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REWET HORIZON EUROPE PROJECT

Restoration Readiness Levels for Natural Ecosystems

A multi-dimensional framework for assessing and advancing the readiness of ecosystem restoration initiatives, from pilot sites to systemic climate solutions.

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From mission-driven innovation to ecosystem restoration

The Innovation Readiness Levels (IRL) framework was developed by Bax to help manage mission-driven innovation: complex, multi-stakeholder processes aimed at solving major societal challenges. Inspired by NASA's Technology Readiness Levels and Mariana Mazzucato's mission-oriented innovation policy, the IRL provides a structured 9-level scale to assess and advance innovations across Policy, Economy, Society and Technology (PEST) domains.

Within the REWET Horizon Europe project, Bax adapted this approach to the specific context of natural ecosystem restoration. The Restoration Readiness Level (RRL) applies the same structured logic to the ecological, social, financial, technological, and governance dimensions that determine whether an ecosystem restoration site can move from a one-off pilot to a durable, replicable climate solution.

Why readiness matters for wetlands

More than 70% of Europe's wetlands have been lost since the Industrial Revolution. While the business case for ecological restoration is increasingly proven, offering returns of €4 to €38 per €1 invested, scaling these efforts remains a systemic challenge.

The main barriers include: social acceptance, financing pathways, and governance continuity.

The Innovation Readiness Levels scale

The IRL scale structures innovation progress into three phases of three levels, tracking progress from an observed challenge to a standardised, mainstream solution.

DESIGN	DEMONSTRATE	DELIVER
1 Challenge agreed upon by practitioners and experts	**4** Concept validated with non-technical stakeholders	**7** Repeated pilots with stakeholder buy-in
2 Solution concept described in detail	**5** Prototype feasibility tested in controlled conditions	**8** Solution scaled without public support
3 Proof of concept validated by experts	**6** Prototype demonstrated in controlled environment	**9** Solution standardised

Five dimensions of restoration readiness

The RRL replaces the generic PEST domains with five dimensions calibrated for ecosystem restoration. Each dimension is assessed independently, producing a multi-dimensional readiness profile for any site.

Ecological readiness: Biodiversity, hydrology, GHG balance
Technological readiness: Monitoring system, data continuity
Societal readiness: Acceptance, participation, local ownership
Political & Governance: Policy alignment, institutional stability
Business readiness: CapEx/OpEx logic, viable revenue streams

RRL assessment framework: levels and dimensions

Each cell describes the expected condition at that Readiness Level (RRL 1-9) for each of the five dimensions. Assessment is conducted through structured workshops combining scientific data with practitioner knowledge.

RRL	Ecological	Technological	Social	Policy & Governance	Business & Financial
DESIGN PHASE: FROM PROBLEM TO PLAN					
1	Site's ecological importance recognised but no baseline data exists.	Monitoring or restoration technologies only discussed; no data collection.	Local awareness almost absent; no outreach or stakeholder identification.	Wetlands recognised inbroad policy framework, but no link to this site.	Restoration finance discussed in general terms in the country/region; no site-specific budget or interest.
2	Preliminary site description and stressors identified (e.g. drainage eutrophication peat oxidation.)	Available geospatial data (Copernicus,national maps) identified but not analysed.	First identification of relevant stakeholders and contact or interest; community or landowner awareness emerging.	National or regional policy mentions wetlands, but no local instrument or permit pathway identified.	Rough cost estimating or initial funding idea discussed; early dialogue with donors.
3	Initial pilot restoration plans in place and ecological surveys completed (water level, increased native cover, GHGsnapshot.)	First pilot monitoring plan in place and pilot monitoring started (manual sampling drones, sensors, or EO mapping.)	Stakeholder mapping completed; first meeting or workshop held. Plan for stakeholder engagement in place.	Initial governance established for the site. The site is referenced in draft local or basin-level planning documents.	Seed funding obtained (e.g., research or small pilot grant); first ecosystem service value explored.
DEMONSTRATE PHASE: FROM PLAN TO LIVE DEMONSTRATION					
4	First restoration trial implemented; measurable early response in water or vegetation	Monitoring tools tested successfully; basic database created for site data.	Local residents or land users engaged;educational or volunteer actions run on site.	Permitting discussions ongoing; cooperation between agencies started.	Co-funding or small-scale PES/carbon methodology piloted; site-level cost tracking initiated.
5	Ecological indicators improving (stable water table, increased native cover, reduced nutrient load).	Integrated monitoring functioning: EO and field data combined for trend tracking.	Broad local acceptance; community benefits visible (jobs, recreation, education).	Local authorities recognise the site in planning or restoration programmes.	Multi-year funding secured; private or public cofinancing confirmed.
6	Restoration area expanded to full pilot extent; clear recovery trends for carbon biodiversity. and hydrology.	First active monitoring of the pilot site, and testing of technology. Monitoring platform in place.	Active participation from community groups or land users in restoration tasks or monitoring.	Restoration formally approved or supported by authorities; monitoring added in permits.	Long-term financing arrangement in place (public private or multi-annual grant).
DELIVER PHASE: FROM DEMONSTRATE TO EVERYDAY USE					
7	The restored site is ecologically functional and stable under natural variation (seasonal floods,drought).	Advanced monitoring technologies in continuous use; data shared with research partners.	The community acts as costeward; other regions visit for learning and replication.	Site included in official management or basin plan; clear governance framework operating.	Stable income or payment mechanism (PES, offsets, biodiversity credits) supports maintenance.
8	The site provides measurable ecosystem services (carbon storage, biodiversity refuge, water regulation).	Standardised methods, quality control, and data sharing established; contributes to open platforms (VerifAid,REWET database).	Stewardship embedded in education and tourism.	Restoration success reported to regional/national level; integrated into climate or biodiversity targets.	Financing diversified and recurring (blended funds, trust, publicprivate models).
9	The pilot operates as a reference site; long-term ecological resilience proven over time.	Continuous monitoring and innovation integrated into adaptive management; data used to guide other sites.	The site is a regional flagship for community & nature.	Governance model replicated elsewhere; contributes evidence to policy improvement.	Financial model self-sustaining; site generates or attracts continued investment through ecosystem value.

The RRL in practice across seven European sites

The RRL framework was piloted across seven European Open Labs within the REWET project, spanning boreal peatlands, Mediterranean floodplains, riverine systems and peri-urban nature areas.

Structured assessment workshops combined quantitative biophysical and sensor data with local practitioner insights at each of these locations to generate comprehensive, multi-dimensional readiness profiles. This collaborative approach allowed the project teams to look beyond static metrics and unpack the underlying narrative context, exploring exactly why a specific site might achieve a high level of ecological or technical success while remaining highly vulnerable to socio-economic or financial bottlenecks.

Archetypes defined

The multi-dimensional readiness profiles reveal a consistent pattern across the seven European Open labs: ecological and technical readiness tend to run ahead, while business, governance and social readiness lag, which keep pilots from scaling up.

However, these profiles alone do not dictate how a site should expand. By analyzing the scoring trends across the Open Labs alongside their specific market demands, we defined three distinct replication archetypes: recurring site profiles that future projects can identify with, each organised around the single dominant dimension most critical to its operational and commercial viability. They are a strategic reading of the cross-cutting evidence, not an automatic output of the scores.

This archetype driven approach proves that a singular scaling model cannot simply be copied-and-pasted to another context: an urban tourism wetland and a remote carbon-farming peatland scale through entirely different dimensions and operational realities.

The three archetypes that emerged are outlined below:

Archetype 1: Urban & recreational wetlands

Scale through societal integration. Visitor infrastructure, community ties, and local education frameworks become just as critical to the site's long-term sustainability as its baseline hydrology.

Archetype 2: Carbon-farming peatlands

Scale through technological credibility. Grid-connected monitoring and standardised GHG protocols are prerequisites for investor trust.

Archetype 3: Riverine floodplains

Scale through policy alignment. Value and systemic funding is realised through integration with basin authorities and disaster-risk reduction frameworks.

What the readiness lens changes

The ultimate value of the multi-dimensional RRL framework lies not merely in generating a static score, but in making invisible barriers visible and highly actionable. Three distinct shifts occur once a site is assessed through this dynamic lens:

1. Gaps become locatable, not just a verdict: Rather than asking whether a site is "ready," the lens shows exactly where it is ready and where it is not. Naming the dimension and the level turns a vague "not ready yet" into a specific, addressable gap.

2. Those gaps can be closed intentionally: Once bottlenecks are explicit, whether social acceptance, governance fragmentation, or lack of revenue logic, they can be strategically targeted and addressed.

3. Peer learning becomes structured: Sites strong in one dimension can support others. For example, the Dutch experience in revenue stacking, the Estonian standardised data protocols, and the Austrian flood-resilience governance models can be shared directly. Replication transitions into a structured peer-to-peer exchange rather than a process of trial-and-error.

References

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