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Rethinking Stakeholder Engagement in European Wetland Restoration: A Systematic Literature Review

Shivangi Shreya
Södertörn University
Lina Suleiman
KTH Royal Institute of Technology
Mona Petersson
Södertörn University
Kari Lehtilä
Södertörn University
Nandita Singh
nandita.singh@sh.se
Södertörn University

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Abstract

Stakeholder engagement is widely recognized as an important component of wetland restoration, yet empirical understanding of how it operates across restoration stages and influences restoration practice remains fragmented. This systematic literature review synthesizes evidence from 24 studies of organized wetland restoration initiatives across the European Union, examining stakeholder roles, engagement approaches, enabling and constraining conditions, and their reported contributions to restoration processes and outcomes. The synthesis highlights stakeholder engagement as a dynamic, context-dependent process extending from planning and implementation to adaptive management and long-term stewardship. Engagement is shaped by interacting institutional, relational and motivational conditions, including organizational coordination, advisory support, trust, knowledge exchange and stakeholder values. Beyond facilitating participation, stakeholder interactions also influence how restoration objectives are translated into practice. Landowner decisions, intermediary organizations and negotiations among competing interests can enable restoration to proceed, while negotiated compromises may also modify restoration designs or ecological ambitions. This highlights an important distinction between the social and institutional feasibility of restoration and the realization of its ecological objectives. While the reviewed studies provide evidence of stakeholder contributions to restoration planning, implementation and management, their implications for long-term ecological performance remain less clearly established. The review underscores the importance of approaching stakeholder engagement as a sustained and adaptive process, while recognizing its influence on restoration decisions and trade-offs. These findings offer insights for designing wetland restoration programmes that are socially feasible, institutionally supported and attentive to long-term ecological objectives.

1. Introduction

Wetlands are among the world's most valuable ecosystems, providing essential ecosystem services including biodiversity conservation, water purification, flood regulation, groundwater recharge, carbon sequestration and climate regulation (Ramsar Convention Secretariat 2021; IPBES 2019). Despite their ecological and societal importance, wetlands have undergone extensive degradation through drainage, agricultural intensification, urbanization and infrastructure development, resulting in substantial biodiversity loss and declining ecosystem functioning (Davidson 2014). In response, wetland restoration has become a major international policy priority, reflected in initiatives such as the UN Decade on Ecosystem Restoration (2021–2030) (UNEP and FAO 2020), the Kunming–Montreal Global Biodiversity Framework (Convention on Biological Diversity 2022), and, more recently, the European Union Nature Restoration Regulation, which establishes legally binding restoration targets across Member States (European Parliament and Council of the European Union 2024). Together, these initiatives signal a shift from protecting remaining wetlands towards restoring degraded ecosystems at scales capable of reversing biodiversity loss while strengthening ecosystem resilience and the provision of ecosystem services.

Over the past few decades, these policy ambitions have given rise to a wide variety of organized wetland restoration efforts, including individual restoration projects, catchment-scale programmes, long-term collaborative initiatives and landscape-scale restoration strategies (UNEP & FAO 2020; Verhoeven 2014; Gumiero et al. 2013). This evolution reflects a growing recognition that successful wetland restoration requires not only ecological recovery but also sustained management capable of maintaining ecosystem functions over time (Verhoeven 2014). Although restoration initiatives differ considerably in their ecological objectives, spatial scales and institutional settings, they share a common characteristic: restoration depends on the coordinated actions of diverse stakeholders whose decisions, knowledge, resources and responsibilities shape how restoration is planned, implemented, adapted and sustained. Consequently, wetlands are increasingly understood as social–ecological systems in which restoration involves not only ecological and technical interventions, but also ongoing interactions among diverse stakeholders within institutional and governance contexts (Berkes et al. 2003; Gann et al. 2019; Santaoja et al. 2025). This perspective is reflected in the *Society for Ecological Restoration's International Principles and Standards for the Practice of Ecological Restoration*, which identify stakeholder engagement as a guiding principle of ecological restoration (Gann et al. 2019).

The social dimensions of wetland restoration have therefore attracted growing scholarly attention. Increasing recognition that restoration depends on the actions and decisions of diverse stakeholders has stimulated research on stakeholder engagement across a wide range of restoration contexts. Recent reviews have substantially advanced this field by synthesizing evidence on stakeholder identification, engagement methods and participatory approaches (Gaspers et al. 2025), while also examining how stakeholder engagement is addressed in wetland restoration manuals and guidelines (Santaoja et al. 2025). Collectively, this body of work has established stakeholder engagement as a fundamental component of ecological restoration and highlighted the importance of integrating social, institutional and ecological dimensions of restoration. Nevertheless, an important conceptual question remains. Existing studies have predominantly examined stakeholder engagement through particular forms of interaction—for example, participation, consultation, workshops, collaborative governance, advisory processes or co-management—or have evaluated methods for identifying and involving stakeholders. Recent literature on stakeholder engagement methodologies have likewise highlighted the need to better understand how stakeholder engagement processes, contextual conditions and outcomes are linked over time, while recognizing the empirical challenges of studying these relationships (Eaton et al. 2023). Together, these perspectives have generated valuable insights into specific dimensions of restoration practice, but they leave a less integrated understanding of how stakeholder interactions shape restoration from planning through implementation and long-term stewardship.

This question becomes particularly relevant in a context where European countries begin implementing the EU Nature Restoration Regulation. Delivering restoration at the scales envisaged by the Regulation will require sustained interaction among numerous landowners, municipalities, public agencies, advisory organizations, researchers, environmental organizations and local communities operating across institutional and administrative boundaries. Under these conditions, restoration is not only an ecological challenge but also a governance challenge. Ecological knowledge remains indispensable, but its

translation into restoration practice depends equally on how actors coordinate actions, exchange knowledge, reconcile competing interests, negotiate responsibilities and adapt decisions as ecological, institutional and social conditions evolve.

Against this background, this systematic literature review synthesizes evidence on stakeholder engagement in European wetland restoration to develop a more integrated understanding of how stakeholder engagement shapes organized wetland restoration efforts in practice. Particular attention is given to Sweden, which represents the largest national group of studies included in the review. While Santaoja et al. (2025) examined how stakeholder engagement is addressed in European wetland restoration manuals and guidelines, the present review takes a complementary empirical perspective. By synthesizing case-based evidence from restoration initiatives, it examines how stakeholder engagement is organized and sustained in practice, the conditions shaping these processes, and their reported contributions to restoration implementation and management.

Specifically, the review addresses the following research questions:

1. Who are the key stakeholders involved in organized wetland restoration efforts, and what roles do they play?
2. How are stakeholders engaged throughout wetland restoration?
3. What conditions enable or constrain stakeholder engagement?
4. What contributions and trade-offs are associated with stakeholder engagement in wetland restoration processes and outcomes?

In this review, stakeholders are understood as individuals or organizations that affect, or are affected by, wetland restoration (Freeman 1984). Across the restoration literature, interactions with stakeholders are described using a range of overlapping concepts, including participation, consultation, dialogue, collaboration, and advisory support and other forms of interaction (Reed 2008; Reed et al. 2009; Gaspers et al. 2025). Rather than treating these as separate or competing concepts, we adopt *stakeholder engagement* as an overarching analytical lens through which to examine the diverse interactions reported across the reviewed studies. By synthesizing evidence on stakeholder roles, engagement approaches, enabling and constraining conditions, and reported contributions, this review seeks to move beyond describing individual engagement activities towards understanding stakeholder engagement as an evolving process through which wetland restoration is coordinated, implemented and sustained. Rather than asking only who participates or how stakeholders are engaged, this review asks what a synthesis of stakeholder roles, interactions, enabling conditions and contributions reveals about the nature of stakeholder engagement in organized wetland restoration efforts.

2. Materials and Methods

2.1 Review design

This review examines how stakeholder engagement has been addressed in organized wetland restoration initiatives across the European Union (EU). The objective was not only to identify who participates in restoration projects and how engagement is organized, but also to understand the conditions that shape stakeholder involvement and the contributions it makes to restoration processes and outcomes. Because the available evidence comes largely from qualitative case studies undertaken in different ecological and institutional settings, a systematic literature review was considered the most appropriate approach for identifying, comparing and synthesizing this evidence.

The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) reporting guidelines (Page et al. 2021). While PRISMA informed the search strategy, study selection and reporting process, the synthesis itself was qualitative and interpretive in nature. Rather than aggregating findings statistically, the review compared evidence across individual case studies to identify common patterns in stakeholder engagement and to examine how these varied between different restoration settings.

The review was limited to EU Member States because wetland restoration is increasingly shaped by a shared legislative and policy framework, including the Water Framework Directive, the Habitats Directive and, more recently, the Nature Restoration Regulation. Focusing on the EU therefore provided a broadly comparable policy context while still capturing substantial variation in ecological conditions, restoration practices and stakeholder arrangements. The four research questions addressed in the review have been listed in the Introduction.

2.2 Literature search and eligibility criteria

The literature search was designed to identify empirical studies examining stakeholder engagement in organized wetland restoration initiatives across the European Union (EU). Three multidisciplinary bibliographic databases— ProQuest, Web of Science and Scopus—were selected because together they provide broad coverage of environmental management, restoration ecology, natural resource management and the social sciences.

The search strategy was developed collaboratively by the authors to capture publications addressing both wetland restoration and stakeholder engagement. Searches were conducted in August 2024 by the first author independently using Basic Search in ProQuest, Title–Abstract–Keyword searches in Scopus, and Topic searches in Web of Science. An updated search conducted in April 2026 did not identify any additional studies meeting the eligibility criteria.

The principal Boolean search string combined terms describing stakeholder engagement with terms related to wetland restoration:

("stakeholder" OR "actor" OR "engag*" OR "participat*" OR "collaborat*") AND ("wetland restor*" OR "wetland conserv*" OR "wetland manag*" OR "peatland rewet*" OR "environment* restor*" OR "ecological restor*")

The search syntax was adapted where necessary to accommodate the requirements of each database. Complete search strategies, together with database-specific syntax and filters, are provided in the supplementary file, Appendix A1.

Studies were selected on the basis of inclusion and exclusion criteria that were defined using the SPIDER framework (Sample, Phenomenon of Interest, Design, Evaluation and Research type), which is well suited to qualitative evidence synthesis (Cooke et al. 2012). The review focused on organized wetland restoration initiatives undertaken within EU Member States (Sample), where stakeholder engagement formed a central element of the restoration process (Phenomenon of Interest). Eligible studies reported empirical evidence from qualitative or mixed-methods case studies (Design) and examined stakeholder roles, engagement processes, enabling or constraining conditions, or the contribution of stakeholder engagement to restoration processes or outcomes (Evaluation). Only primary research published in peer-reviewed journals in English between 2000 and 2026 was included. Studies were excluded if they focused solely on ecological restoration outcomes without examining stakeholder engagement, described restoration policy or planning without empirical evidence, were review articles or other non-primary publications, or concerned restoration initiatives outside the European Union.

Following the database search, Swedish case studies emerged as the largest national group within the retrieved literature. To complement the peer-reviewed evidence from this context, a targeted search of Swedish grey literature was subsequently undertaken using equivalent search terms in English and Swedish (Supplementary file, Appendix A2). This additional search was undertaken because many wetland restoration initiatives in Sweden are documented in reports prepared by public authorities and practitioner organizations rather than in peer-reviewed journals. Grey literature was included only when it met the same eligibility criteria as the peer-reviewed studies and provided empirical evidence relevant to one or more of the review questions.

2.3 Study selection

All references retrieved from the database searches were imported into Rayyan for removal of duplicate records before being screened (Ouzzani et al. 2016). Screening was carried out in Rayyan in three stages —titles, abstracts and full texts—using the eligibility criteria described in Section 2.2.

The database search identified 2,802 records. After duplicate removal, 1960 records were screened by title, of which 393 were retained for abstract screening. Following abstract screening, 92 publications were assessed in full, resulting in the inclusion of 21 peer-reviewed studies. The targeted search of Swedish grey literature identified three additional reports that met the eligibility criteria. In total, the review synthesized evidence from 24 studies, comprising 21 peer-reviewed publications and three grey literature reports. The study selection process is summarized in Fig. 1.

The literature search and initial screening were undertaken by the first author. Full-text eligibility, interpretation of the inclusion criteria and any uncertainties arising during the synthesis were subsequently discussed with all co-authors until consensus was reached.

2.4 Data extraction and assessment of methodological transparency

A structured analytical framework (Table 1) was developed to guide data extraction across the included studies. The framework was organized around the four review questions and recorded information on stakeholder groups and their roles, stakeholder engagement throughout the restoration process, conditions enabling or constraining stakeholder engagement, and the reported contributions of stakeholder engagement to restoration processes and outcomes. Figure 1: PRISMA 2020 Flow Diagram showing identification, screening, eligibility and inclusion

Table 1
Analytical framework used for data extraction and synthesis

Research question	Evidence extracted and analyzed from each study
RQ1. Who are the principal stakeholders involved in organised wetland restoration initiatives, and what roles do they play?	Stakeholder groups involved in restoration initiatives, together with their roles, responsibilities and contributions to planning, implementation, management, monitoring or decision-making, as reported or inferred from the study.
RQ2. How are stakeholders engaged throughout different stages of the wetland restoration process?	Evidence describing when and how stakeholders were engaged during the restoration process, including the stages of engagement, the approaches used and the nature and extent of stakeholder participation.
RQ3. What conditions enable or constrain stakeholder engagement in wetland restoration?	Evidence describing reported conditions that enable or constrain stakeholder engagement, together with the contextual factors associated with these conditions. These conditions and contextual factors were grouped into thematic categories developed inductively during the synthesis rather than defined a priori.
RQ4. What contributions does stakeholder engagement make to restoration processes and outcomes?	Evidence describing the reported contributions of stakeholder engagement to restoration processes and outcomes, including project planning, implementation, collaboration, conflict management, learning, restoration outcomes and long-term stewardship.

Descriptive information was also recorded for each study, including the country, wetland type, restoration context, research design, data collection methods and stakeholder composition. The extracted evidence is presented in Table S1 (peer-reviewed studies) and Table S2 (grey literature), while Table S3 summarizes the characteristics of the included studies together with the assessment of methodological transparency. These three tables are presented in the supplementary file.

Data extraction was undertaken jointly by the first and corresponding authors using the analytical framework presented in Table 1. The extracted information was reviewed throughout the process to ensure that evidence was interpreted consistently and recorded in a comparable way across studies. Differences in interpretation were discussed until agreement was reached.

The review included qualitative studies, mixed-methods research and practitioner reports, making the application of a single quality appraisal tool, particularly for a formal risk-of-bias assessment, inappropriate. Instead, the methodological transparency of each study was assessed using five reporting criteria: (i) clarity of the restoration context; (ii) identification of stakeholder groups; (iii) description of data collection methods; (iv) transparency of the analytical approach; and (v) consistency between the empirical evidence presented and the conclusions drawn. Each study was classified as having high, moderate or limited methodological transparency (Supplementary Table S3). This assessment informed interpretation of the findings but was not used to exclude studies.

2.5 Analysis and Synthesis

The extracted evidence was organized around the four research questions. Information from each study was grouped according to stakeholder roles, stakeholder engagement throughout the restoration process, conditions enabling or constraining stakeholder engagement, and the reported contributions of stakeholder engagement to restoration processes and outcomes. Many studies addressed more than one research question and therefore contributed to several parts of the synthesis.

The analysis combined deductive and inductive approaches. The four review questions provided the initial structure for organizing the extracted evidence, while comparisons across studies allowed additional themes and relationships to emerge. These emerging patterns were incorporated into the synthesis where they contributed to a more comprehensive understanding of stakeholder engagement. The emerging interpretation of the evidence was discussed throughout the review. Alternative interpretations were considered until agreement was reached on the final organization of the findings and their interpretation process by all authors.

The aim of the synthesis was to develop an integrated understanding of stakeholder engagement rather than to quantify the frequency of individual findings. Particular attention was given to findings reported consistently across multiple studies, while also considering how differences in ecological, institutional and restoration contexts influenced stakeholder engagement.

Swedish restoration initiatives represented the largest national group of peer-reviewed studies included in the review. The synthesis therefore considered whether patterns identified in the Swedish cases were also evident in studies from other European countries. This comparison supported interpretation of the findings but was not intended as a formal subgroup analysis.

Synthesis was not appropriate. Confidence in the findings was strengthened through systematic comparison of evidence across independently conducted studies, integration of peer-reviewed and grey literature, and consideration of the methodological transparency of the included studies during interpretation.

3. Results

3.1 Stakeholders and their Role in wetland restoration

The reviewed studies identified a wide range of stakeholders involved in wetland restoration across Europe, although the level of detail used to describe stakeholder groups and their roles varied considerably among studies (supplementary file, Appendix B). Stakeholders operated at multiple governance levels, ranging from local landowners and community organizations to regional authorities, national agencies and, in some cases, European institutions. The richest descriptions of stakeholder roles came from Swedish studies, particularly those examining restoration in agricultural landscapes, but broadly similar stakeholder groups were identified across restoration contexts in the wider European literature. Rather than attributing restoration to a single actor, the reviewed studies consistently portrayed it as a collaborative endeavor requiring the complementary contributions of multiple stakeholder groups. Table 2 summarizes the stakeholder groups identified in the reviewed literature together with their reported roles in wetland restoration.

Table 2
Identified Stakeholders and their roles

Stakeholder Group	Roles Across the Papers	Source
Landowners **(often farmers)**	• Primary land stewards and decision-makers in restoration areas. • Voluntary participants in wetland restoration on privately owned land. • Influence whether restoration proceeds and affect wetland location, design and implementation through land ownership. • Contribute local knowledge during restoration planning and site selection. • Participate in negotiations over restoration design and implementation. • May oppose or be reluctant to participate because of perceived economic impacts, land-use restrictions or concerns about restoration outcomes.	Aggestam (2014); Aklilu and Elofsson (2022); Franzén et al. (2015); Geranmayeh et al. (2024); Hahn et al. (2006); Hansson et al. (2012); Hansson and Kokko (2018); Lindahl and Söderqvist (2004); Schultz et al. (2007); Andersson (2012).
Consultants and Advisors	• Support restoration planning, site assessment, design and implementation. • Facilitate communication and negotiations between landowners and public authorities. • Provide ecological, technical and socio-ecological expertise. • Evaluate restoration sites and recommend alternative designs where appropriate. • Advise landowners on funding opportunities and restoration options. • Coordinate restoration activities with contractors and public authorities. • Build long-term relationships with landowners through advisory support.	Aggestam (2014); Andersson (2012); Franzén et al. (2015); Geranmayeh et al. (2024); Lindahl and Söderqvist (2004)

Stakeholder Group	Roles Across the Papers	Source
Local Authorities (e.g. Municipalities)	• Co-finance and coordinate catchment-based restoration programmes. • Facilitate restoration planning and coordination among stakeholders. • Identify funding opportunities and negotiate compromises among participating stakeholders. • Provide leadership through programme boards, executive committees and inter-municipal collaboration where applicable.	Aggestam (2014); Andersson (2012); Franzén et al. (2015); Hahn et al. (2006); Lindahl and Söderqvist (2004)
County and Regional Agencies	• Review restoration applications, administer financial support, oversee regional implementation and monitor restoration activities. • Provide technical guidance and planning support. • Coordinate restoration implementation with municipalities, landowners and other stakeholders. • Participate in programme boards, working groups and other collaborative governance arrangements where applicable.	Aggestam (2014); Alström et al. (2000); Andersson (2012); Franzén et al. (2015); Hahn et al. (2006); Lindahl and Söderqvist (2004)
Water Management Agencies	• Coordinate river-basin and catchment water management. • Support planning and implementation of wetland restoration and other water management measures. • Facilitate coordination among municipalities, landowners and other stakeholders through Water Authorities, Water Councils and related governance platforms. • Balance water quality, flood management, agricultural production and ecological objectives within catchment management.	Franzén et al. (2015); Hammer et al. (2011); Root-Bernstein and Frascaroli (2016); Ricart and Rico-Amorós (2022)

Stakeholder Group	Roles Across the Papers	Source
European and National Policy Authorities	• Develop policy frameworks and establish regulations supporting wetland restoration. • Provide financial support through European and national funding programmes. • Establish national priorities, technical guidance and eligibility criteria for restoration. • Support implementation through strategic planning and coordination with regional authorities.	Aggestam (2014); Andersson (2012); Franzén et al. (2015); Geranmayeh et al. (2024); Hammer et al. (2011); Ricart and Rico-Amorós (2022)
Local NGOs and Interest Groups	• Advocate for biodiversity conservation and ecological restoration. • Provide local ecological knowledge and support restoration planning and implementation. • Participate in advisory committees, reference groups and collaborative governance forums. • Contribute to monitoring, awareness-raising and knowledge exchange. • Represent ecological, recreational, cultural and livelihood interests, and raise concerns about potential impacts of restoration.	Aggestam (2014); Alström et al. (2000); Franzén et al. (2015); Hahn et al. (2006); Ricart and Rico-Amorós (2022); Root-Bernstein and Frascaroli (2016); Schultz et al. (2007)
Scientists and Researchers	• Contribute scientific and ecological knowledge, assessments and monitoring. • Evaluate restoration outcomes and inform adaptive management. • Support restoration planning and decision-making. • Facilitate stakeholder dialogue, collaborative learning and knowledge exchange.	Aggestam (2014); Grygoruk and Rannow (2017); Hahn et al. (2006); Lindahl and Söderqvist (2004); Manolache et al. (2018); Ricart and Rico-Amorós (2022); Root-Bernstein and Frascaroli (2016)

Stakeholder Group	Roles Across the Papers	Source
	• Contribute to integrating scientific and local knowledge.	
General Public and Local Communities	• Beneficiaries of ecosystem services provided by restored wetlands (e.g., recreation, flood mitigation, improved water quality and cultural values). • Represent local interests, values and concerns related to wetland restoration. • Influence the social acceptance and legitimacy of restoration initiatives. • May participate in consultation and engagement processes where opportunities for public involvement are provided.	Geranmayeh et al. (2024); Grygoruk and Rannow (2017); Hahn et al. (2006); Nita et al. (2018); Ricart and Rico-Amorós (2022); Root-Bernstein and Frascaroli (2016)
Children and Schools	• Participate in environmental education and awareness-raising activities related to wetland restoration. • Contribute to building long-term awareness and stewardship of wetland ecosystems.	Grygoruk and Rannow (2017)

Landowners—often farmers—were consistently identified as central stakeholders because wetland restoration frequently took place on privately owned agricultural land (Aggestam 2014; Aklilu and Elofsson 2022; Franzén et al. 2015; Geranmayeh et al. 2024; Hahn et al. 2006; Hansson et al. 2012; Hansson and Kokko 2018; Lindahl and Söderqvist 2004; Schultz et al. 2007; Andersson 2012). Across many restoration programmes, particularly in Sweden, participation was voluntary, giving landowners considerable influence over whether restoration proceeded and, where it did, how wetlands were located, designed and implemented (Aggestam 2014; Andersson 2012; Franzén et al. 2015; Geranmayeh et al. 2024; Hansson et al. 2012; Lindahl and Söderqvist 2004). In addition to providing access to land, landowners contributed local knowledge during site selection and restoration planning, while negotiations over restoration design often reflected attempts to balance ecological objectives with agricultural production and landowner concerns.

Supporting landowners throughout the restoration process were advisors and environmental consultants, who acted as intermediaries between landowners and public authorities (Aggestam 2014; Andersson 2012; Franzén et al. 2015; Geranmayeh et al. 2024; Lindahl and Söderqvist 2004). Their roles extended beyond technical advice to include identifying suitable restoration sites, preparing preliminary designs, explaining funding opportunities, facilitating permit applications, coordinating communication among stakeholders and overseeing implementation. In Sweden, the Greppa Näringen advisory

programme illustrates how trusted advisory relationships can encourage voluntary wetland restoration by combining technical guidance with long-term dialogue and practical support (Geranmayeh et al. 2024). Similarly, consultant organizations such as Ekologgruppen played a central role in catchment-based restoration by coordinating negotiations with landowners, preparing restoration plans, managing procurement and supporting implementation (Lindahl and Söderqvist 2004; Andersson 2012).

Public authorities were involved throughout restoration planning and implementation, although their responsibilities differed across administrative levels (Aggestam 2014; Andersson 2012; Franzén et al. 2015; Hammer et al. 2011; Ricart and Rico-Amorós 2022). At the European and national levels, institutions established policy frameworks, funding mechanisms and regulatory requirements supporting wetland restoration. Regional agencies administered financial support, processed restoration applications, provided technical guidance and monitored implementation, while municipalities frequently coordinated restoration activities, secured funding and facilitated collaboration among stakeholders. The Swedish studies illustrate particularly well how different actors can play distinct but complementary roles in restoration. For example, municipalities participating in the Kävlinge River Programme helped identify funding opportunities and negotiate agreements among participating stakeholders, while County Administrative Boards coordinated implementation, administered financial support and provided technical guidance (Lindahl and Söderqvist 2004; Aggestam 2014; Andersson 2012). Specialised institutions, including the Land and Environment Court, were also involved where restoration required formal water permits (Andersson 2012).

The reviewed studies also identified important contributions from civil society organizations, researchers and local communities. Environmental organizations and interest groups represented ecological, recreational, cultural and livelihood interests, participated in advisory committees and reference groups, contributed local ecological knowledge and, in some cases, supported restoration activities and ecological monitoring (Aggestam 2014; Alström et al. 2000; Franzén et al. 2015; Hahn et al. 2006; Ricart and Rico-Amorós 2022; Root-Bernstein and Frascaroli 2016; Schultz et al. 2007). Researchers contributed scientific expertise through ecological assessments, monitoring and evaluation while also facilitating knowledge exchange and collaborative learning between scientific and local knowledge systems (Aggestam 2014; Grygoruk and Rannow 2017; Hahn et al. 2006; Lindahl and Söderqvist 2004; Manolache et al. 2018; Ricart and Rico-Amorós 2022; Root-Bernstein and Frascaroli 2016). Local communities influenced the legitimacy and social acceptance of restoration initiatives, while children and schools were identified only in the adaptive wetland management case reported by Grygoruk and Rannow (2017).

Although only Schultz et al. (2007) explicitly described local actors such as private forest owners, hunting associations, fishing associations, village associations and other nature conservation groups as *stewards*, several studies reported that stakeholder involvement frequently extended beyond planning and consultation into restoration work, ecological monitoring, knowledge sharing and long-term management (Hahn et al. 2006; Root-Bernstein and Frascaroli 2016; Blicharska and Rönnbäck 2018; Geranmayeh et al. 2024; Andersson 2012). Taken together, the reviewed literature suggests that wetland

restoration relied not only on the participation of diverse stakeholder groups but also on the complementary roles they assumed throughout planning, implementation and, in many cases, the continuing stewardship of restored wetlands.

3.2 Organization and Methods of Stakeholder Engagement

Although stakeholder engagement was recognized as an important component of wetland restoration across most of the reviewed studies, relatively few examined engagement processes in a systematic way. More commonly, stakeholder engagement was described in relation to specific stages of restoration, such as planning, implementation or management, rather than as the primary focus of investigation (Aggestam 2014; Franzén et al. 2015; Hammer et al. 2011; Blicharska and Rönnbäck 2018; Geranmayeh et al. 2024; Andersson 2012). Across the reviewed literature, stakeholder engagement was organized in different ways depending on restoration objectives, ecological conditions, institutional settings and the stakeholders involved. No single engagement model emerged as being applicable across all restoration contexts (Gumiero et al. 2013; Grygoruk and Rannow 2017; Andersson 2012).

The studies nevertheless describe several recurring ways of organizing stakeholder engagement. In the Kävlinge River catchment in Sweden, Lindahl and Söderqvist (2004) reported a municipality-led process in which voluntary agreements with landowners were facilitated by an independent intermediary organization that coordinated communication, negotiations and implementation. Hahn et al. (2006) described a collaborative arrangement in the Kristianstads Vattenrike centered on a bridging organization that connected actors across institutional levels while promoting trust, knowledge exchange and adaptive learning. Drawing on restoration experiences across a diversity of European river and floodplain restoration projects, Gumiero et al. (2013) found that stakeholder engagement was adapted to local circumstances through different combinations of participatory planning, public–private partnerships, farmer collaboration and bottom-up initiatives. Grygoruk and Rannow (2017), meanwhile, illustrated how structured dialogue between scientists, practitioners and local stakeholders supported adaptive wetland management under conditions of environmental change. Rather than representing competing models, these studies demonstrate that stakeholder engagement was tailored to the ecological, institutional and social contexts in which restoration was undertaken. Table 3 summarizes the principal stakeholder engagement approaches identified in studies that described engagement processes in sufficient detail for comparison.

Table 3
Stakeholder engagement approaches and methods reported in the principal empirical studies

Aspect	Lindahl and Söderqvist (2004)	Hahn et al. (2006)	Gumiero et al. (2013)	Grygoruk and Rannow (2017)
Organisation of stakeholder engagement	Municipality-led restoration supported by intermediary-facilitated negotiation with landowners	Collaborative adaptive management coordinated through a bridging organisation	Context-specific combinations of participatory approaches adapted to ecological and institutional settings	Science–management partnership using structured stakeholder dialogue
Lead coordinating actor(s)	Municipality and independent intermediary organisation	Bridging organisation (Ecomuseum Kristianstads Vattenrike)	Varied among restoration projects	National Park administration together with scientific partners
Role of key stakeholders	Landowners: negotiated participation and restoration design; Municipality: programme coordination and funding; Consultants/intermediary: facilitation, communication and implementation	Local resource users, NGOs, public authorities and researchers: collaborative planning, knowledge generation and adaptive ecosystem management; Bridging organisation: coordination and facilitation	Farmers, landowners, public authorities, NGOs, private actors and local communities: participated through consultation, partnerships or collaborative planning depending on local context	Scientists, park managers, public authorities, landowners and local communities: contributed scientific knowledge, local experience and stakeholder perspectives to adaptive planning
Principal Engagement Methods	Negotiation, direct communication, site visits, voluntary agreements, intermediary facilitation	Collaborative learning, dialogue, networks, working groups, adaptive management	Participatory planning, consultation, partnerships, stakeholder collaboration	Structured dialogue, workshops, knowledge exchange, participatory communication
Primary Purpose of Engagement	Build consensus and voluntary participation for restoration implementation	Strengthen collaboration, trust and adaptive ecosystem management	Tailor restoration to local ecological, institutional and social contexts	Integrate scientific and local knowledge to support adaptive wetland management

Aspect	Lindahl and Söderqvist (2004)	Hahn et al. (2006)	Gumiero et al. (2013)	Grygoruk and Rannow (2017)
Distinctive feature	Negotiated implementation supported by an independent intermediary	Bridging organization linking stakeholders across institutional levels	Flexible engagement adapted to restoration context rather than a single model	Science–practice partnership supporting adaptive decision-making

Despite this diversity in organizational arrangements, the practical activities through which stakeholders were engaged were remarkably consistent across studies. Consultation, dialogue, negotiation, advisory support, collaborative planning, reference groups, partnership working, regular communication and knowledge exchange were repeatedly reported as mechanisms for involving stakeholders in restoration planning and implementation (Aggestam 2014; Franzén et al. 2015; Hammer et al. 2011; Geranmayeh et al. 2024; Lindahl and Söderqvist 2004; Andersson 2012; Alström et al. 2000). Advisors, consultants and intermediary organizations frequently played central roles in facilitating these interactions, particularly where restoration depended on voluntary participation by private landowners. In several Swedish studies, these actors acted not only as technical experts but also as trusted facilitators who helped translate policy objectives into locally acceptable restoration measures (Lindahl and Söderqvist 2004; Geranmayeh et al. 2024; Andersson 2012; Alström et al. 2000).

The extent to which stakeholders influenced restoration decisions also varied across engagement processes. Some studies described engagement primarily in terms of consultation and information sharing, whereas others reported more collaborative arrangements in which stakeholders contributed to planning, negotiated restoration designs, participated in implementation or engaged in ongoing learning and management (Hahn et al 2006; Grygoruk and Rannow 2017; Lindahl and Söderqvist 2004; Blicharska and Rönnbäck 2018; Geranmayeh et al. 2024; Andersson 2012). These differences reflected the objectives and context of individual restoration programmes rather than a progression from one engagement approach to another.

3.3 Conditions Enabling or Constraining Stakeholder Engagement

The reviewed studies identified a range of conditions that influenced stakeholder engagement throughout wetland restoration. Although individual studies emphasized different aspects of the restoration process, recurring patterns emerged across the evidence base. These conditions are presented under three broad categories: institutional conditions, relational conditions, and stakeholder motivations.

3.3.1 Institutional conditions

The reviewed studies identified several institutional conditions that shaped stakeholder engagement during wetland restoration. The most frequently reported were organizational coordination, advisory systems, funding arrangements, and permitting and regulatory procedures. Although their relative importance varied among restoration contexts, these conditions formed the institutional setting within which stakeholder engagement took place (Aggestam 2014; Franzén et al. 2015; Goosen and Vellinga 2004; Hammer et al. 2011; Andersson 2012; Alström et al. 2000).

Organizational coordination featured prominently in studies describing restoration involving multiple organizations and administrative levels. Municipalities, County Administrative Boards, environmental agencies, advisory organizations, consultants and non-governmental organizations frequently assumed complementary responsibilities during restoration planning and implementation (Lindahl and Söderqvist 2004; Aggestam 2014; Franzén et al. 2015; Goosen and Vellinga 2004; Hammer et al. 2011; Andersson 2012). The Swedish studies illustrated different institutional arrangements for wetland restoration. In municipality-led restoration programmes, municipalities commonly coordinated restoration activities, secured funding and facilitated communication among participating stakeholders (Lindahl and Söderqvist 2004; Aggestam 2014). In contrast, studies of Rural Development Programme-funded restoration highlighted the role of County Administrative Boards in administering agri-environmental schemes, processing restoration applications and providing technical guidance to landowners (Andersson 2012). Studies comparing different institutional settings also reported that fragmented organizational structures, overlapping mandates and weak coordination among implementing organizations complicated stakeholder engagement and delayed restoration planning and implementation (Hammer et al. 2011; Andersson 2012; Root-Bernstein and Frascaroli 2016).

Advisory systems and intermediary organizations were another recurring feature of the reviewed literature, particularly where restoration depended on voluntary participation by private landowners. Advisors and consultants supported stakeholders by identifying suitable restoration sites, providing technical and ecological advice, explaining funding opportunities, facilitating communication between landowners and authorities, assisting with permit applications and coordinating practical aspects of restoration. The Swedish studies described several forms of advisory support. In municipality-led restoration programmes, advisors and consultants primarily facilitated planning, technical design and communication among participating stakeholders (Lindahl and Söderqvist 2004; Alström et al. 2000). By contrast, studies of the Greppa Näringen advisory programme and Rural Development Programme-funded restoration emphasized long-term advisory support to landowners, including guidance on restoration planning, funding opportunities and practical implementation (Andersson 2012; Geranmayeh et al. 2024).

Funding arrangements influenced how restoration programmes were implemented, particularly where changes in agricultural land use required financial support. The reviewed studies showed that programme design, eligibility criteria, levels of compensation, continuity of funding and administrative requirements shaped the accessibility and operation of restoration initiatives (Alström et al. 2000; Andersson 2012; Franzén et al. 2015; Geranmayeh et al. 2024). Short-term or uncertain funding, complex

application procedures and administrative burdens were reported as limiting programme implementation and, in some cases, delaying restoration efforts (Andersson 2012; Hammer et al. 2011; Root-Bernstein and Frascaroli 2016).

3.3.2. Relational conditions

The reviewed studies consistently identified relational conditions as shaping stakeholder engagement throughout wetland restoration. Among the most frequently reported were trust, communication, dialogue, knowledge exchange and long-term relationships. Although described using different terminology, these conditions were reported across a range of restoration settings and stages, from early planning and negotiation to implementation, monitoring and long-term management (Hahn et al. 2006; Lindahl and Söderqvist 2004; Schultz et al. 2007; Geranmayeh et al. 2024; Andersson 2012).

Communication and dialogue formed a central part of many stakeholder engagement processes. Meetings, consultations, negotiations, advisory visits and collaborative planning created opportunities for stakeholders to discuss restoration objectives, address concerns and negotiate practical solutions (Lindahl and Söderqvist 2004; Geranmayeh et al. 2024; Andersson 2012). Several Swedish studies further described how advisors, consultants and intermediary organisations facilitated communication between landowners and public authorities throughout restoration planning and implementation. In the restoration of wetlands along Kävlinge and Höje Rivers, for example, the intermediary negotiator not only facilitated dialogue but also mediated between ecological objectives and landowner priorities, helping negotiate restoration designs that secured stakeholder participation while accommodating competing interests (Aggestam 2014). Likewise, long-term advisory programmes emphasised continued interaction with stakeholders rather than one-off consultations (Geranmayeh et al. 2024; Andersson 2012).

Trust was another recurring feature of the reviewed studies. Rather than being treated as a prerequisite for stakeholder engagement, trust was commonly described as developing through repeated interaction, transparent communication and continued collaboration among stakeholders (Hahn et al. 2006; Schultz et al. 2007; Geranmayeh et al. 2024). Several studies reported that sustained engagement depended on maintaining dialogue throughout implementation and adaptive management, particularly where restoration relied on voluntary participation by landowners and local communities (Schultz et al. 2007; Hahn et al. 2006).

Knowledge exchange frequently accompanied these interactions. The reviewed studies described stakeholder engagement as creating opportunities to combine scientific expertise, professional experience and local ecological knowledge through collaborative planning, adaptive management and ongoing dialogue (Hahn et al. 2006; Grygoruk and Rannow 2017; Root-Bernstein and Frascaroli 2016). Advisors, researchers and practitioners often acted as intermediaries by translating technical information while incorporating local knowledge into restoration planning (Lindahl and Söderqvist 2004; Geranmayeh et al. 2024; Andersson 2012). Several studies also highlighted the importance of recognising stakeholder perspectives and maintaining open dialogue to support the legitimacy and

continuity of restoration initiatives involving diverse stakeholder groups (Ricart and Rico-Amorós 2022; Root-Bernstein and Frascaroli 2016).

Several studies also reported that stakeholder engagement extended beyond the initial planning phase. Continued interaction among landowners, public authorities, advisors, researchers and local organisations was described during restoration implementation, monitoring and long-term stewardship (Schultz et al. 2007; Hahn et al. 2006; Blicharska and Rönnbäck 2018; Geranmayeh et al. 2024). Rather than being confined to consultation or project planning, stakeholder relationships were maintained throughout restoration, supporting ongoing communication, adaptive management and continued participation in restoration activities.

3.3.3 Stakeholder Motivation

The reviewed studies showed that stakeholder participation in wetland restoration was influenced by a range of motivations that extended beyond financial considerations. Environmental values, stewardship commitments, perceived benefits and risks, and social influences were all reported as shaping decisions to participate, although their relative importance varied across restoration contexts.

Environmental values and stewardship were frequently described as motivating participation in restoration activities. Several studies reported that landowners and local stakeholders valued wetland restoration for its anticipated contributions to biodiversity conservation, improved water quality, landscape enhancement and broader environmental benefits (Aggestam 2014; Hahn et al. 2006; Schultz et al. 2007; Blicharska and Rönnbäck 2018). In voluntary restoration programmes, stakeholder values not only influenced willingness to participate but also shaped negotiated restoration outcomes. Where ecological objectives intersected with agricultural production and other land-use priorities, restoration designs were often modified through negotiation to accommodate stakeholder preferences, illustrating how differing value orientations influenced both participation and ecological outcomes (Aggestam 2014).

Financial incentives nevertheless remained an important consideration in many restoration programmes. Compensation schemes, agri-environmental payments and other forms of financial support were frequently reported as encouraging participation, particularly where restoration involved opportunity costs or changes in agricultural land management (Hansson et al. 2012; Aklilu and Elofsson 2022; Elofsson et al. 2021; Andersson 2012). At the same time, the reviewed studies showed that participation decisions were also influenced by perceived economic risks, administrative requirements and expectations regarding restoration outcomes, indicating that financial considerations formed one part of a broader decision-making process (Hansson et al. 2012; Aggestam 2014; Andersson 2012).

Social influences also contributed to stakeholder participation. Both peer-reviewed and grey literature described how trusted advisors, demonstration sites, peer learning and exchanges among neighboring landowners encouraged wider participation in restoration initiatives (Geranmayeh et al. 2024; Andersson 2012; Alström et al. 2000). These studies reported that opportunities to observe restoration outcomes,

exchange experiences and learn from other landowners helped build confidence in restoration practices and encouraged continued participation, particularly in voluntary restoration programmes.

3.4 Contributions of stakeholder engagement to restoration processes and outcomes

Across the reviewed literature, stakeholder engagement was described as influencing multiple stages of wetland restoration, extending from planning and implementation to monitoring and long-term management. The reported contributions ranged from improving restoration design and supporting implementation to facilitating adaptive management, long-term stewardship and the negotiation of competing restoration objectives (Lindahl and Söderqvist 2004; Hahn et al. 2006; Schultz et al. 2007; Geranmayeh et al. 2024; Andersson 2012).

Restoration planning emerged as the stage where stakeholder engagement was most consistently described. Local ecological knowledge, practical experience and scientific expertise were brought together to identify suitable restoration sites, refine restoration measures and negotiate restoration objectives that reflected local ecological and social conditions (Lindahl and Söderqvist 2004; Hahn et al. 2006; Grygoruk and Rannow 2017; Root-Bernstein and Frascaroli 2016). In several Swedish restoration programmes, advisory organizations and intermediary actors further supported planning by helping landowners interpret technical information, assess restoration opportunities and develop site-specific restoration plans (Geranmayeh et al. 2024; Andersson 2012).

Stakeholder engagement commonly continued during implementation rather than ending once restoration plans had been agreed. Ongoing dialogue between landowners, advisors, public authorities and other stakeholders helped address practical challenges, coordinate restoration activities and adapt restoration measures to local circumstances as projects progressed (Geranmayeh et al. 2024; Andersson 2012; Alström et al. 2000). Several studies also described implementation as an iterative process in which stakeholder feedback, practical experience and changing site conditions informed subsequent restoration decisions (Hahn et al. 2006; Schultz et al. 2007; Geranmayeh et al. 2024).

Many studies further described stakeholder involvement beyond implementation. Landowners, local communities, researchers and public authorities remained engaged through ecological monitoring, maintenance activities and adaptive management of restored wetlands (Schultz et al. 2007; Hahn et al. 2006; Blicharska and Rönnbäck 2018). In these studies, stewardship was presented as an ongoing responsibility that maintained stakeholder involvement after restoration works had been completed and supported the continued management of restored wetland ecosystems.

The reviewed studies also showed that stakeholder engagement provided opportunities to negotiate competing restoration objectives. Discussions among landowners, public authorities, advisors and other stakeholders frequently shaped decisions about restoration design, land use and management priorities, particularly where ecological objectives intersected with agricultural production, recreation or other local interests (Aggestam 2014; Lindahl and Söderqvist 2004; Hammer et al. 2011). In several cases,

negotiated compromises enabled restoration to proceed while also modifying restoration design or ecological ambitions to accommodate stakeholder concerns (Aggestam, 2014). Other studies similarly described stakeholder engagement as providing a forum for balancing diverse perspectives and identifying context-specific solutions where restoration involved multiple stakeholder interests (Ricart and Rico-Amorós 2022; Root-Bernstein and Frascaroli 2016).

4. Discussion

4.1 From stakeholder roles to evolving stakeholder engagement dynamics

Existing reviews have substantially advanced understanding of stakeholder engagement by identifying the actors involved in wetland restoration and describing their respective roles. The present synthesis further shows that understanding how restoration is coordinated, implemented and sustained through interactions among diverse actors requires attention to the motivational, relational and institutional conditions that shape stakeholder engagement.

The reviewed evidence demonstrates that wetland restoration depends on a diverse constellation of stakeholders whose contributions extend well beyond formally assigned responsibilities. Landowners, public authorities, municipalities, advisory organizations, researchers, consultants, environmental organizations and local communities each contribute different forms of knowledge, authority, resources and legitimacy throughout restoration. While previous studies have documented the diversity of stakeholders involved in restoration and the roles they perform, the collective evidence reviewed here suggests that stakeholder engagement cannot be fully understood through assigned and formal stakeholder roles alone.

This distinction is important because restoration initiatives are inherently dynamic. Stakeholders rarely contribute independently or only at isolated moments. Instead, their roles evolve through continuing interaction as restoration progresses from planning and design to implementation, monitoring and long-term stewardship. Responsibilities frequently overlap, shift or require adjustment over time. Advisory organizations facilitate communication between landowners and authorities, municipalities coordinate planning and funding, researchers contribute scientific expertise while engaging with local knowledge, and landowners influence implementation through decisions affecting privately owned land. These interactions are more than supporting activities; they provide the means through which restoration decisions are negotiated, refined and translated into practice.

Taken together, the findings suggest that stakeholder roles are best understood in relation to one another rather than in isolation. Restoration progresses through the coordination of differentiated responsibilities across organizational and institutional boundaries, making stakeholder interaction—not simply stakeholder presence—the defining feature of stakeholder engagement.

4.2 Stakeholder engagement through the wetland restoration process

The reviewed evidence further suggests that stakeholder engagement is best understood as a process that unfolds throughout wetland restoration rather than as a collection of discrete participation activities. Recent reviews have advanced understanding of stakeholder engagement by examining stakeholder identification, engagement methods, participatory approaches and restoration guidance (Gaspers et al. 2025; Santaoja et al. 2025). Building on these contributions, the present review integrates evidence across stakeholder roles, engagement approaches, contextual conditions and reported contributions to show how stakeholder engagement evolves throughout the wetland restoration process.

Across the reviewed studies, stakeholder engagement encompasses consultation, dialogue, advisory support, collaborative planning, knowledge exchange, coordination, adaptive learning and long-term stewardship. Considered individually, these appear as different forms of engagement or project activities. Viewed collectively, however, they represent different expressions of stakeholder engagement that emerge as restoration progresses from planning and design through implementation, adaptive management, monitoring and long-term stewardship.

Stakeholder engagement does not follow a linear sequence. Instead, its forms and intensity evolve in response to changing ecological conditions, institutional settings and local circumstances. During the early stages of restoration, engagement commonly centered on recognizing restoration opportunities, establishing shared objectives, exchanging knowledge, and building relationships among stakeholders. As restoration progressed, advisory support, coordination and knowledge exchange became increasingly important for translating plans into implementation. During monitoring and subsequent management, continued dialogue, shared learning and adaptive decision-making enabled stakeholders to respond to changing ecological and social conditions while supporting long-term stewardship.

This interpretation also helps explain why stakeholder engagement cannot be understood solely in terms of individual engagement methods. Workshops, consultations, stakeholder dialogues and collaborative planning are important mechanisms for engaging stakeholders, but they represent only individual components of a broader process. Their contribution extends beyond providing opportunities for participation. They enable stakeholders to exchange knowledge, coordinate responsibilities, adapt restoration measures, and sustain collaboration as restoration progresses.

Taken together, the findings indicate that stakeholder engagement is dynamic rather than episodic. Rather than comprising isolated engagement events, it develops through continuing interaction among diverse stakeholders whose roles, relationships and contributions evolve as restoration progresses. Viewing stakeholder engagement through the wetland restoration process therefore shifts attention from individual engagement activities to the evolving interactions that support restoration over time. This process-oriented perspective also helps explain why stakeholder engagement influences restoration outcomes in different ways across restoration contexts. As stakeholders negotiate

competing interests, priorities and forms of knowledge throughout the restoration process, engagement contributes not only to the legitimacy and practical feasibility of restoration but also to the trade-offs through which restoration objectives are interpreted, adapted and ultimately realized. Consequently, stakeholder engagement should be understood not simply as a means of facilitating restoration, but as a process through which restoration trajectories and outcomes are continually shaped.

4.3 Conditions shaping stakeholder engagement

The reviewed evidence indicates that stakeholder engagement is shaped not by any single enabling factor but by the interaction of institutional, relational and motivational conditions operating within each restoration context. Institutional conditions—including policy support, advisory systems, funding arrangements, permitting processes and organizational support—interacted with relational conditions such as trust, communication, facilitation and knowledge exchange, together with motivational conditions including environmental values, stewardship, perceived benefits, perceived risks and incentives. Although the relative importance of these conditions varied across restoration settings, stakeholder engagement consistently emerged through their interaction rather than through any single determinant.

The interaction of these conditions is particularly evident in restoration programmes dependent on voluntary landowner participation. Financial incentives and institutional support can create opportunities for participation, but their effectiveness may depend on advisory relationships, trust and the perceived acceptability of restoration measures. Conversely, favourable stakeholder attitudes may not translate into implementation where administrative procedures, inadequate funding or weak organizational coordination create barriers. These findings suggest that enabling conditions should be understood not simply as separate requirements for engagement, but as interdependent elements that influence whether stakeholder willingness can be translated into practical restoration action. This interpretation is consistent with broader methodological research emphasizing the interdependence of contextual conditions, engagement processes and restoration outcomes (Eaton et al. 2023).

Although these conditions recur across the reviewed studies, no single combination was consistently found to support stakeholder engagement across all restoration settings. Differences in ecological contexts, institutional arrangements and stakeholder configurations gave rise to varying patterns of interaction, even where broadly similar engagement approaches were adopted. Thus, consultation, advisory support and collaborative planning cannot be understood independently of the circumstances in which they operate. This contextual variation underscores the importance of adapting stakeholder engagement approaches to the specific conditions of individual restoration initiatives.

The broader relevance of these findings is reinforced by Europe-wide expert assessments, which likewise identify fragmented governance, weak cross-sector coordination, limited political commitment and inadequate funding as persistent barriers to ecological restoration (Cortina-Segarra et al. 2021). Although derived from expert judgement rather than individual restoration projects, these findings closely mirror the institutional challenges identified across the empirical studies reviewed here.

4.4 Towards an integrated understanding of stakeholder engagement

The principal contribution of this review is not the identification of additional dimensions of stakeholder engagement, but the integration of dimensions that have largely been examined separately in previous research. Previous research has substantially advanced understanding of stakeholder identification, participation, collaborative approaches, and engagement methods. By synthesizing stakeholder roles, engagement approaches, contextual conditions and reported contributions, the present review demonstrates how these dimensions collectively explain stakeholder engagement throughout organized wetland restoration.

Rather than considering these dimensions separately, the review integrates them to develop a more comprehensive understanding of how stakeholder engagement shapes restoration practice. The synthesis further indicates that stakeholder engagement is not simply a mechanism for involving stakeholders but also a process through which differing values, priorities and restoration objectives are negotiated, influencing both stakeholder participation and restoration outcomes. Viewed collectively, the evidence suggests that stakeholder engagement is best understood as an evolving process rather than a sequence of discrete participation activities. As restoration progresses, stakeholders contribute different forms of knowledge, authority, resources, experience and decision-making capacity, while their roles and relationships continue to evolve. Engagement therefore extends beyond individual participation events to encompass the ongoing interactions through which restoration objectives are interpreted, knowledge is integrated, responsibilities are coordinated, and restoration approaches are refined in response to changing ecological and social conditions.

A second insight emerging from the synthesis is that stakeholder engagement is inherently context dependent. Differences in ecological settings, institutional conditions, stakeholder configurations and policy environments influenced how engagement developed across the reviewed studies. Rather than identifying a universally applicable model of stakeholder engagement, the evidence suggests that restoration initiatives adapt engagement processes to local circumstances while maintaining dialogue, learning and coordination over time. This interpretation is consistent with broader social–ecological research showing that effective environmental management depends on aligning institutional arrangements with ecological complexity and local contexts (Kininmonth et al. 2015).

This integrated perspective helps explain why stakeholder engagement cannot be fully understood through stakeholder identification, engagement methods, or contextual conditions considered independently. Each provides an important but partial perspective on restoration. Considered together, however, they reveal stakeholder engagement as a dynamic, context-dependent process through which diverse stakeholders coordinate actions, integrate knowledge, reconcile differing priorities, adapt restoration decisions and sustain restoration over time. Rather than proposing a new conceptual framework, this synthesis offers an integrated process perspective that brings together the multiple dimensions of stakeholder engagement identified across the reviewed literature.

These findings reveal practical implications for wetland restoration management. While stakeholder engagement can facilitate cooperation, agreements and implementation, the evidence suggests that its contribution cannot be assessed solely in terms of participation or project completion. Negotiations among stakeholders may also influence restoration design and ecological ambitions, particularly where restoration involves privately owned agricultural land. This highlights the need to consider both the feasibility of restoration interventions and the ecological objectives they are intended to achieve. Furthermore, the review suggests that continued advisory support, institutional coordination and stakeholder commitment are important for maintaining engagement beyond initial implementation. Restoration programmes should therefore consider stakeholder engagement not merely as a procedural requirement, but as an integral part of planning, implementation and long-term management.

5. Conclusion

This systematic literature review synthesized evidence on stakeholder engagement in European wetland restoration by examining stakeholder roles, engagement approaches, enabling and constraining conditions, and their reported contributions to restoration processes and outcomes. The findings highlight that stakeholder engagement is not merely a collection of participation activities but a dynamic, context-dependent process extending from restoration planning and implementation to adaptive management and long-term stewardship. Its development is shaped by interacting institutional, relational and motivational conditions, including organizational coordination, funding arrangements, trust, knowledge exchange, stakeholder values and perceived benefits and risks. These conditions influence how stakeholders collaborate, negotiate decisions and sustain their involvement throughout restoration.

Stakeholder engagement influences how restoration objectives are translated into practice. Landowner decisions, advisory relationships, institutional coordination and negotiations among competing interests can shape restoration planning, design and implementation. Importantly, while collaboration can facilitate agreement and enable restoration to proceed, negotiated compromises may also modify restoration designs or ecological ambitions. This highlights a distinction between the social and institutional feasibility of restoration and the realization of its ecological objectives. Stakeholder engagement should therefore be understood not only in terms of its contribution to participation and implementation, but also in relation to the decisions and trade-offs through which restoration outcomes are shaped.

These findings have important implications for wetland restoration management and policy. They suggest that effective wetland restoration depends not only on ecological interventions, technical design or financial incentives, but equally on how stakeholders interact, collaborate, exchange knowledge, build trust, share responsibilities and adapt restoration decisions throughout the restoration process. Understanding these interactions may help explain why some restoration initiatives progress from planning to successful implementation and long-term stewardship, while others are delayed, substantially modified or fail to proceed.

Stakeholder engagement should therefore be approached as a sustained and adaptive process rather than a procedural requirement confined to project planning. Strengthening advisory support, intermediary organizations and collaborative governance arrangements can help translate restoration ambitions into practice, while sustained stakeholder relationships and institutional commitment are important for supporting monitoring, adaptive management and long-term stewardship.

As wetland restoration expands under the EU Nature Restoration Regulation and other environmental commitments, greater attention is needed to both the processes and consequences of stakeholder engagement. Although the reviewed studies provide valuable evidence of its contributions to restoration planning, implementation and management, the relationship between stakeholder engagement and long-term ecological performance remains insufficiently established. Future research should therefore examine more directly how stakeholder interactions, institutional arrangements and negotiated decisions influence restoration outcomes over time. Such understanding is essential for developing wetland restoration programmes that are not only socially acceptable and institutionally feasible, but also capable of achieving and sustaining their ecological objectives.

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Authorship contributions

Conceptualization: Shivangi Shreya, Nandita Singh, Lina Suleiman, Mona Petersson and Kari Lehtilä; methodology: Shivangi Shreya, Nandita Singh, Lina Suleiman, Mona Petersson and Kari Lehtilä; investigation and formal analysis: Shivangi Shreya and Nandita Singh; writing-original draft: Shivangi Shreya and Nandita Singh; writing-review and editing: Lina Suleiman, Mona Petersson and Kari Lehtilä; project administration: Nandita Singh; funding acquisition: Nandita Singh, Lina Suleiman, Mona Petersson and Kari Lehtilä. All authors have read and agreed to the final version of the manuscript.

Competing interest

The authors have no competing interests to declare that are relevant to the content of this article.

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Figures

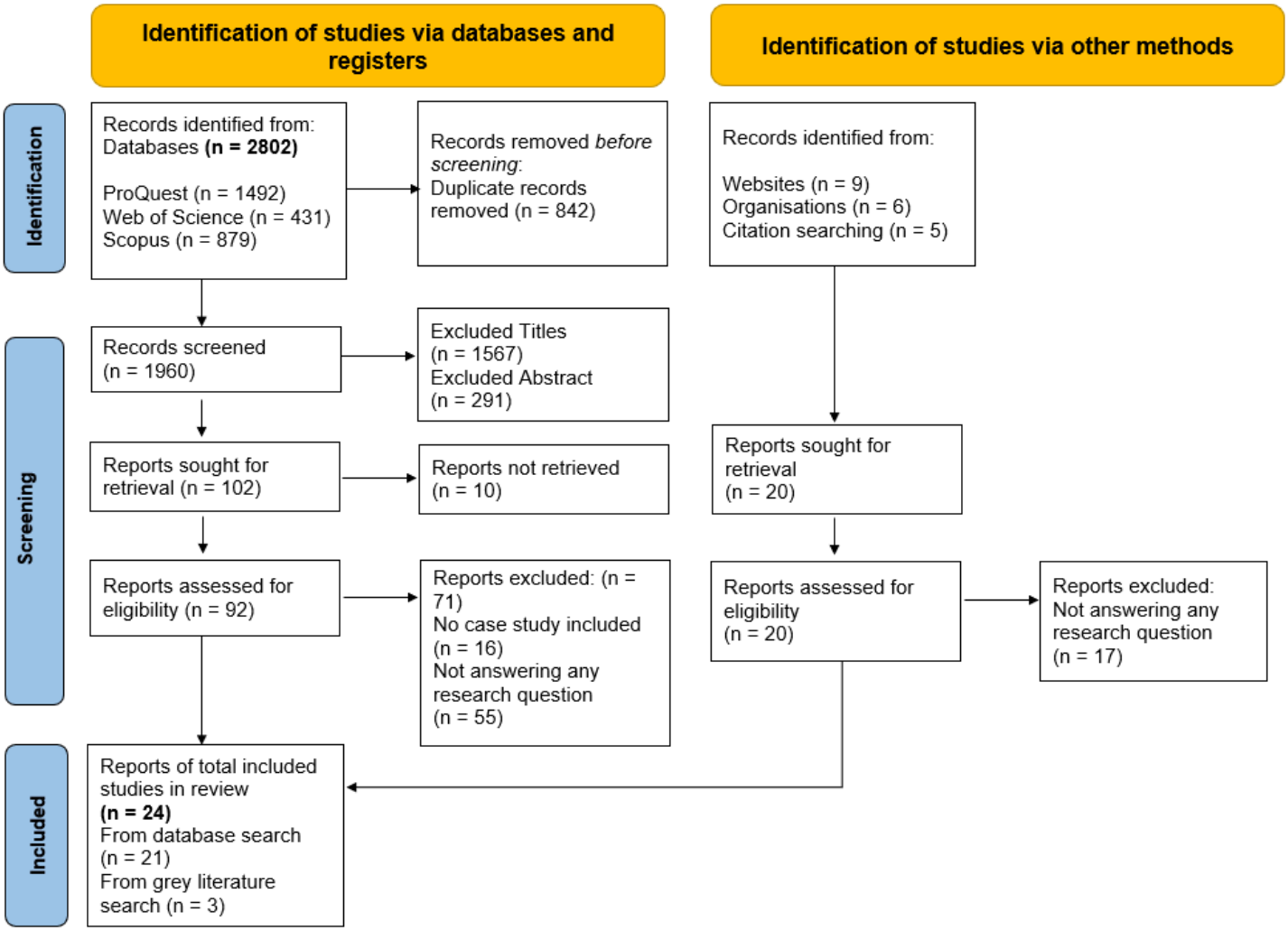

Figure 1

PRISMA 2020 Flow Diagram showing identification, screening, eligibility and inclusion

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