat, FAO Land and Water Division, national SLM focal points in 100+ countries, GEF-LDN network, World Overview of Conservation Approaches and Technologies |
| Annual content pipeline | Continued REACT4MED monitoring data; PRIMA follow-on projects; Mediterranean pilot area alumni | Annual additions to WOCAT database from global contributors; emerging SLM technologies across dryland and Mediterranean ecosystems; UNCCD country reporting data |
| Funding | EU Horizon 2020 / PRIMA residual budget for Vol. 1; explore PRIMA Section 2 follow-on for series | WOCAT institutional funding; FAO co-publication budget; GEF project resources; CGIAR publishing platform |
| Proposed next step: HMU to contact WOCAT Secretariat (wocat@cde.unibe.ch, University of Berne / Centre for Development and Environment) with a one-page partnership concept note proposing: (1) official WOCAT endorsement of D3.4 Vol. 1; (2) WOCAT co-branding of the annual series from Vol. 2; (3) joint WOCAT-REACT4MED editorial board for the series; and (4) shared distribution infrastructure. WOCAT's existing SLM publication track record and FAO partnership make this the most credible and impactful co-publishing partner available. | | |

### 3.3.10 Technology Readiness Level (TRL)

**TRL 7-8 - System Complete and Demonstrated / Operational**

D3.4 is a complete, professionally designed publication in 5 languages, authored by experts from 11 institutions, and already distributed to stakeholders across all 8 pilot countries. It is ready for ISBN registration and open-access deposit immediately. The annual series model and WOCAT partnership are at TRL 3-4 (concept validated, initial partnership discussions to begin).

| | |
|---|---|
| Ready Now (TRL 7+) | • ISBN registration for 5 language editions of D3.4 Vol. 1.<br>• Zenodo and OAPEN open-access deposit.<br>• Physical print distribution to ministries and libraries.<br>• FAO AGRIS and WorldCat registration. |
| Short-term (M36-M42) | • WOCAT partnership discussion and endorsement of Vol. 1.<br>• Series ISSN registration.<br>• Trainer Edition development proposal submitted to PRIMA.<br>• French translation concept developed with CIHEAM Montpellier or AFD |
| Medium-term (M42-M60) | • Vol. 2 editorial board established (WOCAT, FAO, PRIMA representation).<br>• Vol. 2 content pipeline sourced from WOCAT database and PRIMA follow-on projects.<br>• Vol. 2 published and distributed through WOCAT global network.<br>• Formal EU Farm Advisory Service adoption in at least 2 pilot countries. |
| Key Dependencies | • Completion of D3.4 back matter (WP7) - needed before ISBN registration and final deposit.<br>• National partner review of 4 translated language editions before final deposit.<br>• WOCAT Secretariat willingness to formalise co-branding partnership - depends on HMU outreach in M33-M36.<br>• PRIMA or LIFE follow-on funding for Vol. 2 production and editorial board sustainability. |

## 3.4 Agro-Ecological Restoration Actions for the Mediterranean (WP3/7)

Translating research outputs into accessible, actionable guidance for land managers and restoration practitioners is a central mission of REACT4MED. Deliverable D3.4 delivers this through a comprehensive, multilingual Guidebook for Practitioners documenting agro-ecological restoration actions demonstrated across the project's eight pilot areas in eight countries. The guidebook is designed as a practical reference tool, combining WOCAT-structured technology descriptions with site-specific implementation guidance, including detailed costing data, ecosystem service co-benefits, replicability conditions, and photographic documentation. It is produced in multiple languages including Arabic, to ensure accessibility for North African and MENA practitioners and extension services and will be registered with an ISBN for formal citability and permanence. All restoration measures described in the guidebook are simultaneously deposited in the WOCAT global database, providing a persistent, internationally searchable open-access record.

The exploitation strategy for D3.4 is one of the most mature in the REACT4MED portfolio, reflecting its high TRL (6-8) and the breadth of its target audience. Immediate dissemination through WOCAT, the REACT4MED project website, and partner institution networks reaches land managers, NGOs, development agencies, and researchers worldwide. Print-on-demand activation following ISBN registration enables low-cost physical distribution for field use in low-connectivity environments. A planned annual practitioner series building on the guidebook as a foundation creates a long-term publishing pathway for REACT4MED partners and affiliated institutions. The multilingual production, particularly the Arabic edition, directly addresses the often-cited barrier of language access in technology transfer to North Africa and the Levant, positioning the guidebook as a reference tool for FAO, IFAD, and World Bank rural development programming in the region.

### 3.4.1 Tools and Innovations

D3.4 - Guidebook for Practitioners: Agro-Ecological Restoration Actions for the Mediterranean

- Practitioner-oriented guidebook covering 8 restoration actions across 8 Mediterranean pilot areas (IT, TR, EG, ES, CY, MO, GR, IL).
- Structure: Introduction → Restoration Actions (8 chapters with climate context, pilot area profile, real farmer story, implementation steps, benefits, contacts) → LanDS dashboard guidance.
- Published in 5 languages: English, Arabic, Greek, Italian, Spanish - one of the few Mediterranean restoration resources available in Arabic for North African and Middle Eastern audiences.
- Real farmer narratives as role models (Diomede family IT, Kostas Karatzis GR, Yuli and Nitzan Betzer IL, Asensi family ES, Mehmet TR, and others).
- Implementation steps grounded in multi-year field research; climate projections per pilot area (cross-referenced with D2.4); economic context derived from D5.2 CBA.
- Editors: Evelyn Lukat & Raissa Ulbrich (Osnabrück University). Lead partner: OU. Contributing partners: TUC, CYI, HMU, UH, UV, CIHEAM-Bari, UTEAM, INRA, PDS, SOFTW.
- Dissemination level: PU (public). Copyright © 2022 REACT4MED Consortium. Third-party reuse permitted with attribution.

All 8 restoration measures also documented in the WOCAT global SLM database, creating a bi-directional link between the narrative Guidebook and WOCAT's technical database layer.

### 3.4.2 Brief Description

D3.4 is a practitioner-focused, open-access guidebook presenting the eight agro-ecosystem restoration actions developed, tested, and validated by the REACT4MED project across Mediterranean pilot areas in Cyprus, Greece, Italy, Spain, Morocco, Israel, Turkey, and Egypt. It is explicitly not a scientific report: the foreword describes it as a working manual for everyone committed to restoring Mediterranean lands and livelihoods at scale.

The Guidebook's structure is deliberately accessible: each of the eight chapters opens with a climate change context specific to the pilot area (drawing on D2.4 projections), profiles the local farming landscape, presents

a named farmer's story as a tangible role model, provides step-by-step implementation guidance, lists measurable benefits, and provides direct contact information for local advisors and organisations. A concluding chapter introduces the LanDS decision-support dashboard (WP4) as a complementary digital tool for land managers.

Published in English, Arabic, Greek, Italian, Turkish, and Spanish, D3.4 is one of the few Mediterranean restoration resources accessible to Arabic-speaking practitioners across North Africa and the Middle East, as well as to farming communities in all pilot area countries in their native languages. This multilingual reach, combined with the integration of real farmer stories and practical implementation guidance, gives D3.4 a unique market position among Mediterranean agricultural restoration publications.

The Guidebook is conceived as the foundation of a potential annual practitioner series, co-branded with WOCAT, that would extend its reach and sustainability well beyond the REACT4MED project lifetime.

### 3.4.3 Exploitation Methods

The Guidebook is not sold; it is published open-access. Exploitation is through impact, reach, and the sustainability mechanisms below:

| # | Exploitation Method | Rationale / Value Proposition | Revenue / Sustainability Model |
|---|---|---|---|
| 1 | ISBN-registered open-access publication (Vol. 1) | Register individual ISBNs for each of the 5 language editions through the lead partner's national ISBN agency (OU → MVB Germany; or HMU → EKT Greece). Assign a Zenodo DOI for open-access deposit. Register with WorldCat, OAPEN, FAO AGRIS, and OpenAIRE for maximum global library discoverability. Print-on-demand via WOCAT or national library print services for practitioners without digital access. | Open access (free to all readers); production and dissemination costs covered by remaining REACT4MED project budget; print-on-demand at cost price; no commercial price point. |
| 2 | Annual Mediterranean Restoration Practitioner Series | Transform the Guidebook into Volume 1 of an ongoing annual series, co-branded with WOCAT. Apply for a Series ISSN. Each annual volume features 15-20 WOCAT-validated SLM practices from the Mediterranean and dryland regions, with the same accessible practitioner format. Source technologies from WOCAT database, REACT4MED alumni, PRIMA-funded successor projects, and open submissions from contributing institutions. | Publication costs covered by editorial board member institutional contributions, PRIMA Section 2 / LIFE follow-on grants, or FAO/WOCAT co-publication budget. No pay-wall. Revenue is generated indirectly through institutional positioning and follow-on advisory contracts. |
| 3 | WOCAT co-branding and database integration partnership | Formalise a partnership with the WOCAT Secretariat (Berne) to co-brand the annual series. WOCAT already co-publishes SLM handbooks (e.g. WOCAT Global Overview of SLM, CTA 2011, ISBN 978-92-9081-469-5). Each D3.4 chapter would be formally linked to its corresponding WOCAT database entry. WOCAT's distribution network (100+ | Co-publication agreement (cost-sharing between REACT4MED/HMU and WOCAT); WOCAT handles ISBN registration and library distribution for co-branded volumes; |

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| | | countries, UNCCD and FAO institutional relationships) provides unparalleled global reach for the annual series. | REACT4MED provides Mediterranean content pipeline. |
| 4 | EU Farm Advisory Service (FAS) and extension training material | Propose D3.4 as a standard reference resource for EU Farm Advisory Services (CAP Art. 15 - agricultural advisory systems). Develop a companion 'Trainer Edition' with facilitation guides, assessment tools, and links to WP6 Policy Briefs, for use in national agricultural advisory service training programmes across EU pilot area countries. | Trainer Edition production funded via PRIMA or EIP-AGRI Operational Group grants; adoption by national FAS bodies provides sustained reach and institutional embedding. |
| 5 | Physical print distribution to ministries and libraries | Print and distribute physical copies of D3.4 to: agricultural ministries and national libraries in CY, GR, IT, ES, MO, IL, TR, EG; UNCCD secretariat (Bonn); FAO Rome headquarters; CIHEAM (Bari, Montpellier, Zaragoza, Chania); Mediterranean agricultural university libraries. | One-time cost from project budget. High policy impact - physical presence in ministry and library collections ensures long-term discoverability beyond the digital sphere. |

### 3.4.4 Target Users / Target Groups

Target groups, needs, and specific actions per group:

| Target Group | Needs / Interests | Actions Performed | Actions Planned |
|---|---|---|---|
| Farmers, pastoralists, smallholders | Practical, locally relevant guidance in own language; real farmer stories as role models; implementable step-by-step descriptions; contact information for local support. | D3.4 Guidebook available in 5 languages; distributed at ERLL stakeholder events in all 8 pilot areas; farmer stories featured (Diomede family IT, Karatzis GR, Betzer family IL, Asensi family ES, Mehmet TR). | Distribute physical copies via national extension services; develop e-reader and audio versions for low-literacy contexts; promote via WOCAT farmer network; produce country-specific condensed field cards. |
| Agricultural extension officers and advisors | Evidence-based, field-tested restoration measures; implementation checklists; climate context per region; contact networks for peer learning. | Guidebook presented at ERLLs; D3.4 directly usable as advisory reference material; WOCAT database entries linked. | Training workshops for extension officers using Guidebook as primary reference; translate key sections into national advisory service materials; propose as standard reference for EU Farm Advisory Service training (CAP Art. 15). |
| Policy makers and government officers | Menu of shovel-ready, costed interventions with measurable co-benefits (carbon, biodiversity, yield, water) for agri-environment scheme and Nature | WP6 Policy Briefs prepared alongside D3.4; Guidebook foreword explicitly addresses policy audiences; distributed at | Deposit with agricultural ministries in 8 pilot countries; propose as reference for UNCCD National Action Programme updates; |

| | | | |
|---|---|---|---|
| | Restoration Law implementation planning. | project dissemination events. | present at EU Green Week and PRIMA annual conference. |
| Research institutions and universities | Replicable methodology; interdisciplinary synthesis of agronomy, hydrology, economics, and social science; citable open-access reference with DOI. | D3.4 publicly available (PU); authors from 11 institutions; cross-disciplinary approach documented in Executive Summary and Foreword. | Register with WorldCat and FAO AGRIS; deposit in OAPEN and OpenAIRE; assign DOI per chapter for granular citation; submit to CIARD (Coherence in Information for Agricultural Research for Development) registry. |
| International development organisations (FAO, IFAD, UNCCD, GEF) | Portfolio of Mediterranean restoration practices validated across 8 diverse sites; CBA data integrated; multilingual accessibility; replicable for programming in Mediterranean and dryland MENA contexts. | Measures documented in WOCAT SLM database (used by FAO and UNCCD as authoritative source); D3.4 available in Arabic. | Distribute through FAO AGRIS, UNCCD Library, and GEF-LDN programme; propose joint distribution with WOCAT; explore translation into French for North African extension reach. |
| Private sector (agri-food, ESG, agrotourism) | Evidence-based, accessible documentation of restoration practice co-benefits (soil, water, biodiversity, carbon) for supply chain sustainability reporting and NbS investment due diligence. | Guidebook features real commercial farm cases (organic table grapes IT, premium wine CY); economic co-benefits described accessibly. | Develop a targeted 'business edition' supplement highlighting economic indicators and ESG relevance per measure; promote at AgriInvest and ESG-focused investment forums. |
| Global WOCAT audience | Access to Mediterranean SLM practices validated through multi-year research; integration with WOCAT's global SLM documentation and discoverability infrastructure. | REACT4MED measures already documented in WOCAT database; D3.4 provides the practitioner-facing narrative layer. | Formalise WOCAT co-branding; link each WOCAT database entry to corresponding D3.4 chapter; promote annual series through WOCAT's 100+ country network. |

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- All 8 restoration measures documented in WOCAT SLM database, establishing the technical foundation for WOCAT co-branding discussions.
- D3.4 Guidebook structure designed to be practitioner-accessible: real farmer stories (named individuals), step-by-step implementation, climate context, contact information.
- Design completed by Danai Kalergi; professional publication-standard layout ready for ISBN registration.

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### 3.4.6 Actions Planned

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Potential IP Issues

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- WOCAT co-branding agreement: A formal co-publication agreement with WOCAT should specify: copyright ownership (consortium IP, with WOCAT distribution rights); co-branding terms; revenue and cost-sharing for print editions; editorial governance for annual series volumes.
- Third-party imagery: Any photographs or figures in D3.4 sourced from outside the consortium should be verified for licence compatibility with open-access publication (CC-BY or equivalent) prior to ISBN registration.
- National partner contributions: Authors from 11 consortium institutions contributed content.
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| Phase | Timeline | Actions | Partners / Channels |
|---|---|---|---|
| Phase 1: Finalise & Register | M33-M36 | Assign ISBN through lead partner institution (Osnabrück University via MVB Germany, or HMU via EBOOK GR / National Documentation Centre, EKT). Register DOI via Zenodo. Finalise English edition with back matter (WP7). Submit to Zenodo and REACT4MED website as open-access PDF. | OU (lead), HMU, WP7 dissemination team; national ISBN agency; Zenodo |
| Phase 2: Multilingual Open-Access Release | M34-M36 | Release Arabic, Greek, Italian, Spanish editions with individual ISBNs per language edition. Deposit all language editions in OpenDOAR-compliant open-access repositories (Zenodo, OAPEN, OpenAIRE). Register with WorldCat for global library discoverability. | OU, HMU, national partners (CIHEAM Bari, UV, INRA, UH, PDS); OAPEN; OpenAIRE |
| Phase 3: WOCAT Partnership Formalisation | M34-M42 | Open formal discussions with WOCAT Secretariat (Berne) to co-brand the annual series. WOCAT already co-publishes SLM handbooks with ISBNs. Propose REACT4MED Guidebook as the inaugural volume of a jointly branded annual Mediterranean Restoration Practitioner Series. Establish editorial board with WOCAT, FAO, and PRIMA representation. | HMU, OU; WOCAT Secretariat; FAO Land and Water Division; PRIMA programme office |
| Phase 4: Annual Series - Volume 2 | M43-M54 (post-project) | Source contributing technologies from WOCAT database (15-20 validated SLM practices per issue). Commission case study contributions from REACT4MED alumni pilots and new Mediterranean contributors. Apply for ISSN for the series (in addition to per-volume ISBN). Explore co-publication with a Mediterranean-focused open-access university press or CGIAR publishing platform. | HMU (series editor), WOCAT, FAO, PRIMA, UNCCD secretariat; open-access university press (e.g. Göttingen University Press, OpenEdition) |
| Phase 5: Institutional & Policy Uptake | Ongoing | Distribute physical copies to agricultural ministries and extension services in all 8 pilot countries. Deposit with UNCCD Library, FAO AGRIS, and national agricultural libraries. Propose use in CAP advisory service training programmes (EU Farm Advisory Services). Pursue listing in Mediterranean environmental education curricula. | HMU, OU, national partners; UNCCD; FAO AGRIS; DG AGRI; national extension bodies |

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| **Annual Mediterranean Restoration Practitioner Series - Business Model** | **The table below compares the current D3.4 Volume 1 with the proposed annual series model:** | | | |
| | **Element** | **Current Volume (Vol. 1 - REACT4MED)** | **Future Annual Volumes (Vol. 2+)** | **Element** |
| | Series Title | Mediterranean Agro-Ecosystem Restoration - Practitioner Guidebook | Mediterranean Agro-Ecosystem Restoration - Practitioner Guidebook (Annual) | Series Title |
| | Scope | 8 restoration actions across REACT4MED pilot areas: CY, GR, IT, ES, MO, IL, TR, EG | 10-20 validated SLM practices per volume, drawn from WOCAT global database and new field-validated cases | Scope |
| | Languages | English, Arabic, Greek, Italian, Spanish (5 editions) | English + up to 5 regional languages per volume, depending on featured practices | Languages |
| | Format | Open-access PDF (Zenodo, OAPEN, REACT4MED website); print-on-demand via WOCAT / national partners | Open-access PDF + print-on-demand; potential e-reader edition; possible Spotify/podcast companion for non-literate audiences | Format |
| | ISBN / ISSN | Individual ISBN per language edition (5 ISBNs total for Vol. 1) | Per-volume ISBN + Series ISSN; DOI per chapter for granular citation | ISBN / ISSN |
| | Editorial Governance | REACT4MED consortium (OU lead editors: Lukat, Ulbrich) | Joint editorial board: HMU, WOCAT Secretariat, FAO Land and Water, PRIMA, UNCCD; rotating regional guest editor per volume | Editorial Governance |
| | Technology sourcing | REACT4MED pilot area research and field validation | WOCAT-validated SLM database; REACT4MED alumni; PRIMA-funded projects; submitted case studies from global contributors | Technology sourcing |
| | Revenue model | Open access - free to all; costs covered by project budget | Publication costs covered by editorial board | Revenue model |

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| | | | member contributions, PRIMA/LIFE grant funding, or article-processing charge waived via WOCAT/FAO partnership; no pay-wall | |
| | Distribution | REACT4MED website, Zenodo, OAPEN, OpenAIRE, WorldCat, FAO AGRIS, WOCAT | All above + UNCCD library, Mediterranean agricultural ministry libraries, EU Farm Advisory Service networks, national agricultural university libraries | Distribution |
| | Monitoring | Downloads, citations, WOCAT database entry referrals | Annual download statistics (Zenodo), citation tracking (OpenCitations), practitioner uptake survey | Monitoring |
| **WOCAT Partnership Proposal** | **A formal partnership with WOCAT would create a synergistic co-publication model with established global credibility:** | | | |
| | **Partnership Dimension** | **REACT4MED Brings** | **WOCAT Brings** | **Partnership Dimension** |
| | Content | 8 fully validated SLM practices with CBA data (D5.2), biophysical indicators (WP3), climate context (D2.4), and social justice analysis; multilingual practitioner-friendly narratives with real farmer stories | Global SLM database (>6,000 documented practices); standardised SLM documentation methodology; quality assurance process; global credibility with UNCCD, FAO, and national governments | Content |
| | Publishing infrastructure | Multi-language editorial capacity (OU editorial team); EU open-access compliance (Zenodo/OAPEN); REACT4MED branding and design | Co-publication track record (WOCAT Global Overview of SLM - published by CTA with ISBN); established ISBN/ISSN registration; international distribution | Publishing infrastructure |

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| | | | network; WorldCat and library indexing | |
| | Networks | PRIMA programme, Horizon 2020 alumni network, Mediterranean research institutions, EU policy networks (DG AGRI, DG ENV) | UNCCD secretariat, FAO Land and Water Division, national SLM focal points in 100+ countries, GEF-LDN network, World Overview of Conservation Approaches and Technologies | Networks |
| | Annual content pipeline | Continued REACT4MED monitoring data; PRIMA follow-on projects; Mediterranean pilot area alumni | Annual additions to WOCAT database from global contributors; emerging SLM technologies across dryland and Mediterranean ecosystems; UNCCD country reporting data | Annual content pipeline |
| | Funding | EU Horizon 2020 / PRIMA residual budget for Vol. 1; explore PRIMA Section 2 follow-on for series | WOCAT institutional funding; FAO co-publication budget; GEF project resources; CGIAR publishing platform | Funding |
| | Proposed next step: HMU to contact WOCAT Secretariat (wocat@cde.unibe.ch, University of Berne / Centre for Development and Environment) with a one-page partnership concept note proposing: (1) official WOCAT endorsement of D3.4 Vol. 1; (2) WOCAT co-branding of the annual series from Vol. 2; (3) joint WOCAT-REACT4MED editorial board for the series; and (4) shared distribution infrastructure. WOCAT's existing SLM publication track record and FAO partnership make this the most credible and impactful co-publishing partner available | | | |
| **Technology Readiness Level (TRL)** | TRL 7-8 - System Complete and Demonstrated / Operational<br>D3.4 is a complete, professionally designed publication in 5 languages, authored by experts from 11 institutions, and already distributed to stakeholders across all 8 pilot countries. It is ready for ISBN registration and open-access deposit immediately. The annual series model and WOCAT partnership are at TRL 3-4 (concept validated, initial partnership discussions to begin). | | | |
| **Market Readiness & Key Dependencies** | Ready Now (TRL 7+) | • ISBN registration for 5 language editions of D3.4 Vol. 1.<br>• Zenodo and OAPEN open-access deposit.<br>• Physical print distribution to ministries and libraries.<br>• FAO AGRIS and WorldCat registration. | | |
| | Short-term (M36-M42) | • WOCAT partnership discussion and endorsement of Vol. 1.<br>• Series ISSN registration.<br>• Trainer Edition development proposal submitted to PRIMA.<br>• French translation concept developed with CIHEAM Montpellier or AFD. | | |

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| | Medium-term (M42-M60) | • Vol. 2 editorial board established (WOCAT, FAO, PRIMA representation).<br>• Vol. 2 content pipeline sourced from WOCAT database and PRIMA follow-on projects.<br>• Vol. 2 published and distributed through WOCAT global network.<br>• Formal EU Farm Advisory Service adoption in at least 2 pilot countries |
| | Key Dependencies | • Completion of D3.4 back matter (WP7) - needed before ISBN registration and final deposit.<br>• National partner review of 4 translated language editions before final deposit.<br>• WOCAT Secretariat willingness to formalise co-branding partnership - depends on HMU outreach in M33-M36.<br>• PRIMA or LIFE follow-on funding for Vol. 2 production and editorial board sustainability. |

## 3.5 Land Degradation Decision-Support Toolbox “LanDS” (WP4)

Scaling restoration interventions from individual pilot sites to landscape and national levels requires decision-support infrastructure capable of integrating heterogeneous data streams climate projections, land cover, soil characteristics, socio-economic parameters and translating them into spatially explicit, actionable recommendations. Deliverable D4.3 addresses this need through the LanDS (Land Degradation Decision-Support) Toolbox: a web-accessible, machine-learning-enabled platform designed for site suitability assessment, climate-risk profiling, and Nature-based Solutions (NbS) prioritisation across Mediterranean agricultural and forest landscapes. LanDS integrates REACT4MED’s climate projections (D2.4), co-developed indicators (D3.2), and pilot area empirical data into a user-configurable interface that enables planners, restoration practitioners, and researchers to explore degradation risk scenarios, identify candidate restoration interventions, and evaluate their expected biophysical and economic outcomes under alternative climate pathways. The toolbox incorporates ML-based clustering algorithms to identify sites with conditions analogous to REACT4MED pilot areas, enabling evidence-based transferability assessments for scaling restoration measures to new contexts.

LanDS represents the highest-value commercial exploitation opportunity in the REACT4MED portfolio, reflecting the growing market demand for spatially explicit, data-driven decision-support tools in the land management and NbS investment space. Its current TRL of 4-5 reflects the prototype and early validation stage; advancement to TRL 6-7 through user testing and UX refinement is planned within the project lifetime, with public release at M33-36. Commercial exploitation pathways include software-as-a-service (SaaS) licensing, fee-based consulting bundled with LanDS-generated suitability analyses, and integration into national and regional land monitoring platforms. The SOFTW consortium partner is identified as the lead commercial entity for LanDS packaging and licensing. The toolbox also offers strong non-commercial exploitation value as a free, open-access research infrastructure for PRIMA network institutions, JRC, EEA, and Copernicus land monitoring teams.

### 3.5.1 Tools and Innovations

LanDS Toolbox (D4.3 / D4.4) - Land degradation Decision-Support Toolbox

- Geo-referenced data repository (STAC-compliant, 9 pilot area collections + Mediterranean-wide), storing site-specific resources, satellite-based indices, and WP2/WP3 outputs
- Data Viewer: interactive visual analytics module supporting time-series, boxplots, choropleth and raster maps for all dataset types (.nc, .shp, .csv, .tif)

- Indicators Library: modular open-source Python/Jupyter code library computing 56 biophysical, climate, and socioeconomic indicators (ETCCDI climate extremes, aridity, soil salinity, land cover change, GDP, population)
- Machine Learning (ML) Procedure: unsupervised k-means clustering of Mediterranean macro-areas using PCA-reduced indicator sets (historical 2001-2019; future SSP2-4.5 / SSP5-8.5)
- Expert-based filter: GIS-based spatial overlay module to identify pilot-area-similar zones suitable for restoration outscaling (under development)
- LanDS Dashboard (D4.4, M34): user-friendly web interface for policy-makers to assess land degradation, evaluate restoration impacts, and explore future scenarios
- Full open-source technology stack (PostgreSQL/PostGIS, FastAPI, Leaflet, Drupal/Vue.js, Jupyter, Scikit-learn, Plotly, hvPlot); all code released publicly under GNU GPL v3 licence

GitLab group and repositories (https://gitlab.com/lands-r4m):

- lands_web (https://gitlab.com/lands-r4m/lands_web) - Full Docker-compose stack to self-host a LanDS demo web portal; enables any organisation to deploy a standalone LanDS instance on their own infrastructure
- indicators_library (https://gitlab.com/lands-r4m/indicators_library) - Python/Jupyter notebook code library computing all 56 biophysical, climate, and socioeconomic indicators; reusable for new geographic contexts beyond REACT4MED pilot areas
- ml_tool (https://gitlab.com/lands-r4m/ml_tool) - Machine-learning (k-means) clustering procedure code; supports historical (2001-2019) and future SSP scenario inputs; configurable k, correlation threshold, and input indicator selection
- Operational web portal at: http://lands.soft-water.it; online documentation and tutorials at: https://lands.soft-water.it/documentation

### 3.5.2 Brief Description

D4.3 describes the final version of the LanDS toolbox, a comprehensive science-based decision-support system developed by SoftWater s.r.l. with TUC, UH, UOS, CIHEAM Bari, and HMU. The toolbox integrates multi-source geospatial and socioeconomic data from REACT4MED's eight Mediterranean pilot areas with global public repositories to support harmonised land degradation assessment and restoration impact evaluation.

The LanDS offers four operational tools: (1) a STAC-compliant georeferenced repository organising pilot-area datasets; (2) an interactive data viewer with time-series, boxplot, raster, and choropleth visualisations; (3) an indicators code library computing 56 standardised climate, biophysical, and socioeconomic metrics; and (4) an ML-based clustering procedure identifying Mediterranean macro-zones with similar degradation profiles for restoration outscaling. A fifth tool - the LanDS Dashboard (D4.4) - is under development and will provide a consolidated interface for policy-makers.

Key outputs include: pilot-area climate and land degradation indicator datasets; Mediterranean-scale ML cluster maps under historical and future SSP scenarios; a monitoring data template and real monitoring data from Stornara & Tara (Italy); and open-source code enabling replication across new sites. The toolbox is designed to be portable, extensible, and directly exploitable beyond the project lifecycle as an autonomous service for land restoration planning and investment decision-making.

### 3.5.3 Exploitation Methods

Six complementary exploitation pathways have been identified:

| # | Exploitation Method | Rationale / Value Proposition | Revenue / Sustainability Model |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 1 | Open-access toolbox and code repositories | Three public GPL-licensed repositories already available under https://gitlab.com/lands-r4m: (1) lands_web - full self-hostable Docker stack; (2) indicators_library - 56-indicator Python/Jupyter computation library; (3) ml_tool - k-means clustering and PCA pipeline. Datasets published on Zenodo/ESDAC with DOI-citable metadata. Maintain public web instance at lands.soft-water.it. Enables broad scientific reuse, validation, and citation by external researchers and organisations. | Open access (free); sustained via partner institutional hosting (SOFTW/HMU) and project website. Potential co-hosting with ESDAC or ISIMIP portal. |
| 2 | Subscription-based decision-support service for restoration planners | Package the LanDS Dashboard and ML outscaling tool as a fee-based SaaS platform for land managers, restoration agencies, and government bodies needing site-suitability assessments. Bundle D2.4 climate projections and D3.2 indicators. | Annual SaaS subscription or project-based service fees; tiered pricing for public bodies vs. private clients. SOFTW as lead commercial entity. |
| 3 | Integration into national and EU land monitoring frameworks | Promote LanDS indicator library and data repository as reference infrastructure for EU Soil Monitoring Law, UNCCD Land Degradation Neutrality reporting, and CAP agri-environment monitoring. Cross-reference with Copernicus, LUCAS, ESDAC, and JRC data. | No direct revenue; high policy impact. Creates long-term institutional demand and positions REACT4MED partners for follow-on contracts and framework agreements. |
| 4 | Commercial climate-risk and NbS suitability advisory | Offer site-suitability assessments combining ML clustering, climate scenario analysis (SSPs), and indicator profiling for private NbS project developers, ESG investors, and agricultural insurers requiring science-based site risk profiles. | Project-based consulting fees; premium for customised outscaling analysis and uncertainty quantification. High growth potential aligned with TCFD, TNFD, CSRD disclosure requirements. |
| 5 | Training and capacity-building programme | Deliver workshops and e-learning modules on using the LanDS toolbox for land degradation assessment, restoration indicator tracking, and scenario exploration. Target: extension services, NGOs, national environmental agencies, universities. | Training fees; EU-funded capacity-building projects (LIFE, Erasmus+, PRIMA follow-on); certification potential. Co-develop curricula with CIHEAM Bari, HMU, TUC. |
| 6 | Scientific publications and citation leverage | Publish peer-reviewed articles on ML-based Mediterranean area classification, indicator benchmarking, and toolbox architecture. Leverage acknowledged publications and toolbox to attract further research collaboration. | No direct revenue; builds reputational capital and citation leverage supporting future funding bids, consulting mandates, and follow-on project proposals. |

### 3.5.4 Potential Users / Target Groups

Seven primary target groups identified, each with distinct needs and interests:

| **Target Group** | **Key Needs / Interests** | **Actions Already Performed** | **Actions Planned** |
|---|---|---|---|
| National & regional environmental / agricultural agencies | Locally validated land degradation baselines; future climate-land | Pilot-area agency representatives participated in ERLL | Targeted briefings translating LanDS indicator outputs into |

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| (Ministries in Cyprus, Greece, Italy, Spain, Morocco, Israel, Turkey, Egypt) | scenarios compatible with UNCCD NAPs, SDG 15.3, CAP agri-environment reporting; ready-to-use indicator sets for national monitoring | workshops; LanDS repository populated with pilot-area data; D4.3 shared via REACT4MED website | national monitoring workflows; bilateral meetings with ministry focal points; propose integration into national agri-environment schemes (WP6) |
| EU institutions and programmes (EC DG ENV/AGRI/CLIMA, EEA, JRC) | Evidence-based multi-country harmonised indicator framework aligned with EU Soil Monitoring Law, EU Adaptation Strategy, CAP post-2027, EU Nature Restoration Law; cross-referencing with LUCAS, ESDAC, Copernicus | LanDS indicators cross-referenced with Copernicus ERA5-Land and ISIMIP/CMIP6; acknowledged in Nature (2025) and Nature Water (2023) publications; explicit EU open-data alignment | Submission of LanDS open dataset to EEA/JRC soil and climate monitoring working groups; engagement in EC consultations on EU Soil Monitoring Law climate indicator development; co-authorship of policy briefs (WP6) |
| International organisations (FAO, UNCCD, IUCN, World Bank, IPCC) | Globally replicable indicator methodology with Mediterranean specificity; multi-model ensemble with uncertainty quantification; alignment with UNCCD LDN framework and FAO voluntary guidelines; SSP/GWL compatibility with IPCC reporting | ISIMIP multi-model framework cited by IPCC AR6; project aligned with PRIMA/Horizon 2020 international cooperation goals; D4.3 toolbox openly accessible | Submit LanDS climate atlas and indicator dataset to FAO GIAHS and UNCCD practice library; UNCCD COP side-event participation; contribution to IPCC AR7 Mediterranean regional chapter references |
| NGOs and civil society (WWF MedPO, IUCN Med, CIHEAM network) | Credible, visual scenario narratives demonstrating restoration urgency; participatory tools translating indicator outputs into locally relevant storylines; accessible without heavy technical infrastructure | LanDS data viewer provides interactive charts and maps accessible without login; pilot-area collections populated and publicly browsable; ERLL stakeholders used LanDS to contextualise restoration challenges | Co-develop simplified pilot-area briefing cards using LanDS dashboard visualisations; explore joint funding bids (LIFE, Green Deal partnership calls); disseminate open-access LanDS toolbox across NGO networks |
| Private sector: NbS developers, ESG investors, voluntary carbon/biodiversity market actors, agricultural insurers | Science-based, multi-site validated land degradation and climate-risk profiles under multiple warming scenarios for NbS project design and verification; alignment with ISIMIP-based frameworks used by insurance and investment contexts; scenario analysis compatible with Verra, Gold Standard, SBTi | No direct commercial engagement yet; methodology assessed for alignment with ISIMIP-based climate risk frameworks; toolbox architecture designed for extensibility to private-sector workflows | Develop commercial land-risk service offer using LanDS ML outscaling tool; engage with voluntary carbon market standard bodies; present at AgriInvest and ESG-focused investment forums; explore licensing with agri-tech and climate analytics platforms |

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| Research institutions and universities | Open reproducible code and datasets for Mediterranean land degradation meta-analysis and model validation; citable reference methodology; REACT4MED-acknowledged publications as foundation for further research | Full LanDS code released on GitLab under GPL; D4.3 report publicly available; indicator library documented in Jupyter notebooks; two acknowledged high-impact publications (Nature 2025, Nature Water 2023) | Submit peer-reviewed articles on ML classification and indicator benchmarking; present at EGU, IALE, ESRA conferences; make LanDS datasets available via Zenodo under CC-BY licence; engage with PRIMA JPI and ISIMIP networks |
| Extension services and farmers / rural communities (direct end-beneficiaries) | Simple, locally relevant indicator outputs showing land degradation trends at pilot-area scale; tools to support planning for more resilient land management and access to agri-environment funding | ERLL workshops used LanDS findings to contextualise observed changes; pilot-area collections include local monitoring data; LanDS Dashboard in development will provide accessible visualisations | Develop simplified one-page "land outlook" cards per pilot area using LanDS dashboard outputs; use indicator trend results to support subsidy and adaptation payment applications; capacity-building programme for extension officers |

### 3.5.5 Actions Already Performed (cross-cutting)

- LanDS toolbox v1.2 deployed and publicly accessible at http://lands.soft-water.it with online documentation and tutorials (December 2024).
- Geo-referenced data repository populated with nine pilot-area collections (Troodos/Cyprus, Heraklion/Greece, Stornara & Tara/Italy, Cañyoles/Spain, Merchouch/Morocco, Bethlehem of Galilee/Israel, Lower Gediz/Turkey, Tamia/Egypt, Mediterranean Area).
- 56-indicator code library implemented in Python/Jupyter and released under GPL on GitLab; 40-indicator ML input set derived and applied to 2001-2019 historical data.
- ML clustering procedure applied to Mediterranean region: k-means (k=12) clustering map produced; multiple configurations tested (k=2-20; mean, mean+trend, mean+trend+variance inputs; SSP245 and SSP585 future scenarios).
- Expert-based filter framework defined and exemplified for PA2 (Heraklion, Greece); full implementation planned for D6.3.
- Monitoring data template created and real monitoring data (Stornara & Tara, PA3) uploaded and visualised as interactive charts in Data Viewer.
- NDVI (csv) and NDSI (tif) satellite-based indicators visualised for Troodos Mountains pilot area.
- LanDS user workshop held on 13 December 2024 with one representative per pilot area to train users on toolbox functionality and monitoring data upload.
- LanDS codebase (web stack, indicators library, ML tool) open-sourced on GitLab (https://gitlab.com/lands-r4m) under GPL licence.
- D4.3 indicator library cross-referenced with WP2 (D2.4 climate datasets) and WP3 (D3.2 indicator framework) ensuring input-output consistency across WPs.

### 3.5.6 Actions Planned

- Complete D4.4 LanDS Dashboard (M34): deploy user-friendly web interface for policy-makers integrating indicator comparisons across PAs, scenario exploration, and restoration impact assessment.

- Finalise expert-based filter and ML future-scenario analysis in collaboration with TUC; report in D6.3 LanDS Scenarios to Inform Policy Making (M36).
- Host final LanDS webinar (jointly with WP7) to present dashboard to all ERLL stakeholders and policy-makers; launch open public access.
- Publish open-access LanDS dataset (Zenodo, CC-BY) with full metadata, scenario descriptions, and pilot-area tagging; register DOI.
- Submit peer-reviewed journal articles on ML Mediterranean clustering methodology, indicator benchmarking framework, and LanDS toolbox architecture.
- Present LanDS at EGU, IALE, ESRA, and UNCCD COP side events; engage with ISIMIP and PRIMA JPI networks to promote toolbox adoption.
- Develop commercial SaaS offer and pricing model for LanDS decision-support service targeting private restoration funders, ESG investors, and agricultural insurers.
- Engage EU/national policy processes (EC DG CLIMA/ENV, EEA, JRC) to promote integration of LanDS indicator library and ML outscaling tool into soil and land degradation monitoring frameworks.
- Explore sustainable hosting arrangements beyond project lifetime: institutional hosting (SOFTW/HMU), potential integration into ESDAC or Copernicus Land Monitoring Service infrastructure.
- Prepare exploitation and business case summary for inclusion in final D7.4 exploitation plan; define IP agreements and revenue-sharing arrangements with consortium partners for commercial service launch.

### 3.5.7 Potential IP Issues

IP Status: The LanDS toolbox (D4.3) is a public (PU) output led by SoftWater s.r.l. (SOFTW) with contributions from TUC, UH, UOS, CIHEAM Bari, and HMU. The following issues and considerations should be managed:

- Ownership: D4.3 codebase is publicly released under GPL. The toolbox, methodology, and derived pilot-area indicator datasets constitute consortium IP (SOFTW lead). Any transition to fully commercialised SaaS services built on the toolbox requires consortium IP agreement and revenue-sharing arrangements.
- Third-party data and model licensing: The LanDS indicator library builds on ISIMIP Phase 2b/3b/3 ensembles, ERA5-Land, CMIP6, ESACCI, HydroSHEDS, WorldPop, Wang & Sun GDP gridded data, and Yang et al. land-use projections. These are publicly available for scientific research; commercial use of derived products must comply with applicable data licences. Any commercial service must distinguish consortium-developed methodology (IP) from underlying third-party model outputs.
- Open-source vs. commercial tension: The GPL licence governing LanDS source code requires that derivative works also be released under GPL. Premium commercial services (custom downscaling, uncertainty quantification, NbS suitability certification) should be structured as hosted services or proprietary add-on modules to avoid mandatory open-source disclosure of commercial enhancements. Legal advice is recommended prior to commercial service launch.
- Software and platform sustainability: Post-project hosting of the LanDS web instance at lands.soft-water.it depends on SOFTW infrastructure commitment. Formal hosting agreements with institutional partners or migration to public cloud infrastructure should be established before project end to ensure service continuity.
- Attribution of co-developed components: The indicators library, ML tool, and dashboard were co-developed across multiple partners (SOFTW, TUC, UH, UOS, CIHEAM Bari, HMU). Care must be taken to accurately represent partner contributions in any commercial or policy communication; co-inventor agreements should be formalised before commercial exploitation.

No existing third-party IP conflicts identified. Partners are advised to document all data source licences and model use permissions before commercial release of any land-risk advisory service built on LanDS outputs.

### 3.5.8 Technology Readiness Level (TRL)

**TRL 5-6 - Technology Validated in Relevant Environment / Technology Demonstrated**

The LanDS toolbox has been validated across all eight real-world Mediterranean pilot sites using observed monitoring data, multi-model ISIMIP ensembles (5 GCMs), ERA5-Land reanalysis, ESACCI land cover, and WorldPop/GDP gridded socioeconomic datasets. The repository, data viewer, and indicators library are fully operational and publicly accessible at lands.soft-water.it. The ML clustering procedure has been validated on the 2001-2019 historical period and demonstrated for SSP future scenarios. The LanDS Dashboard (D4.4, TRL 4-5) remains under development. Delivery of a fully operational commercial SaaS service will require additional productisation effort (TRL 7-8) estimated for the 6-12 months post-project period.

### 3.5.9 Market Readiness & Key Dependencies

- Scientific market: Fully ready. Codebase open-sourced; 56-indicator library documented; ML methodology applied and demonstrated. Two REACT4MED-acknowledged publications (Nature 2025, Nature Water 2023) underpin scientific credibility. Additional LanDS-focused publications in preparation.
- Policy market: Ready for immediate engagement following Dashboard launch (M34). Indicator library and ML outputs are sufficiently mature to feed into EU Soil Monitoring Law consultations, UNCCD NAP reporting, and CAP agri-environment monitoring.
- NGO / practitioner market: Ready after LanDS Dashboard deployment and production of simplified pilot-area briefing materials (planned M34-36).
- Private sector / commercial market: Requires additional packaging (SaaS pricing model, terms of service, alignment with TCFD/TNFD/carbon market standards) - estimated readiness M36-42 (post-project). GPL licence implications for commercial deployment must be resolved.
- Key dependency 1: Completion and deployment of D4.4 LanDS Dashboard (M34) is critical to unlocking policy-maker and practitioner market uptake.
- Key dependency 2: D6.3 LanDS Scenarios to Inform Policy Making (M36) will deliver expert-based filter outputs and future scenario analysis, substantially increasing the commercial and policy value of the ML tool.
- Key dependency 3: Sustainable hosting infrastructure post-project must be confirmed before project end to avoid service interruption.

## 3.6 Long-Term Sustainability and Replicability Monitoring System (WP5)

Demonstrating that restoration interventions deliver sustained ecological and socio-economic benefits over time and that these benefits can be reliably measured and attributed to specific management practices is essential both for scientific credibility and for access to public and private funding for restoration at scale. Deliverable D5.3 provides the monitoring infrastructure to achieve this through a Long-Term Sustainability and Replicability Monitoring System designed for deployment across all eight REACT4MED pilot areas. The system integrates three complementary monitoring modules: a Soil Organic Carbon (SOC) monitoring protocol based on the LUCAS soil survey methodology adapted for restoration contexts; a Water-Use Efficiency (WUE) tracking framework combining remote sensing and field measurement; and a land cover change monitoring workflow based on multi-temporal Sentinel-2 analysis at 500m × 500m pilot area grids. The system is designed for operational continuity beyond the project lifetime, with standardised protocols documented in sufficient detail for replication by non-specialist users and integration into national and regional monitoring frameworks.

The monitoring system's exploitation value is particularly significant in the context of rapidly evolving regulatory and market requirements for MRV (Measurement, Reporting and Verification) in land-based carbon and biodiversity markets, and for compliance with the forthcoming EU Soil Monitoring Law. Its policy market readiness is high: the SOC and land cover protocols are sufficiently mature to contribute to EU Soil Monitoring Law consultation processes and UNCCD National Action Programme (NAP) reporting. For NGOs

and practitioners, simplified monitoring starter kits tailored to each pilot area and designed for use by field workers without specialist remote sensing capacity are planned for release at M33-36. The longer-term commercial pathway involves packaging the monitoring system as a monitoring-as-a-service offering for voluntary carbon market developers, ESG investors, and agricultural insurers, with alignment to Verra, Gold Standard, TNFD, and CSRD MRV standards under development post-project.

### 3.6.1 Tools and Innovations

- Harmonised ecological monitoring framework covering 8 Mediterranean pilot areas (Cyprus, Greece, Italy, Spain, Morocco, Israel, Turkey, Egypt)
- LUCAS-endorsed SOC monitoring protocol adapted to 500 m × 500 m pilot-area grid with GPS-georeferenced Soil ID points
- Water Use Efficiency (WUE) monitoring workflow integrating soil moisture sensors, Sentinel-2 / Landsat remote sensing, and crop simulation models
- Land cover and vegetation dynamics monitoring using CORINE Land Cover and Copernicus Land Monitoring Service (CLMS) with 6-year update cycle
- Crop yield dynamics monitoring framework with integrated climate, soil, and management data for yield trend analysis and crop model forecasting
- Landscape Function Analysis (LFA) methodology for assessing soil surface stability, infiltration, and nutrient cycling indicators
- Delivered as a public (PU) open report by CIHEAM Bari (Zdruli, Perrino, D'Agostino); handed over to local decision-makers as a long-lasting project legacy

Brief Description

D5.3 presents a harmonised, multi-site ecological monitoring system for assessing the long-term sustainability and replicability of agro-ecosystem restoration actions across all 8 REACT4MED pilot areas. Built on outputs from D5.1 and D5.2, the deliverable proposes a unified monitoring methodology covering four core dimensions: (i) Soil Organic Carbon (SOC), using the LUCAS survey protocol (composite sampling at 20 cm depth, 500 m × 500 m grid, ISO standard laboratory analysis); (ii) Water Use Efficiency (WUE), combining soil moisture sensors, Sentinel-2/Landsat satellite imagery, and crop simulation models to track irrigation performance and water productivity; (iii) Land Cover and Vegetation Dynamics, using CORINE Land Cover and Copernicus CLMS as primary remote sensing instruments; and (iv) Crop Yield Dynamics, drawing on historical farm records and local administrative archives, integrated with climate and soil data for trend analysis and modelling.

The monitoring system is deliberately designed to combine top-down (remote sensing and biophysical modelling) and bottom-up (local stakeholder engagement, field sampling) approaches, enabling each ERLL to adapt the framework to its own biophysical and socio-economic characteristics. The LFA methodology provides an additional rapid assessment tool for soil surface functionality. The deliverable identifies next steps for institutionalisation and hands over the monitoring system to local decision-makers as the long-lasting legacy of the project.

### 3.6.2 Exploitation Methods

Multiple complementary exploitation pathways have been identified:

| # | Exploitation Method | Rationale / Value Proposition |
|---|---|---|
| 1 | Open-access monitoring framework and protocol repository | Publish the D5.3 harmonised monitoring methodology - including LUCAS-based SOC sampling protocols, remote-sensing WUE workflow, CORINE/Copernicus land cover procedure, and crop yield data collection templates - as a fully documented, open-access resource. |
| 2 | Monitoring-as-a-Service for restoration | Package the D5.3 monitoring framework as a replicable, turnkey service for ongoing restoration programmes. Bundle SOC sampling design, WUE |

| | | |
|---|---|---|
| | programmes and NbS projects | remote sensing dashboards, land cover change GIS layers, and yield trend analysis into a periodic reporting service. |
| 3 | Integration into national and EU agri-environmental monitoring schemes | Propose formal adoption of the D5.3 harmonised methodology into national agri-environment monitoring systems and EU-level frameworks (Soil Monitoring Law, CAP agri-environment conditions, UNCCD Land Degradation Neutrality reporting). |
| 4 | Training and capacity-building service for extension services and land managers | Develop workshops and e-learning modules on implementing the D5.3 monitoring protocols: LUCAS soil sampling, WUE tracking with Sentinel-2, CORINE-based land cover mapping, and crop yield database construction. |
| 5 | Commercial monitoring and verification service for voluntary carbon and biodiversity credit markets | Offer the D5.3 SOC monitoring and land cover change protocols as a scientifically validated, multi-site baseline and monitoring tool for voluntary carbon market (Verra, Gold Standard) and biodiversity credit (TNFD, SBTN) project verification. |
| 6 | Scientific publications and citation leverage | Publish peer-reviewed articles presenting the D5.3 harmonised monitoring methodology, cross-site SOC baselines, WUE trends, and long-term land cover change synthesis across 8 Mediterranean pilot areas. |

### 3.6.3 Actions Already Performed (cross-cutting)

- Harmonised monitoring framework for SOC, WUE, land cover/vegetation, and crop yield dynamics established and documented in public D5.3 deliverable (CIHEAM Bari, April 2025).
- LUCAS SOC sampling protocol adapted for REACT4MED pilot areas (500 m × 500 m grid; GPS-referenced Soil ID points; ISO standard analysis for organic carbon, texture, pH, N, P, K, and CEC).
- WUE monitoring workflow specified integrating soil moisture sensors, Sentinel-2/Copernicus imagery, and crop simulation models (APSIM, EPIC, CERES family).
- CORINE Land Cover and Copernicus CLMS methodology adopted for vegetation and land cover change monitoring with 6-year update cadence.
- Landscape Function Analysis (LFA) methodology included as a rapid, field-applicable tool for assessing soil surface stability, infiltration, and nutrient cycling (11 indicators; 10 m transects).
- Crop yield dynamics procedure specified with Excel-based data collection template linking yield records to climate (rainfall, temperature) and soil data.
- Monitoring framework introduced and discussed at ERLL stakeholder workshops to contextualise observed changes and frame future restoration monitoring commitments.
- D5.3 indicators cross-referenced with WP2 (D2.4 climate projections), WP3 (D3.2 indicator framework), and WP4 (LanDS dashboard) to ensure internal consistency across project work packages.
- Monitoring system formally handed over to local decision-makers in 8 pilot areas as a long-lasting project legacy.

### 3.6.4 Actions Planned

- Publish open-access D5.3 monitoring protocol guide (web-based or Zenodo dataset) with full metadata, pilot-area tagging, and DOI citation.
- Initiate first-round LUCAS-based SOC sampling at all 8 pilot areas to establish a reproducible baseline; schedule second-round sampling at 4-year intervals.
- Develop simplified 'monitoring starter kit' cards per pilot area in local languages for use by extension services, farmers, and NGOs.
- Submit peer-reviewed journal articles on D5.3 SOC baselines, WUE trends, and long-term land cover change synthesis across Mediterranean pilot areas.
- Present D5.3 monitoring framework at EGU, IALE, ESRA, and UNCCD COP side events.

- Develop commercial monitoring-as-a-service offer targeting private restoration funders, voluntary carbon markets (Verra, Gold Standard), ESG investors, and agricultural insurers.
- Engage EU/national policy processes (EC DG AGRI, EEA, JRC) to promote integration of D5.3 SOC and land cover protocols into Soil Monitoring Law implementation guidance and CAP agri-environment monitoring.
- Develop training and capacity-building programme on applying D5.3 monitoring protocols for restoration advisory services; explore Erasmus+ and PRIMA follow-on funding.
- Integrate D5.3 monitoring outputs with LanDS dashboard (WP4) and D3.2 indicator framework (WP3) for a full, web-accessible restoration assessment and monitoring pipeline.
- Prepare exploitation and business case summary for inclusion in final D7.4 exploitation plan.

### 3.6.5 Potential IP Issues

IP Status: The D5.3 monitoring framework is a confidential (CO) output of the REACT4MED consortium (CIHEAM Bari, lead - Zdruli, Perrino, D'Agostino). The following issues and considerations should be managed:

- Ownership: D5.3 is currently classified as CO (confidential to consortium). Any transition to open-access publication of the full monitoring protocol requires agreement among all consortium partners. The methodology, sampling procedures, and pilot-area monitoring datasets are consortium IP (CIHEAM Bari lead).
- Third-party data and methodology licensing: D5.3 incorporates the LUCAS topsoil survey methodology (EU/JRC, publicly available for scientific use), CORINE Land Cover (EEA/Copernicus, open licence), Sentinel-2 imagery (ESA Copernicus, open data), and published LFA methodology (Tongway & Hindley 2004). Commercial use of derivative products must comply with applicable data licences. Consultant packages built on D5.3 must clearly distinguish consortium methodology (IP) from underlying third-party frameworks.
- Open-access versus commercial tension: The monitoring protocols and pilot-area starter kits should be published open-access to maximise scientific and policy impact. Premium commercial services (site-specific monitoring design, uncertainty quantification, carbon credit MRV services) can be built on this open foundation without IP conflict, provided value-added implementation services - not raw methodology - are the commercial offering.
- Attribution of monitoring data: Multi-site datasets compiled under D5.3 involve contributions from all 8 pilot-area partners. Care must be taken to accurately represent partner contributions in any commercial or policy communication, and to obtain consent for sharing pilot-area-specific data beyond the consortium.
- Commercial exploitation agreements: Prior to engaging private sector clients (carbon market verifiers, ESG investors, land managers), a formal IP agreement between consortium partners should confirm exploitation rights, revenue-sharing arrangements, and conditions for sub-licensing of D5.3 methodology and derived datasets.
- No existing third-party IP conflicts identified. Partners are advised to document all data source licences and model use permissions before commercial release of any monitoring service built on D5.3 outputs.

### 3.6.6 Technology Readiness Level (TRL)

**TRL 3-4 - Experimental Proof of Concept / Technology Validated in Laboratory**

The D5.3 monitoring framework has been conceptually designed and methodologically specified across 8 real-world Mediterranean pilot sites, drawing on established protocols (LUCAS, CORINE, Copernicus, LFA) and validated remote sensing tools (Sentinel-2, Landsat). Preliminary monitoring activities have been conducted at ERLL sites during the project lifetime. However, the full multi-round longitudinal monitoring cycle - which requires repeated SOC sampling (4-year intervals), multi-season WUE tracking, and multi-period

land cover update - has not yet been completed. The monitoring system framework is fully documented and replicable. Delivery of a fully operational, institutionalised monitoring service will require additional implementation investment and partner commitment (TRL 5-6) post-project.

### 3.6.7 Market Readiness & Key Dependencies

- Policy market: Ready for immediate engagement - D5.3 SOC and land cover protocols are sufficiently mature to feed into EU Soil Monitoring Law consultation and UNCCD NAP reporting discussions.
- Scientific market: Methodology fully documented; additional peer-reviewed publications in preparation. Scientific credibility established through REACT4MED-acknowledged publications in high-impact journals (Nature 2025, Nature Water 2023) that contextualise the D5.3 monitoring framework.
- NGO / practitioner market: Ready after production of simplified monitoring starter kits and open-access protocol guide (planned M33-36).
- Private sector / commercial market: Requires additional packaging (monitoring-as-a-service offer, pricing model, alignment with Verra / Gold Standard / TNFD / carbon market MRV standards) - estimated readiness M36-42 (post-project).
- Key dependency: Commitment of local stakeholders in all 8 pilot areas to initiate and sustain the monitoring system beyond the project lifetime is essential for the framework to fulfil its intended long-lasting legacy role. Institutional anchoring with national ministries or extension services is a prerequisite for scaling.

## 3.7 Fully Budgeted Restoration Measures (WP5/6)

The eight REACT4MED pilot areas constitute the empirical heart of the project, providing the real-world test-beds in which restoration interventions are designed, implemented, monitored, and evaluated. Each pilot area hosts one or more agro-ecological restoration measures selected through the ERLL co-design process and implemented over the project lifetime: mechanised mountain terrace viticulture in the Troodos Mountains of Cyprus; carob afforestation and silvopastoral systems in Crete, Greece; organic table grape farming in Apulia, Italy; chipped pruned branch mulch in citrus plantations in Valencia, Spain; no-till wheat farming in the Zaer Region of Morocco; agroforestry food forest systems in Northern Israel; subsurface drainage to combat salinity and waterlogging in the Menemen Plain of Turkey; and integrated soil health interventions for wheat in the Fayoum, Egypt. For each measure, D7.4's WP5/WP6 entries provide fully budgeted cost-benefit analyses (CBA), net present value (NPV) and benefit-cost ratio (BCR) estimates, ecosystem service valuation, and WOCAT-standardised technology data sheets incorporating implementation costs and replicability conditions.

| # | Pilot Area / Country | Restoration Measure | NPV (€/ha) | BCR | Initial Investment (€/ha) |
|---|---|---|---|---|---|
| 1 | Troodos, Cyprus (CY) | Mechanised mountain terraces + winery | €48,456 | 1.10 | €331,848 |
| 2 | Heraklion, Greece (GR) | Carob afforestation (silvopastoral) | €20,547 | 1.29 | ~€24,314 |
| 3 | Stornara-Tara, Italy (IT) | Organic table grape farming | €47,468 | 1.18 | €60,500 |
| 4 | Cànyoles, Spain (ES) | Chipped pruned branch mulch (citrus) | €7,290 | 1.18 | ~€5,000 |

| | | | | | |
|---|---|---|---|---|---|
| 5 | Merchouch, Morocco (MO) | No-till soft wheat farming | €6,868 | 2.12 | ~€740 |
| 6 | Bethlehem, Israel (IL) | Agroforestry food forest (theoretical) | €157,270* | 1.54* | €114,222 |
| 7 | Lower Gediz, Turkey (TR) | Subsurface drainage (cotton) | €24,536 | 2.26 | €3,333 |
| 8 | Tamia, Egypt (EG) | Drainage + organic/foliar fertilizer (wheat) | €500 | 1.03 | €3,350 |

The exploitation significance of the eight pilot area entries lies in their function as the primary evidence base for the scaling and transferability arguments underpinning all other REACT4MED exploitation outputs. The fully costed CBA data collected and standardised across eight countries and diverse agro-ecological contexts provides a uniquely rigorous empirical foundation for policy recommendations, development finance project appraisal, and private investment due diligence in Mediterranean land restoration. The WOCAT data sheets ensure that each measure is discoverable, citeable, and replicable by practitioners worldwide through the global WOCAT database. The Arabic-language Guidebook (D3.4) ensures that the measures most relevant to North Africa particularly the Moroccan no-till and Egyptian soil health entries reach Arab-speaking land managers and extension workers. For national and international policy actors, the cross-country comparative CBA data enables evidence-based prioritisation of public investment in restoration under Morocco's Generation Green programme, the EU CAP agri-environment schemes, and FAO/IFAD rural development programming.

| BCR Range (across 8 sites): | NPV Range (positive outcomes): | BCR Range (across 8 sites): |
|---|---|---|
| 1.03 - 2.26 | €500 - €157,270 / ha | €740 - €331,848 / ha |

### 3.7.1 Tools and Innovations

- D5.2 Socioeconomic Analysis of Restoration Measures: cost-benefit analysis (CBA) across 8 Mediterranean pilot areas over a 15-year horizon at 6% discount rate, covering NPV, BCR, lifecycle costs and benefits, and social justice enquiries at 6 of the 8 sites.
- D3.4 Guidebook for Practitioners: practitioner-accessible descriptions of all 8 restoration actions, published in English, Arabic, Greek, Italian, and Spanish, with real farmer stories, step-by-step implementation guidance, climate context, and contact networks.
- WOCAT SLM database entries: all 8 restoration measures documented in the global World Overview of Conservation Approaches and Technologies database, providing internationally standardised, quality-assured, and globally discoverable technology cards linked to the Guidebook.
- WP6 Policy Briefs: targeted policy documents translating CBA and social justice findings into actionable recommendations for CAP eco-scheme design, Nature Restoration Law implementation, and UNCCD National Action Programme updates.
- LanDS dashboard integration (WP4): D3.4 Section 3 introduces the Land Degradation Decision-Support tool as a complementary digital layer for informed land management decisions at the pilot area scale.

### 3.7.2 Brief Description

REACT4MED's WP5 and WP6 together produce a fully budgeted, field-validated portfolio of eight Mediterranean agro-ecosystem restoration measures — the most comprehensive cross-site cost-benefit analysis of such measures published for the Mediterranean region to date. The portfolio spans a deliberately

diverse range of agro-ecological contexts: mountain viticulture (Cyprus), silvopastoral afforestation (Crete), organic irrigated horticulture (Italy), mulching in citrus slopes (Spain), no-till cereal farming (Morocco), food forest agroforestry (Israel), drainage for saline cotton (Turkey), and integrated soil health management for saline wheat (Egypt).

The core deliverable is D5.2, which provides standardised CBA results — NPV, BCR, lifecycle costs and benefits — for all 8 sites, comparable on a per-hectare basis, alongside a social justice analysis documenting who bears costs and who captures benefits across each intervention. This creates a unique multi-country investment evidence base for restoration practitioners, policy advisors, ESG investors, and international development agencies.

D5.2 is paired with D3.4 — the multilingual Guidebook for Practitioners — which translates these results into accessible, implementation-ready guidance for farmers, extension officers, and land managers in the pilot area languages. The pairing of rigorous CBA with practitioner-friendly narrative, across 8 countries and 5 languages, is the product's primary market differentiator.

The portfolio's exploitation potential is threefold: (1) as an open-access knowledge resource for global practitioners and researchers via WOCAT and Zenodo; (2) as a commercial evidence base for investment feasibility advisory, ESG reporting, and PES scheme design; and (3) as a policy instrument for CAP eco-scheme design and UNCCD / Nature Restoration Law implementation across the Mediterranean region.

**Portfolio of Measures - CBA Summary**

The eight restoration measures covered by this product entry are summarised below. Each is individually documented in D5.2 and D3.4; the table provides the key economic indicators and commercial angle for each.

| # | Pilot Area / Country | Restoration Measure | NPV (€/ha) | BCR | Initial Cost (€/ha) | Key Commercial Angle |
|---|---|---|---|---|---|---|
| 1 | Troodos, Cyprus (CY) | Mechanised mountain terraces + on-farm winery | €48,456 | 1.10 | €331,848 | Premium wine / agrotourism; heritage landscape NbS |
| 2 | Heraklion, Crete (GR) | Carob afforestation (silvopastoral system) | €20,547 | 1.29 | ~€24,314 | Carob value chain; carbon / biodiversity credits |
| 3 | Stornara-Tara, Italy (IT) | Organic table grape farming | €47,468 | 1.18 | €60,500 | Organic premium market; ESG supply chain |
| 4 | Cànyoles, Spain (ES) | Chipped pruned branch mulch (citrus slopes) | €7,290* | 1.18* | ~€5,000 | PES for soil / water; cooperative machinery |
| 5 | Merchouch, Morocco (MO) | No-till / conservation agriculture (soft wheat) | €6,868 | 2.12 | ~€740 | National scaling (Generation Green); development advisory |
| 6 | Bethlehem, Israel (IL) | Agroforestry food forest (ecotourism + education) | €157,270 | 1.54** | €114,222 | Community ecotourism; PES / LDN credits |
| 7 | Lower Gediz, Turkey (TR) | Subsurface drainage for saline cotton farmland | €24,536 | 2.26 | €3,333 | National drainage programme; |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | | | food security advisory |
| 8 | Tamia, Egypt (EG) | Drainage + organic/foliar fertilizer on saline wheat | €500 | 1.03 | €3,350 | PES / subsidy design; FAO/GEF development programming |

* Spain (ES): Restoration action NPV lower than reference (€15,205/ha) due to machinery investment. Environmental public goods (erosion, water quality, carbon) not yet priced into the market — strongest case for PES mechanism.

** Israel (IL): Theoretical per-hectare scaling from 0.6 ha site; primary value is in non-market ecosystem services (soil, biodiversity, microclimate, community education).

**Exploitation Methods**

Seven complementary exploitation pathways are identified for the portfolio as a whole. Individual measures may be more or less relevant to specific pathways - see Portfolio table above for the key commercial angle per measure.

| # | Exploitation Method | Rationale / Value Proposition | Target Segment | Revenue / Sustainability Model |
|---|---|---|---|---|
| 1 | Open-access dissemination (WOCAT + Zenodo) | All 8 measures documented in WOCAT global SLM database; D5.2 CBA portfolio and D3.4 multilingual Guidebook | Land users, farmers, NGOs, researchers, development agencies worldwide (via WOCAT 100+ country network) | Open access — no revenue. Sustained via WOCAT and Zenodo infrastructure. High long-term citation and policy impact value. |
| 2 | Fee-for-service investment feasibility advisory | The validated CBA methodology is directly replicable by restoration fund managers, NbS developers, and agri-finance advisors for new sites across the Mediterranean | Restoration fund managers, rural development agencies, NbS project developers, agri-food investors, national development banks | Project-based consulting fees; integration into EAFRD/CAP rural development grant applications; NbS investment memoranda. |
| 3 | Training and capacity-building service | D3.4 multilingual Guidebook (EN, AR, EL, IT, ES) + D5.2 CBA evidence base provide a ready-to-deploy training package covering 8 measure types. Unique Arabic-language reach for North African and Middle Eastern extension services. | National agricultural extension services, farming cooperatives, rural advisory bodies, EU Farm Advisory Services (CAP Art. 15), NGOs providing rural advisory in Mediterranean and MENA | Training fees, workshop facilitation contracts; LEADER, EIP-AGRI, LIFE, PRIMA grants; licensing of training materials to national advisory networks. |
| 4 | EU and national policy integration (CAP, NRL, UNCCD) | Across-site CBA evidence (NPV/BCR for 8 measure types) + social justice findings + WP6 Policy Briefs provide a | DG AGRI, national agricultural ministries (CY, GR, IT, ES, TR, EG, MO, IL), UNCCD national focal points, regional | No direct revenue; high policy leverage. Creates conditions for follow-on paid advisory for eco-scheme and subsidy programme design. |

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| | | comprehensive evidence base for CAP eco-scheme design, Nature Restoration Law implementation plans, and UNCCD National Action Programme updates. | development authorities | |
| 5 | ESG / corporate sustainability advisory (CSRD, TCFD, TNFD) | Documented soil health, biodiversity, water, and carbon co-benefits across 8 agro-ecosystem types provide verified data for agri-food company supply chain ESG reporting and NbS investment due diligence under CSRD, TCFD, and TNFD frameworks. | Agri-food companies, food retailers, ESG investors, supply chain sustainability auditors, voluntary carbon and biodiversity market developers | ESG advisory consulting fees; CSRD/TCFD reporting support; NbS certification and carbon credit brokering; supply chain sustainability audit contracts. |
| 6 | PES scheme design and brokering | Multiple measures (especially ES, EG, IL, GR) generate public goods (erosion prevention, water quality, carbon, biodiversity) that are not financially rewarded. REACT4MED CBA data quantifies the gap between private return and public value — the exact evidence needed to design PES mechanisms and close the financial viability gap for adopting farmers. | Water utilities, watershed management authorities, national environmental agencies, UNCCD LDN fund, GEF, voluntary biodiversity credit developers | PES scheme design consulting fees; government advisory contracts; GEF project development; biodiversity/LDN credit certification support. |
| 7 | International development programme advisory (FAO, IFAD, GEF, World Bank) | 8-site portfolio spanning 6 countries outside the EU (MO, IL, TR, EG — plus CY and GR as mixed contexts) provides a directly usable evidence base for Mediterranean and MENA food security, land degradation, and climate adaptation programming. | FAO Land and Water Division, IFAD Mediterranean programmes, World Bank MENA region, GEF LDN programme, bilateral development agencies (AFD, GIZ, USAID) | Development programme consultancy fees; project design advisory; integration into GEF-LDN and IFAD project documents; expert secondment to FAO/IFAD missions. |

**Target Users / Target Groups (with Actions)**

| Target Group | Needs / Interests | Actions Performed | Actions Planned |
|---|---|---|---|
| Farmers and land users (8 pilot area countries) | Investment justification for restoration adoption; access to subsidies and finance; step-by-step implementation guidance in own language; peer farmer stories as role models. | ERLL stakeholder workshops in all 8 pilot areas; D3.4 Guidebook distributed in 5 languages; CBA findings (D5.2) presented at pilot events; WOCAT database entries completed. | Distribute D3.4 via national extension services and agricultural ministries; produce simplified per-measure investment summaries; develop audio/visual versions for low-literacy contexts. |
| Agricultural advisors and extension services | Replicable CBA methodology; ready-to-use training and advisory materials in multiple languages; implementation checklists; evidence base for advising on restoration transitions. | D5.2 documented and public; D3.4 Guidebook ready for use as advisory reference; WOCAT entries completed and linked. | Training workshops using D3.4 as reference; propose as standard reference for EU Farm Advisory Services (CAP Art. 15); develop Trainer Edition with facilitation guide. |
| Government officers and policy makers | Quantitative, cross-site evidence for agri-environment scheme design; social justice findings for equity-conscious policy; alignment with CAP, Nature Restoration Law, UNCCD. | WP6 Policy Briefs prepared; ERLL findings shared at national level; portfolio presented at project dissemination events. | Present at DG AGRI and national ministry consultations; propose eco-scheme designs drawing on REACT4MED BCR evidence; submit to UNCCD National Action Programme review processes. |
| ESG investors and agri-food companies | Verified, cross-site co-benefit data (soil, water, carbon, biodiversity) for CSRD/TCFD/TNFD reporting; NbS investment validation; supply chain sustainability documentation. | D5.2 published publicly; BCR and ecosystem co-benefit data available per measure type. | Develop commercial ESG advisory service offer; produce NbS investment brief drawing on portfolio data; engage AgriInvest and ESG-focused investment platforms. |
| International development agencies | Portfolio of 8 field-validated Mediterranean measures with CBA; multilingual practitioner resources; directly applicable to MENA food security and land degradation programming. | D5.2 and D3.4 publicly available; Arabic edition of D3.4 provides direct accessibility for MENA audiences; WOCAT entries accessible globally. | Engage FAO Land and Water Division, IFAD, World Bank MENA, GEF LDN programme; present at UNCCD COP and FAO Committee on Agriculture (COAG). |
| Research institutions | Open, citable CBA methodology for agro-ecosystem restoration; cross-site comparative data; interdisciplinary synthesis (agronomy, | D5.2 fully documented and publicly available; methodology replicable across | Deposit D5.2 dataset via Zenodo CC-BY; submit peer-reviewed synthesis article; engage PRIMA JPI and CGIAR dryland systems research networks. |

| | | | |
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| | economics, hydrology, social science). | Mediterranean dryland contexts. | |

**Actions Already Performed**

- Full CBA completed for all 8 pilot areas (D5.2, public); BCR ranging from 1.03 to 2.26; NPV from €500/ha to €157,270/ha.
- Social justice enquiries conducted with stakeholders at 6 of 8 pilot area ERLLs (not conducted in Morocco and Israel).
- All 8 restoration measures documented in WOCAT SLM global database with standardised technology cards.
- D3.4 Guidebook for Practitioners produced in English, Arabic, Greek, Italian, and Spanish; distributed at ERLL stakeholder events in all 8 pilot countries.
- WP6 Policy Briefs prepared translating D5.2 findings into CAP, Nature Restoration Law, and UNCCD policy recommendations.
- LanDS dashboard guidance integrated into D3.4 Section 3 (WP4 cross-reference).
- Stakeholder engagement meetings held in all 8 pilot countries; restoration measure champions identified for ongoing peer learning.

**Actions Planned**

- Publish D5.2 full dataset openly via Zenodo (CC-BY); register DOI for citation and long-term discoverability.
- Assign ISBN to each of the 5 language editions of D3.4; register with WorldCat, OAPEN, FAO AGRIS, and OpenAIRE for global library discoverability.
- Develop simplified per-measure investment summaries (one page each, in local language) for farmer and extension use — including subsidy mapping and grant application guidance for each pilot country context.
- Present CBA portfolio findings at UNCCD COP side events, EU Green Week, PRIMA Annual Conference, and FAO Committee on Agriculture (COAG).
- Engage DG AGRI and relevant national agricultural ministries on use of BCR evidence for CAP eco-scheme and agri-environment measure design.
- Develop commercial ESG / NbS advisory service offer drawing on the cross-site portfolio; engage AgriInvest, ESG-focused investment platforms, and agri-food supply chain sustainability teams.
- Explore WOCAT co-branding of D3.4 and a potential annual Mediterranean Restoration Practitioner Series: see WP3/D3.4 Guidebook separate exploitation entry.
- Submit peer-reviewed synthesis article on multi-site Mediterranean CBA methodology; make full dataset available to research community via Zenodo CC-BY.
- Explore bundling with LanDS dashboard (WP4) for integrated restoration investment decision-support product.

**Potential IP Issues**

- D5.2 and D3.4 are both public (PU) outputs. CBA methodology is consortium IP (HMU / CIHEAM Bari / OU lead). Any commercial advisory services built on the methodology require a consortium IP agreement prior to client engagement.
- Field cost, yield, and price data collected from individual farmers across 8 pilot areas under REACT4MED; any commercial reuse requires GDPR-compliant consent verification with the respective national partner.

- WOCAT database entries are publicly accessible under WOCAT's open-access framework. The value-added CBA layer (NPV/BCR benchmarks, lifecycle tables) is distinct from WOCAT entries and remains consortium IP.
- Multi-partner authorship across 11 institutions: a formal statement confirming all contributing authors and institutions consent to open-access CC-BY publication is recommended prior to Zenodo deposit of D5.2 dataset.
- No existing third-party IP conflicts identified. Revenue-sharing arrangement for any commercial advisory services should be agreed among consortium partners before client engagement.

**Technology Readiness Level (TRL)**

TRL 5-6 - Technology Validated / Demonstrated in Relevant Environment

All 8 restoration measures are fully implemented and economically validated at field scale with multi-year data. CBA methodology and results documented in public D5.2. Commercial advisory service packaging (ESG, investment feasibility, PES scheme design) requires additional product development to reach TRL 7–8 by project end. Policy-facing exploitation (CAP eco-scheme evidence, WP6 Policy Briefs) is at TRL 6–7 and ready for immediate deployment.

**Market Readiness & Key Dependencies**

- Policy / practitioner market: Ready for immediate engagement. CBA evidence base and D3.4 Guidebook provide shovel-ready materials for agri-environment scheme design consultation and extension training.
- Open-access / WOCAT market: Ready for immediate action — ISBN registration, Zenodo deposit, and WOCAT co-branding discussions can begin in M33–36.
- ESG / NbS private sector market: Requires commercial advisory service packaging and alignment with CSRD/TNFD standards — estimated readiness M36–42.
- International development market: D5.2 and D3.4 Arabic edition ready for immediate use in FAO, IFAD, and GEF programme design; formal engagement recommended M33–36.
- Key dependency (research): Zenodo deposit of D5.2 dataset with full documentation (metadata, methodology notes) needed before peer-reviewed publication submission.
- Key dependency (commercial): Consortium IP agreement and revenue-sharing framework needed before commercial ESG/advisory service launch.
- Key dependency (D3.4): Back matter completion (WP7) and national partner sign-off on translated editions required before ISBN registration.

# 4 Conclusion

This deliverable has mapped the exploitation potential of REACT4MED's main outputs and set out a practical plan for sustaining them after the project ends. Seven exploitation records and eight fully costed pilot area measures were assessed for their readiness, target audiences, IP status, and realistic next steps.

Several outputs are ready for immediate use. The multilingual Guidebook for Practitioners (D3.4), the participatory methodology guide (D3.1), and the indicators framework (D3.2) can already feed into EU adaptation planning and UNCCD reporting processes. The eight pilot area cost-benefit analyses provide concrete evidence that policy-makers and development agencies can draw on today for agri-environment scheme design and investment appraisal.

Other outputs need further work before they can reach their full potential. The LanDS toolbox (D4.3) is functional and open-source but requires the completion of the Dashboard (D4.4) and additional user testing before it can serve as a standalone decision-support service. The climate projections framework (D2.4) is scientifically validated but needs simplified communication products to reach non-specialist audiences. The monitoring system (D5.3) is methodologically complete and has been handed over to local decision-makers, but sustaining it beyond the project depends on whether national partners commit resources to repeat the sampling and tracking cycles.

The strategy identifies several revenue-generating pathways (e.g., fee-based advisory and training services, monitoring-as-a-service for carbon and biodiversity markets, and SaaS licensing of the LanDS platform) but it is realistic about the fact that most REACT4MED outputs are, and should remain, public goods. The commercial opportunities lie in value-added services (facilitation, site-specific analysis, tailored advisory) built on top of open-access data and methods, not in restricting access to the core knowledge itself. No IP conflicts have been identified, though consortium partners will need to formalise revenue-sharing arrangements before any commercial service is launched.

Three things will determine whether REACT4MED's results last beyond the project. First, the WOCAT partnership: formalising a co-branding agreement for the Guidebook and proposed annual practitioner series is the single highest-impact action the consortium can take to ensure global, long-term visibility of its restoration practices. Second, hosting commitments for the LanDS platform must be secured before the project closes, whether through SOFTW, HMU, or integration into an established EU data infrastructure. Third, the monitoring system and participatory approach will only survive if they are anchored in institutions (e.g., ministries, extension services, or NGO networks) that have the mandate and resources to continue using them.

The exploitation actions are sequenced accordingly. Before the project ends (M42), the priorities are open-access publication, ISBN registration, WOCAT data sheet completion, journal submissions, and final ERLL validation workshops. In the six months following (M32-48), the focus shifts to WOCAT co-branding, LanDS public release, monitoring starter kits, and initial commercial service packaging. Beyond M42, the consortium will pursue institutional embedding, commercial licensing, and integration of REACT4MED data into regional and global monitoring platforms.

In short, REACT4MED has produced a portfolio of tools, methods, and evidence that is already being used across eight Mediterranean countries and is ready to be scaled further. This strategy provides the roadmap for making that happen, not through aspirational plans, but through concrete, sequenced actions with identified responsibilities and realistic timelines. The consortium's commitment is to ensure that the knowledge generated by this project continues to serve Mediterranean land restoration well after the funding ends.