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A FRAMEWORK FOR STAKEHOLDER WORKSHOPS BRIDGING POLICYMAKING AND IMPLEMENTATION IN FLOOD RISK GOVERNANCE

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A framework for stakeholder workshops bridging policymaking and implementation in flood risk governance

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Abstract

Flood risk in Europe is intensifying, yet a persistent gap between policy frameworks like the EU Floods Directive and locally actionable protection measures continues to produce devastating outcomes, as recent catastrophic events have demonstrated. Stakeholder workshops are widely advocated as bridging mechanisms, but are typically designed ad hoc, disconnected from systematic evidence, and lacking institutional follow-up. This paper addresses this deficit through a structured narrative review of the European flood governance literature, identifying gaps along four dimensions: knowledge, institutional, participation, and implementation. These gaps are translated into four evidence-informed design principles, which are then operationalized into a modular, phased workshop framework integrating collaborative governance, boundary object theory, adaptive governance, knowledge co-production, behavioural economics, and the Systems Innovation Approach. The framework's fixed logical structure (gaps, principles, phases, institutional outputs) ensures theoretical traceability, while its adaptable content enables application across diverse European governance contexts, hazard types, and institutional settings. Empirical validation through pilot implementation is identified as the priority next step.

Keywords: Flood risk governance; Stakeholder workshops; EU Floods Directive; Policy implementation gap; Participatory governance; Adaptive management; Knowledge co-production.

1. Introduction

1.1 The growing flood risk challenge in Europe

Floods are the most common and most costly natural hazard in Europe, and their frequency and severity are increasing: In 2024, Europe experienced its most extensive flooding in over a decade, with almost one-third of its rivers swelling to bursting point during one of the wettest years since 1950 (Power et al., 2024; Euronews, 2025). Storms and floods collectively killed more than 300 people across the continent that year and affected over 413,000 people, inflicting at least €18 billion in economic damage (Kimutai et al., 2024; Feyen, 2025). The trend is not new as serious floods frequency is increasing in Europe while the respective economic losses are projected to grow substantially, under the continued warming (Feyen, 2025).

Recent catastrophic events underscore the severity and recurrence of this challenge. The 2021 western European floods caused 190 fatalities and approximately €33 billion in damages in Germany alone, with post-event analyses revealing that 75% of deaths occurred outside mapped hazard zones due to inadequate early warning and evacuation (Kreibich et al., 2022; Rhein & Kreibich, 2025). In 2023, unprecedented rainfall in Emilia-Romagna, Italy, displaced over 36,000 people and caused an estimated €8.8 billion in damages (Arrighi & Domeneghetti, 2024), while the October 2024 DANA event in Valencia, Spain, killed approximately 237 people amid widely criticized failures in urban planning, warning dissemination, and institutional coordination (Martin-Moreno et al., 2025). These events are symptomatic of a broader structural exposure: as of 2021, approximately 52 million Europeans lived in flood-prone areas, while continued urbanization and climate-driven intensification of precipitation may further stress this exposure (European Commission, 2025). The recurring pattern of known hazards, existing policy frameworks, yet devastating outcomes, points to something beyond a purely technical or financial problem. It suggests a persistent gap between what flood governance frameworks prescribe and what actually happens on the ground. Understanding and addressing this gap is the subject of the next section.

1.2 The policy-implementation gap in European flood governance

Europe already has a comprehensive flood risk management framework under the EU Floods Directive (2007/60/EC), which requires member states to assess risks, map vulnerable areas, and implement coordinated plans updated every six years (European Commission, 2025). The Directive also enshrines public participation rights in the planning process. Now in its third implementation cycle (2022–2027), the Floods Directive has unquestionably improved the institutional landscape of flood governance across Europe.

Yet the evidence from recent events and from the Directive's own evaluation processes tells a more complicated story: The European Court of Auditors, in a special report on the Floods Directive, found that while the Directive had positive effects overall, the implementation of flood prevention measures suffered from weaknesses in allocating funding, and that major future challenges remained concerning the integration of climate change, flood insurance, and spatial planning into flood risk

management, while most plans failed to include quantitative targets, making it difficult to assess the effectiveness of flood risk management (European Court of Auditors, 2018). The gap to full compliance with EU water objectives is not solely financial, but fundamentally a problem of translation from EU-level regulatory requirements, through national and regional planning instruments, to locally actionable protection measures (Papaioannou et al., 2026). The Directive establishes what should be done (assess, map, plan) but leaves substantial discretion to member states on how to do it, resulting in enormous variation in implementation quality and depth. This discretionary space, while necessary given Europe's institutional diversity, creates several interconnected bottlenecks:

- Multi-level coordination challenge: Flood governance in Europe typically spans at least four levels (EU, national, regional, and municipal) with responsibilities fragmented across water management agencies, spatial planning authorities, civil protection services, and environmental bodies. The Ahr Valley disaster of 2021 starkly illustrated this: despite meteorological warnings being issued, the chain from warning to evacuation broke down across institutional boundaries, with tragic consequences (Kreibich et al., 2022; Rhein & Kreibich, 2025). In Valencia in 2024, the regional government's delayed response and contested division of responsibilities between regional and national authorities became a central element of the post-disaster political crisis (Ortiz et al., 2025). These are not anomalies, but structural features of fragmented governance systems (Mees et al., 2018b).
- Disconnect between planning and action: Flood Risk Management Plans exist across Europe, but their translation into concrete, funded, and enforced measures is uneven (Alamanos et al., 2025). With more frequent and severe floods in Europe, member states need to expand their planning and administrative capacity and adequately invest in flood prevention (Alamanos & Linnane, 2022). The Court of Auditors specifically noted that weaknesses in funding allocation hindered the implementation of prevention measures, due to the lack of enforcement mechanisms, or clear accountability structures (European Court of Auditors, 2018).
- Knowledge-to-action disconnect: Scientific understanding of climate-hydrology-flood hydraulics and risks has advanced significantly over the past two decades, but its uptake by decision-makers lag (Nile et al., 2025). The Floods Directive requires public participation (Article 10), but does not specify quality standards for engagement processes. Therefore, participation ranges from genuinely deliberative processes in some member states to purely informational exercises in others, with limited feedback into actual decision-making (Mees et al., 2018a; Newig et al., 2018).

The cumulative effect of these bottlenecks is that European flood governance operates with a persistent implementation deficit. The regulatory architecture provides structure and common standards; it does not, by itself, ensure that local actors have the capacity, the evidence, and the institutional pathways to turn plans into protection. Bridging this gap requires mechanisms that operate at the interface between policy and implementation, bringing together the relevant actors, confronting them with

evidence, and produce outputs that feed back into institutional decision-making. Stakeholder workshops are frequently proposed as such mechanisms. The question, explored in the next section, is whether and how they can be designed to fulfil this function effectively.

1.3 Stakeholder workshops: promise and limitations

Participatory approaches, particularly stakeholder workshops, are widely advocated as mechanisms for bridging top-down policy and local implementation in flood risk management; however, evidence from European practice reveals persistent limitations (Green & Penning-Rowsell, 2010; Thaler & Levin-Keitel, 2016; Wehn et al., 2019): Stakeholder engagement often ends in difficulties and conflicts between political leaders and stakeholder groups, with far more restricted outcomes than expected, and the normative demand for participatory and collaborative governance has yet to be adequately translated into everyday planning practice. Participation processes frequently remain informational rather than deliberative, with authorities' reluctance to share decision-making power limiting the institutionalization of participatory approaches, while the rigidity of governmental frameworks hampers participatory impulses within communities. Moreover, workshops are often designed on a project-specific basis, with limited integration of systematic evidence and weak institutional continuity on risk perception heterogeneity or cognitive biases, and lacking structured follow-up mechanisms that connect outputs to institutional decision-making (Mees et al., 2018b; Newig et al., 2018). What is currently absent from the literature and existing participatory approaches in flood risk management, is a theoretically grounded framework that systematically links identified governance gaps to specific workshop design elements while ensuring that outputs feed back into institutional processes (Ansell & Gash, 2018; Pahl-Wostl, 2019).

1.4 Research objective and paper structure

This paper aims to develop a modular, evidence-informed stakeholder workshop framework for flood risk governance that systematically bridges the gap between European flood policy and local implementation. We pursue this through:

- a structured literature review identifying key governance gaps in European flood risk management, organized along four dimensions (knowledge, institutional, participation, and implementation),
- the translation of identified gaps into design principles for stakeholder workshops; and
- the proposal of a phased, adaptable workshop framework operationalizing these principles.

Section 2 presents the methodology, including the review strategy and theoretical anchoring. Section 3 reports the literature review findings across the four gap dimensions. Section 4 presents the workshop framework. Section 5 discusses contributions, expected outcomes, and limitations. Section 6 concludes with implications for research and practice.

2. Methodology

This paper combines a structured narrative literature review with theory-informed framework development. The methodology follows two sequential stages: first, identifying and synthesizing governance gaps in European flood risk management from the existing literature; and second, translating the identified gaps into design principles and workshop components through an analytical framework grounded in multiple theoretical traditions.

2.1 Structured literature review approach

The review adopts a structured narrative approach rather than a systematic review with a protocol. This choice is deliberate and methodologically appropriate for several reasons. First, the objective is not to exhaustively catalogue all studies on a narrowly defined empirical question (which is what systematic reviews are designed for) but rather to synthesize findings across multiple, partially overlapping bodies of literature (flood governance, participatory methods, risk perception, institutional analysis) in order to identify recurring governance gaps and their interactions (Paré et al., 2015; Snyder, 2019). Second, the output of the review is not a meta-analytic summary but the construction of an analytical typology (the gap dimensions) that serves as the foundation for framework development. Structured narrative reviews are well-established for this purpose in governance and policy research, where the goal is theoretical synthesis rather than effect-size estimation (Torraco, 2005; Snyder, 2019).

To mitigate the subjectivity risks inherent in narrative approaches, the review follows a transparent and reproducible protocol structured along three axes: scope definition, search strategy, and analytical procedure (Table 1).

Table 1: Summarizing the methodological approach of the narrative review.

Scope definition	The review targets the intersection of three bodies of literature: (i) EU flood policy and its implementation, (ii) participatory methods and stakeholder engagement in flood risk management, and (iii) risk perception, cognitive biases, and behavioural factors affecting flood governance. The geographic scope is European, anchored to the institutional context created by the EU Floods Directive (2007/60/EC). The temporal scope covers 2007–2025, with 2007 marking the adoption of the Directive and the beginning of the current European flood governance architecture. Seminal works published before 2007 are included where they provide foundational theoretical contributions (e.g., on collaborative governance, boundary objects, or adaptive management).
Search strategy	Literature was identified through systematic searches in Scopus and Web of Science using Boolean combinations of terms organized around the three axes: (flood* OR fluvial OR pluvial) AND (governance OR policy OR implementation OR directive) AND (Europe* OR EU) for the policy axis; (stakeholder* OR participat* OR workshop* OR co-design OR co-production OR living lab*) AND (flood*) for the participation axis; and (risk perception OR cognitive bias OR salience OR preference*) AND (flood* OR disaster* OR hazard*) for the behavioural axis. These database searches were supplemented with targeted citation tracking (forward and backward) from key review articles and institutional sources, including European Commission implementation reports, European Court of Auditors special reports, and European Environment Agency assessments. Grey literature from these institutional sources was included given its direct relevance to the policy-implementation interface that the paper addresses.
Screening and analytical procedure	Titles and abstracts were screened for relevance to at least one of the four gap dimensions of knowledge, institutional, participation, and implementation (see below). Full texts were retrieved for sources that addressed governance processes, institutional arrangements, stakeholder engagement practices, or behavioural dimensions of flood risk management in European contexts. Sources were excluded if they were purely technical (e.g., hydrological modelling without governance implications), focused exclusively on non-European contexts with no transferable governance insights, or did not address the policy-

	practice interface. The retained literature was analyzed through a deductive-inductive coding process. An initial deductive framework based on four gap dimensions was derived from preliminary reading and from established categorizations in the governance literature (Pahl-Wostl, 2015; Hegger et al., 2016). Within each dimension, findings were coded inductively to identify recurring themes, mechanisms, and patterns. This two-stage coding process ensures that the gap typology is both theoretically grounded and empirically populated.

The four gap dimensions structuring the review are defined as follows:

- Knowledge gaps concern: Disconnects between scientific evidence on flood risk and its accessibility, usability, and uptake by decision-makers and affected populations. This includes mismatches between expert and public risk perception, failures in risk communication, and the limited integration of behavioural evidence into governance processes.
- Institutional gaps concern: Fragmentation of governance responsibilities across administrative levels and sectors, coordination failures between water management, spatial planning, civil protection, and environmental agencies, and divergent implementation of the EU Floods Directive across member states.
- Participation gaps concern: Deficiencies in the design, quality, and institutional embedding of stakeholder engagement processes, including tokenistic participation, absence of systematic evidence use in deliberative settings, power asymmetries, and the lack of structured follow-up mechanisms linking workshop outputs to policy decisions.
- Implementation gaps concern: The translation of flood risk management plans into concrete, funded, and enforced protection measures, including reactive governance patterns, budget-risk cycle misalignment, preference instability among publics and decision-makers, and the absence of adaptive governance instruments.

These dimensions are analytically distinct but empirically interconnected.

2.2 From gaps to design principles

The second analytical stage translates literature findings into actionable design principles for stakeholder workshops. This translation follows a structured logic that establishes a clear linkage between empirical findings and design choices:

- For each gap dimension, the review identifies the dominant mechanisms that produce or reproduce the gap (e.g., for knowledge gaps: information asymmetry, perception heterogeneity, and the failure of linear science communication models).
- Each mechanism is then matched with a design response, e.g. a workshop element or facilitation strategy that directly addresses the identified mechanism (e.g., for information asymmetry: pre-workshop evidence packages and interactive data dashboards functioning as boundary objects).
- Design responses are aggregated into overarching design principles, each addressing one or more gap dimensions. Four principles emerge from this

process: (A) Evidence-based framing, (B) Heterogeneity-responsive design, (C) Bias awareness integration, and (D) Action-oriented structure.

This gap-to-principle mapping constitutes the core analytical contribution of the paper and is presented in synthesis form in Section 3.5. The mapping is intended to be transparent and contestable: readers can trace each design principle back to specific empirical findings in the literature and evaluate whether the proposed design response is warranted. This traceability distinguishes the proposed framework from ad hoc workshop designs and provides a basis for systematic evaluation in future empirical applications.

The principles are conceived as modular and combinatorial rather than sequential. All four principles are intended to operate simultaneously across workshop phases, though their relative emphasis shifts depending on the phase. This modularity also enables adaptation to different contexts: the logical structure (gaps → principles → workshop elements) remains constant while specific content (which evidence is used, which stakeholders are included, which challenges are prioritized) can be adjusted to local conditions.

2.3 Theoretical anchoring

The framework integrates contributions from six theoretical traditions (Table 2). No single tradition is sufficient to address the multi-dimensional nature of the policy-implementation gap in flood governance; the integration itself is a methodological contribution. Each tradition provides specific analytical tools for understanding one or more gap dimensions and for designing workshop elements that address them.

Table 2: The six theoretical traditions summary, covering their core contribution, the gap dimension(s) they primarily address, and the specific framework components they inform.

Theoretical tradition	Role in the overall framework
Collaborative governance theory (Ansell & Gash, 2008; Emerson et al., 2012) provides the overarching process model. It identifies the conditions under which multi-stakeholder deliberation produces legitimate and actionable outcomes: principled engagement, shared motivation, and capacity for joint action.	This tradition informs the overall workshop architecture, particularly the phased progression from evidence presentation through problem reframing to co-designed action, and the emphasis on cross-sector, cross-scale stakeholder composition.
Boundary object theory (Star & Griesemer, 1989; Cash et al., 2003) addresses the challenge of communication across knowledge boundaries. Boundary objects are shared artifacts (maps, dashboards, data visualizations) that are interpretable by different communities of practice without requiring full consensus on meaning.	This concept underpins the role of empirical evidence artifacts (e.g., diagnostic dashboards, localized risk data) in the workshop design, functioning as deliberative anchors that ground discussion in shared factual reference points while accommodating divergent interpretations.
Adaptive governance (Folke et al., 2005, 2016; Pahl-Wostl, 2009, 2015, 2019) addresses the need for governance systems to learn, adjust, and respond to changing conditions. This is a central requirement, given the non-stationary nature of flood risk under climate change.	This tradition informs the framework's emphasis on iterative learning, post-workshop feedback loops, adaptive budgeting instruments, and the explicit treatment of preference instability as a governance challenge rather than an inconvenience.

Knowledge co-production (Jasanoff, 2004; Lemos & Morehouse, 2005; Norström et al., 2020) challenges the linear model of knowledge transfer from science to policy and instead frames legitimate knowledge as produced through the interaction of scientific and experiential forms of understanding.	This tradition justifies the workshop's departure from the expert-briefing model: evidence is presented not as authoritative instruction but as a deliberative resource that participants interrogate, contextualize, and complement with local knowledge.
Behavioural economics and risk perception research (Kahneman & Tversky, 1979; Loewenstein et al., 2003; Bordalo et al., 2022) provides the empirical and theoretical basis for understanding why risk governance often fails even when information is available. Salience bias, projection bias, affect heuristics, and preference instability are well-documented mechanisms that distort risk perception and policy support.	This tradition informs Principle C (Bias awareness integration) and the workshop's explicit use of temporal comparisons and metacognitive reflection to make cognitive biases visible and addressable.
The Systems Innovation Approach (SIA) (Alamanos et al., 2022a; 2022b; Koundouri et al., 2026) provides the operational workshop pipeline: structured stakeholder selection, phased coverage of problem definition, evaluation of past solutions and failures, and co-design of actionable tasks with clear responsibility and accountability. SIA has been applied in analogous participatory governance contexts including water management and environmental policy.	The proposed framework enriches the SIA pipeline by embedding the four evidence-informed design principles derived from the literature review, thereby addressing a limitation of generic SIA applications: Namely, the absence of systematic linkage between empirical evidence on governance gaps and workshop design choices.

The explicit mapping of Table 2 serves a dual purpose: it demonstrates that the framework is theoretically grounded rather than assembled ad hoc, and it allows future researchers to extend or modify the framework by substituting or adding theoretical components as warranted by their context.

3. Literature Review: Governance Gaps in European Flood Risk Management

This section presents the findings of the structured narrative review, organized along the four gap dimensions defined in Section 2. For each dimension, we synthesize key findings from the reviewed literature and conclude with the implications for stakeholder workshop design. Section 3.5 integrates the four dimensions and presents the gap-to-principle mapping that underpins the framework proposed in Section 4.

3.1 Knowledge gaps: from science to actionable understanding

A substantial body of literature documents persistent disconnects between scientific knowledge of flood risk and its uptake by decision-makers and affected populations in Europe. These disconnects operate through at least three mechanisms: perception heterogeneity, cognitive biases, and failures in the science-policy communication model.

First, flood risk perception is neither uniform nor stable. Cross-European studies consistently demonstrate that public understanding of flood risk varies along geographic, demographic, and experiential lines (Kellens et al., 2011; Bradford et al., 2012; Bubeck et al., 2012). Populations in areas with recent flood experience tend to report substantially higher risk perception than those in objectively similar but recently unaffected areas; a pattern consistent with the salience bias formalized in behavioural economics (Bordalo et al., 2012, 2022). Demographic factors including age, education,

gender, and income further mediate perception, though not always in expected directions: higher education, for instance, has in some contexts been associated with lower perceived risk, possibly reflecting greater confidence in institutional protection (Kellens et al., 2011; Wachinger et al., 2013). This heterogeneity means that any governance process that treats risk understanding as homogeneous across stakeholder groups is likely to miss the very variation that drives divergent policy preferences and levels of support for protection measures.

Second, cognitive and affective biases systematically distort risk evaluation and policy support. Slovic et al. (2004) demonstrated that risk judgments operate through parallel analytical and affective systems, with the affect heuristic producing rapid, experience-based evaluations that may diverge substantially from probability-based assessments. Loewenstein et al. (2003) documented projection bias (the tendency for individuals to overestimate the persistence of their current preferences) which helps explain why post-disaster commitment to protection measures fades as the emotional salience of the event recedes. Crucially, Wachinger et al. (2013) identified a "risk perception paradox": high perceived risk does not automatically translate into protective behaviour or spending support. The relationship is mediated by trust in authorities, perceived personal responsibility, and self-efficacy (Terpstra, 2011; Bubeck et al., 2012). This paradox has direct governance implications: raising awareness alone is insufficient if the institutional and motivational conditions for action are absent.

Third, the dominant model of science communication in flood governance remains largely linear; what Cash et al. (2003) termed the "loading dock" approach, in which knowledge is produced by experts, packaged, and delivered to decision-makers (Clark et al., 2016). This model systematically underperforms because it fails to meet the three criteria Cash et al. identified as necessary for effective knowledge systems: salience (relevance to decision-makers' actual problems), credibility (perceived scientific adequacy), and legitimacy (perceived fairness of the knowledge production process) (Clark et al., 2016). The knowledge co-production literature (Jasanoff, 2004; Lemos & Morehouse, 2005; Norström et al., 2020) argues that these criteria can only be satisfied through sustained, interactive engagement between knowledge producers and users, a fundamentally different model from expert briefings or one-way risk communication.

3.2 Institutional gaps: fragmented governance across scales

European flood risk management operates within a complex multi-level governance architecture. The EU Floods Directive establishes a common framework requiring preliminary flood risk assessments, hazard and risk maps, and Flood Risk Management Plans on six-year cycles, but leaves considerable discretion to member states in how these requirements are operationalized. The resulting institutional landscape is characterized by both beneficial diversity and persistent fragmentation.

Comparative studies reveal substantial variation in how EU countries organize flood governance. Wiering et al. (2017) identified six distinct governance arrangements across European states, shaped by interactions between EU policy drivers, national flood management traditions, and the influence of major flood events. Hegger et al. (2016) demonstrated that countries differ not only in their preferred strategies

(prevention, defense, mitigation, preparation, recovery) but also in the degree to which they have diversified across these strategies, with some remaining heavily reliant on structural protection while others have adopted broader portfolios. These differences are partly explained by path dependencies: national flood-governance traditions, once established, are resistant to change even when circumstances shift (Priest et al., 2016; Wiering et al., 2017).

Within countries, flood governance responsibilities are typically fragmented across multiple levels (EU, national, regional, municipal) and across sectoral agencies (water management, spatial planning, civil protection, environmental protection, agriculture). The European Court of Auditors (2018) found that while the Floods Directive had improved coordination between the Commission and member states, coordination within member states (particularly between water management and spatial planning authorities) remained a persistent weakness. This fragmentation has tangible consequences. As we analyzed in the introductory section, these observations were reflected and validated by recent governance failures under stress, such as the 2021 Ahr Valley disaster in Germany, the 2024 Valencia DANA event, or the repeated events in Greece (cyclone Ianos 2022 and storm Daniel 2023) (Lagouvardos et al., 2022; Alamanos, 2025).

The most recent Commission evaluation of the Floods Directive's implementation (EC, 2025) acknowledged that the pace of implementation remains insufficient relative to the escalating risk (in view of more frequent extreme events), and called for expanded planning and administrative capacity and adequate investment in flood prevention, with particular emphasis on nature-based solutions and early warning systems.

The implication for workshop design is to ensure cross-scale and cross-sector representation in stakeholder selection, including actors from multiple governance levels and from sectors (spatial planning, civil protection, insurance, agriculture) whose decisions affect flood risk but who are often absent from water management deliberations. Workshop facilitation must explicitly address institutional coordination and accountability, treating the governance architecture itself as a subject of deliberation rather than a background condition. The framework must be adaptable to different national governance arrangements rather than assuming a uniform institutional context.

3.3 Participation gaps: beyond tokenistic engagement

Public participation is formally required under the EU Floods Directive (FD) (Article 10), which stipulates that member states shall encourage the active involvement of interested parties in the production, review, and updating of Flood Risk Management Plans. However, the Directive does not specify what form this involvement should take, what quality standards it should meet, or how its outputs should influence decision-making. The result, as documented across multiple European contexts, is a wide spectrum of participation quality, much of it falling short of genuine deliberation (Challies et al., 2017).

Newig et al. (2018) compared participation provisions in the FD with those in the Water Framework Directive and found that the FD's requirements are substantially weaker, with early evidence from Germany indicating that participation in FD implementation

was largely informational in character and had limited influence on plan content. Wehn et al. (2019) conducted a governance analysis across multiple European case studies and found that while legal obligations for citizen participation exist, actual implementation is constrained by differing authority perceptions of citizen roles and limited impact of participation on decision-making outcomes. Mees et al. (2018a), in a cross-European comparison, concluded that effective co-production of flood risk management requires institutional support, dedicated resources, and genuine influence on decisions, which are frequently absent.

Power asymmetries represent a further persistent challenge. Thaler and Levin-Keitel (2016) demonstrated that stakeholder engagement in English flood risk management is fundamentally shaped by the power relationship between national and local actors, with local grassroots capacity determining the quality and impact of engagement. Where local capacity is low, participation tends toward passive reception of top-down decisions. Conversely, where local actors have resources and leadership, bottom-up initiatives can significantly influence governance outcomes (but these are exceptions). More broadly, the literature reports that authorities are frequently reluctant to share decision-making power, limiting the institutionalization of participatory approaches (Thaler & Levin-Keitel, 2016; Mees et al., 2018a), while the rigidity of governmental frameworks hampers participatory impulses originating within communities.

A critical gap identified across this literature is the absence of systematic feedback loops between participatory processes and institutional decision-making. Workshops and consultations are overwhelmingly frequently implemented as compliance-driven, one-off exercises, with limited institutional mechanisms for uptake or continuity. This absence contributes to stakeholder fatigue and disillusionment, a well-documented phenomenon in which communities disengage from participatory processes that produce no visible governance consequences (Mees et al., 2018a; Newig et al., 2018).

A further limitation of existing participatory approaches in flood governance is the rare incorporation of systematic empirical evidence into workshop design. Most workshops are "desk-designed", structured around facilitators' assumptions, rather than grounded in quantitative or qualitative evidence on risk perception, preference dynamics, or governance performance. Maskrey et al. (2016) demonstrated that participatory modelling approaches, which co-construct conceptual models of local flood risk systems using evidence, can substantially improve the identification of intervention options and stakeholder buy-in. However, such evidence-informed approaches remain the exception rather than the rule.

Therefore, workshops must be action-oriented, with clear pathways from deliberative outputs to institutional uptake. This requires both structural features (commitment phases, follow-up mechanisms, designated institutional entry points for workshop outputs) and process features (facilitation that manages power asymmetries, ensures representative participation, and builds genuine influence rather than token consultation). Evidence must be systematically integrated as a deliberative resource, not introduced ad hoc. The design must explicitly address the feedback loop problem by building in post-workshop accountability and review mechanisms.

3.4 Implementation gaps: from plans to protection

The most consequential gap in European flood governance is arguably the translation of plans, maps, and policies into actual, sustained protection. The literature documents several reinforcing mechanisms that produce and reproduce this implementation deficit (Driessen et al., 2016).

The most prominent is what may be termed the salience trap: a pattern of reactive governance in which political attention, public support, and funding for flood protection spike following a disaster and then progressively decay as the event recedes from collective memory. This pattern is consistent with the salience bias documented in behavioural economics (Bordalo et al., 2012, 2022) and is empirically observed across European contexts. Post-disaster windows of opportunity generate rapid policy responses (emergency funding, new regulations, institutional reforms) but these responses frequently fail to translate into sustained investment once salience fades (Alamanos et al., 2024; Papaioannou et al., 2026). The result is a boom-bust cycle in which governance is perpetually responding to the last disaster rather than anticipating the next one (Merz et al., 2021). This reactive pattern is structurally reinforced by budget cycles that are misaligned with risk cycles: annual or multi-annual budget processes prioritize current demands over long-term mitigation investments whose benefits are uncertain, diffuse, and politically invisible.

Closely related is the problem of preference instability. Loewenstein et al. (2003) demonstrated that individuals systematically overestimate the persistence of their current preferences. Communities that express strong support for protection investment in the aftermath of a flood may shift their priorities within months or years as other concerns become more salient, yet governance processes typically assume that expressed preferences are stable and can serve as a durable mandate for action. Koundouri et al. (2023) reinforced this point by highlighting how emotions, uncertainty, and intertemporal trade-offs systematically shape environmental preferences and policy support, underscoring the need for governance mechanisms that anticipate rather than merely record preference dynamics. Again, the European Court of Auditors (2018) has also consistently documented the gap between planning and implementation. The absence of enforcement mechanisms, adaptive triggers, or built-in review processes in many national plans, means that they can formally satisfy FD's requirements while failing to translate into measurable risk reduction.

At the same time, the evidence shows that adaptation efforts can be effective when sustained. Paprotny et al. (2025) analyzing seven decades of European flood data, found that non-structural adaptation measures (early warning systems, emergency preparedness, building regulations) had reduced normalized economic losses by 63% and fatalities by 52% since 1950. However, the same study found that increased exposure (driven by urbanization and development in flood-prone areas) had been the dominant trend, partially offsetting adaptation gains.

These mean that current adaptation approaches, while valuable, are approaching their limits under continued climate change and require complementary governance innovations that address the structural drivers of reactive decision-making. The implication for workshop design is therefore, to incorporate explicit bias awareness mechanisms that surface the salience trap and preference instability as governance challenges, not merely as individual psychological phenomena. The action planning

phase must generate concrete outputs, specified in terms of target populations, timing within the disaster cycle, institutional mechanism, and evidence base, with built-in adaptive features (review triggers, anti-cyclical funding proposals, perception audit schedules). The commitment phase must create social accountability devices that help translate awareness into durable institutional action, counteracting the tendency for commitment to erode as salience fades.

3.5 Synthesis: the four-dimensional gap landscape

The four gap dimensions described above are analytically distinct but empirically interconnected. Knowledge gaps feed institutional gaps: when decision-makers lack accessible, localized evidence on risk perception and preference dynamics, they cannot design governance arrangements that account for these factors, defaulting instead to generic approaches. Institutional gaps feed participation gaps: when responsibilities are fragmented and unclear, participation has no obvious institutional entry point, and stakeholder inputs fall into coordination voids. Participation gaps feed implementation gaps: when engagement is tokenistic and disconnected from decisions, plans lack local buy-in, enforcement becomes politically difficult, and the governance cycle reverts to reactive mode. And implementation gaps reinforce knowledge gaps: when governance is reactive, there is no institutional demand for the kind of sustained, anticipatory evidence that could break the cycle.

This mutually reinforcing pattern suggests that addressing any single dimension in isolation is unlikely to produce durable governance improvement. Effective flood risk governance requires an integrated approach that simultaneously addresses the knowledge-to-action chain (making evidence accessible and usable), the institutional architecture (ensuring cross-scale coordination and clear accountability), the quality of participation (creating genuine deliberation with institutional pathways for uptake), and the implementation mechanisms (building in adaptive instruments that anticipate preference shifts and maintain sustained investment). Table 3 provides that synthesis by mapping each gap dimension to its dominant mechanisms, the workshop design implication derived from the literature, and the design principle that operationalizes the response. This constitutes the analytical bridge between the literature review (Section 3) and the workshop framework (Section 4).

Table 3: From governance gaps to workshop design principles.

Gap Dimension	Dominant Mechanisms from Literature	Implication for Workshop Design	Design Principle
Knowledge	Risk perception heterogeneity (geographic, demographic, experiential); salience and affect biases; expert-public mismatch; linear science communication failure	Ground deliberation in localised evidence; make perception gaps visible; engage analytical and affective dimensions; use evidence as boundary object	A: Evidence-based framing
Institutional	Multi-level governance fragmentation; cross-sector coordination failures; divergent FD implementation; path dependencies; warning-to-action chain breakdowns	Ensure cross-scale, cross-sector representation; address coordination and accountability explicitly; adapt to local governance arrangements	B: Heterogeneity-responsive design
Participation	Tokenistic engagement; weak FD Art. 10 requirements; power asymmetries; no evidence integration; project-	Make workshops action-oriented with institutional pathways; manage power imbalances;	C: Bias awareness integration

	based and ad hoc; no feedback loops to decisions	integrate evidence systematically; build follow-up mechanisms	
Implementation	Salience trap (boom-bust attention); preference instability; budget-risk cycle misalignment; plans without enforcement or adaptive triggers; reactive governance	Incorporate bias awareness mechanisms; generate concrete, accountable outputs; build adaptive governance instruments; create social commitment devices	D: Action-oriented structure

Note: The mapping between gap dimensions and design principles is not strictly one-to-one. Principle A primarily addresses knowledge gaps but also serves participation gaps (by providing shared evidence for deliberation). Principle B addresses institutional gaps but also knowledge gaps (by accounting for geographic and demographic heterogeneity). Principle C draws on behavioural evidence (knowledge gaps) to address implementation gaps (the salience trap, preference instability). Principle D addresses implementation gaps but also participation gaps (by ensuring workshops produce institutional outputs rather than discussion only). This cross-cutting character reflects the interconnected nature of the gap landscape documented in the literature and motivates the modular, combinatorial application of principles across workshop phases described in Section 4.

4. The Proposed Workshop Framework

The four design principles derived from the literature review (Table 3) can be operationalized into a phased, modular workshop framework. Each component is explicitly linked to the governance gaps it addresses, ensuring traceability from evidence to design. The framework follows the Systems Innovation Approach (SIA) pipeline, i.e., structured stakeholder selection, problem definition, evaluation of past solutions, and co-design of actionable tasks (Alamanos et al., 2022a; 2022b; Koundouri et al., 2026), but enriched with the evidence-informed principles A–D.

4.1 Framework overview and modularity

The proposed framework comprises five components: a pre-workshop preparation stage, three workshop phases (evidence immersion, governance challenges, action planning), and a post-workshop follow-up mechanism (Table 4). Its logical structure is fixed:

Literature-identified gaps → Design principles (A–D) → Workshop phases → Institutional outputs

However, the specific content within this structure is adaptable. Three elements are treated as core (always present regardless of context): the use of empirical evidence as a boundary object for deliberation; a phased progression from shared understanding through problem reframing to co-designed action; and a commitment and follow-up mechanism linking outputs to institutional processes. Three further elements are treated as adaptable: the geographic and hazard scope, the stakeholder composition (adjusted to local governance arrangements), and the evidence type used as input (survey data, flood risk maps, FD evaluation reports, loss databases, or other localized sources). This modularity responds directly to the institutional gaps literature, which documents that European flood governance arrangements vary substantially across countries (Driessen et al., 2016; Hegger et al., 2016; Wiering et al., 2017), making a rigid, one-size-fits-all design inappropriate.

Table 2. Summary of the framework, mapping each phase to its objective, key activities, the gap dimensions it addresses, and the active design principles.

Phase	Objective	Key Activities	Gap(s) Addressed	Principle(s)

Pre-workshop	Inclusive selection; evidence preparation; reduce information asymmetry	Stakeholder mapping; pre-reading package; evidence compilation; reflection prompts	Knowledge; Institutional	A, B
Phase 1: Evidence immersion (~90 min)	Shared factual grounding; make heterogeneity visible	Plenary evidence presentation; interactive polling; localised breakout groups; facilitated report-back	Knowledge	A, C
Phase 2: Governance challenges (~60 min)	Reframe evidence as actionable governance problems	Challenge framing derived from gaps; mixed-stakeholder deliberation on cross-cutting issues	All four	B, C
Phase 3: Action planning (~90 min)	Co-design concrete interventions with accountability	Solution development with specification template; cross-group integration; commitment phase	Implementation; Participation	D
Post-workshop	Institutional embedding; adaptive follow-up	Intervention portfolio; evidence-to-action map; stakeholder commitments; follow-up sessions; perception audits	All four	All

4.2 Pre-workshop preparation

The effectiveness of evidence-informed deliberation depends critically on preparation conducted approximately one week before the workshop. Two tasks are essential.

- Stakeholder selection: The participation gaps literature documents that engagement quality depends on who is included and whose interests are represented (Thaler & Levin-Keitel, 2016; Mees et al., 2018a). Accordingly, the framework requires participants to be selected across four categories, each justified by the gap dimension it helps address: (a) governmental decision-makers from multiple levels (national/regional/municipal) and sectors (water management, spatial planning, civil protection, budget offices), addressing institutional gaps through cross-scale representation; (b) community representatives reflecting the demographic and geographic composition of the area at risk, addressing knowledge gaps by bringing experiential knowledge into deliberation; (c) technical and scientific experts (climate scientists, hydrologists, urban planners), providing credibility to the evidence base; and (d) civil society and cross-sector actors (NGOs, insurers, infrastructure operators, agricultural organizations), addressing participation gaps by broadening the range of actors whose decisions affect flood risk. The specific composition is adaptable to context, but the requirement for multi-level, multi-sector, and multi-knowledge representation is a core feature.
- Evidence preparation: To address the knowledge gap of information asymmetry and to operationalize the knowledge co-production principle (Cash et al., 2003; Jasanoff, 2004; Norström et al., 2020), participants receive a concise pre-reading package comprising: a brief summary of the flood risk context (hazard, exposure, recent events, governance arrangements), key empirical findings on risk perception and governance performance in the specific context (drawn from

surveys, FD evaluations, loss databases, or other available sources), and guided reflection prompts (e.g., "How do these patterns compare with your experience?"; "What surprised you?"). This pre-reading is deliberately framed as a preparatory exercise, not an expert briefing, following Fishkin's (2009) evidence that information provision before deliberation produces more reflective and informed preferences (Willis et al., 2022; Ainscough & Willis, 2024).

4.3 Phase 1: Evidence immersion

This phase addresses knowledge gaps directly by grounding deliberation in empirical evidence, operationalizing Principle A (Evidence-based framing) and beginning to activate Principle C (Bias awareness integration).

The phase opens with a plenary session (~30 minutes) presenting key findings through accessible visualizations: geographic patterns of risk perception, temporal shifts in preferences or risk indicators, demographic heterogeneity, and (where data permit) the gap between perceived and objective risk. The presentation format is critical: evidence is introduced as a shared deliberative resource rather than a one-way expert input. Interactive polling (e.g., "Do these patterns match your experience?"; "Which finding surprised you most?") immediately engages participants and makes perception divergences visible within the room, following the "mirror back" technique grounded in deliberative democracy practice (Fishkin, 2009; Willis et al., 2022; Ainscough & Willis, 2024) and boundary object theory (Star & Griesemer, 1989).

Participants then break into location-specific or stakeholder-type groups (~40 minutes) to examine their community's or sector's profile in greater depth. Each group identifies key surprises, areas of concern, and divergences between perceived and actual risk. This localized exploration responds to the literature finding that risk perception is fundamentally geographic and experience-dependent (Kellens et al., 2011; Bradford et al., 2012), and that generic discussions obscure precisely the variation that drives governance challenges.

A facilitated report-back (~20 minutes) synthesizes group findings, with the facilitator highlighting cross-group differences and framing the core tension that motivates Phase 2: how can governance function effectively when perceptions, priorities, and institutional arrangements vary so substantially?

4.4 Phase 2: From evidence to governance challenges

This phase bridges evidence and action by reframing empirical patterns as governance problems that require collective response. It draws on all four gap dimensions and activates Principles B (Heterogeneity-responsive design) and C (Bias awareness integration).

Building on Phase 1 findings, the facilitator presents three cross-cutting governance challenges derived from the literature review. These challenges are indicative (practically would be refined based on the specific context) but are designed to address the core mechanisms identified across the four gap dimensions:

- Challenge 1: The salience trap. How can political and public support for protection be maintained between disasters, given that attention and funding

follow a post-disaster surge-and-decline pattern? This challenge operationalizes the salience bias and preference instability findings (Loewenstein et al., 2003; Bordalo et al., 2022; Koundouri et al., 2023) and addresses the reactive governance pattern documented in the implementation gaps literature (European Court of Auditors, 2018; Merz et al., 2021).

- Challenge 2: The heterogeneity challenge. How can governance account for the fact that risk perceptions, institutional capacities, and stakeholder priorities vary substantially across geographies, demographics, and governance levels? This challenge integrates knowledge gaps (perception heterogeneity) with institutional gaps (divergent implementation, coordination failures).
- Challenge 3: The feedback loop deficit. How can participatory processes generate outputs that are genuinely taken up by institutions, monitored, and revisited (rather than producing recommendations that are acknowledged and then archived)? This challenge directly addresses the participation-implementation interface documented (European Court of Auditors, 2018; Mees et al., 2018b; Newig et al., 2018).

Participants reorganize into mixed-stakeholder groups (~40 minutes), each tackling one challenge. Mixing stakeholder types is essential: the institutional gaps literature shows that governance failures frequently occur at the interfaces between sectors and levels (Rhein & Kreibich, 2025), and deliberation within homogeneous groups reproduces rather than bridges these divides. Groups are guided to consider: what institutional mechanisms currently exist to address this challenge, where they fail, and what alternative approaches could work within existing governance structures.

4.5 Phase 3: Capacity building and action planning

This phase translates deliberation into concrete, accountable outputs, operationalizing Principle D (Action-oriented structure) and directly addressing both implementation and participation gaps.

- Solution development (~50 minutes): Groups design two to three concrete interventions for their assigned challenge. To ensure interventions are specific and traceable, each must be documented using a structured specification template requiring: the target population or institutional actor; the timing within the disaster cycle (pre-event, during event, post-event, inter-event); the institutional mechanism through which the intervention would operate; and the evidence link, namely which gap dimension(s) and which specific finding(s) the intervention addresses. This template requirement is not procedural formality; it operationalizes the gap-to-action traceability that distinguishes this framework from ad hoc workshop designs. Indicative intervention types, informed by the literature, include anti-cyclical funding arrangements that ring-fence post-disaster budgets for long-term mitigation (addressing the salience trap), segmented risk communication strategies tailored to different audience profiles (addressing perception heterogeneity), adaptive budgeting processes with built-in review triggers linked to perception or risk indicators (addressing preference instability), and cross-sector coordination protocols specifying who

acts, when, and with what authority during the warning-to-action chain (addressing institutional fragmentation).

- Cross-group integration (~25 minutes): Groups present their proposed interventions. The facilitator maps connections across groups: identifying synergies (e.g., anti-cyclical funding enabling segmented communication), tensions (e.g., resource competition between interventions), and links proposed actions back to the evidence base presented in Phase 1. This integration step addresses the institutional gap of sectoral silos by forcing cross-challenge deliberation.
- Commitment phase (~15 minutes): Each stakeholder category articulates one specific follow-up action aligned with their institutional role and capacity. These commitments are documented as a public record and form the basis for post-workshop accountability. The commitment phase is grounded in the participation gaps finding that workshops that do not translate into observable institutional actions generate stakeholder fatigue and disengagement (Mees et al., 2018a; Newig et al., 2018). By creating social commitment devices (public pledges with specified timelines and designated responsible actors) the framework counteracts this pattern.

4.6 Post-workshop outputs and follow-up

The follow-up mechanism is what most critically distinguishes this framework from standard workshop designs. The participation gaps literature consistently identifies the lack of mechanisms linking workshop outputs to subsequent decision-making processes as a primary reason workshops fail to influence governance (Mees et al., 2018b; Newig et al., 2018; Wehn et al., 2019). The framework addresses this through two output categories.

- Immediate outputs (within weeks): a) an intervention portfolio documenting the proposed mechanisms with full specification templates; b) an evidence-to-action map visually connecting the empirical findings from the evidence base through the governance challenges to the proposed interventions, serving both as a synthesis device and as a communication tool for wider dissemination; and c) a structured record of stakeholder commitments with specified timelines and responsible actors.
- Medium-term outputs and feedback loops (3–6 months): a) co-authored policy briefs organized around the governance challenges, translating workshop outputs into formats suitable for institutional uptake; b) a follow-up session (at 6 months) revisiting commitments, assessing progress, and examining whether the salience-driven dynamics documented in the literature are already affecting implementation momentum; and c) where resources permit, a perception audit comparing current stakeholder views with the baseline evidence used in the workshop, creating a feedback loop between evidence, deliberation, and governance adjustment. This audit function is grounded in the adaptive governance literature (Folke et al., 2005, 2016; Pahl-Wostl, 2009), which emphasizes that governance systems must learn and adjust iteratively rather than treating any single deliberative output as definitive.

4.7 Replicability and adaptation pathways

The framework's logical structure “gaps-principles-phases-institutional outputs” is transferable across contexts. Adaptation operates along five dimensions without altering this core logic:

- geographic scope (from community to transnational, adjusting stakeholder composition accordingly);
- hazard type (the framework is designed for floods but its structure is applicable to drought, wildfire, or multi-hazard contexts where similar governance gaps exist);
- institutional context (centralized vs. federated governance, adjusting the cross-scale representation requirement);
- evidence type (surveys, monitoring data, FD evaluations, insurance records, depending on availability); and
- format (half-day, full-day, multi-day, or hybrid/virtual designs, adjusting phase durations proportionally).

Minimum requirements for application are: the availability of some form of localized evidence on flood risk or governance performance, sufficient to function as a boundary object for deliberation; access to multi-level, multi-sector stakeholders with genuine decision-making relevance; and institutional willingness (at minimum from one convening authority) to consider workshop outputs in subsequent decision-making. Where the first requirement is not met, a preliminary evidence-gathering phase (e.g., rapid risk perception survey, secondary data compilation) would precede workshop implementation.

5. Discussion

The framework proposed in this paper offers three contributions to the flood risk governance literature, each addressing a limitation identified in the review.

The first is methodological: a traceable pipeline from literature-identified governance gaps, through design principles, to specific workshop activities. This pipeline ensures that each element of the workshop design is justified by evidence rather than assembled ad hoc (a common criticism of participatory approaches in flood risk management). The gap-to-principle mapping (Table 3) makes this traceability explicit and contestable: readers and practitioners can evaluate whether a given design choice adequately addresses the gap it targets, and can substitute or extend components as warranted by their context. This transparency also provides a basis for systematic evaluation in future empirical applications, something largely absent from existing workshop-based approaches, which rarely articulate the theoretical rationale for their design choices in ways that permit comparative assessment.

The second contribution is theoretical integration, as we draw on six distinct traditions (collaborative governance, boundary objects, adaptive governance, knowledge co-production, behavioural economics, and the SIA) because no single tradition adequately covers the multi-dimensional nature of the policy-implementation gap.

Thus, the proposed framework combines a solid process architecture, able to identify the biases, emphasize learning and iteration, specify how evidence should enter deliberative processes, while being attentive to implementation dynamics. The integration itself, namely the demonstration that these traditions are complementary and jointly necessary, constitutes a contribution beyond the individual components.

The third contribution is the modular design's practicality, with a fixed logical structure (gaps-principles-phases-institutional outputs) and adaptable content. This responds to a genuine tension in the participatory governance literature between generalizability and context-specificity (Hegger et al., 2016; Wiering et al., 2017). European flood governance arrangements are too diverse for a rigid, prescriptive workshop template, but too fragmented for purely ad hoc engagement. The framework navigates this by specifying what must be present (evidence as boundary object, phased progression, commitment and follow-up mechanisms) while leaving how these are operationalized to local adaptation. The minimum requirements for application (localized evidence, multi-level stakeholders, institutional willingness to consider outputs) are intentionally modest, maximizing the range of contexts in which the framework can be deployed.

A distinctive feature of the framework is its treatment of empirical evidence as a boundary object (Star & Griesemer, 1989; Cash et al., 2003; Clark et al., 2016) within the workshop. Rather than functioning as a one-directional expert input that participants passively receive, evidence functions as a shared deliberative artifact that different stakeholder groups interrogate and contextualize from their own perspectives. This approach is consistent with the knowledge co-production literature (Norström et al., 2020) and with deliberative democratic practice, which emphasizes that information provision before preference elicitation produces more reflective outcomes (Fishkin, 2009; Willis et al., 2022). It also responds directly to the knowledge gap finding that linear science communication systematically underperforms because it fails to meet the criteria of salience, credibility, legitimacy, and usability that effective knowledge systems require (Cash et al., 2003; Clark et al., 2016).

The framework's explicit treatment of cognitive biases (particularly the salience trap and preference instability) as governance challenges rather than individual irrationalities represents a departure from much of the participatory flood governance literature, which tends to treat risk perception as a communication problem to be solved rather than as a structural feature of the governance landscape to be navigated. The behavioural economics literature (Loewenstein et al., 2003; Bordalo et al., 2012, 2022; Koundouri et al., 2023) makes clear that these biases are systematic, predictable, and domain-general. The framework's response to make biases visible through temporal comparisons, metacognitive reflection, and structured challenge framing, does not attempt to eliminate biases (which is unrealistic) but rather to incorporate awareness of them into the governance process itself, enabling stakeholders to design adaptive instruments that anticipate rather than merely react to shifting preferences.

The post-workshop follow-up mechanism deserves particular emphasis, as it addresses what the review identified as arguably the most consequential participation gap: the absence of institutional feedback loops between workshop outputs and governance decisions (Mees et al., 2018b; Newig et al., 2018; Ainscough & Willis,

2024). The framework's commitment phase, follow-up sessions, and perception audit instruments are designed to counteract this pattern by creating social accountability devices and iterative learning cycles grounded in adaptive governance theory (Folke et al., 2005, 2016; Pahl-Wostl, 2009, 2015). Whether these mechanisms are sufficient to overcome the institutional inertia and political disincentives that typically erode post-workshop momentum is an empirical question that only implementation and evaluation can answer.

This leads to the most important limitation: the framework has not been empirically tested. It is a theoretically grounded proposal, not a validated intervention. While the literature review provides robust evidence for the existence and mechanisms of the governance gaps the framework targets, and while each design element is justified by established theory and practice, the question of whether the assembled framework produces better governance outcomes than alternative approaches remains open. A second caveat is that workshop effectiveness is inherently dependent on facilitation quality, institutional context, and political willingness; factors that the framework can account for in design but cannot guarantee. Third, the framework assumes the availability of some form of localized evidence as input; where this is lacking, a preliminary data-gathering phase would be required, adding cost and time. Finally, the long-term impact of any single workshop intervention remains uncertain and would require longitudinal evaluation to assess.

These limitations define a clear research agenda. Priority should be given to pilot testing the framework in some European contexts with contrasting governance traditions. For example, a centralized system (France), a federated system (Germany), and a polycentric system (the Netherlands), to evaluate whether the modular design adapts effectively across institutional settings. Comparative evaluation of workshop outcomes across these pilots, using both process metrics (quality of deliberation, stakeholder satisfaction, perceived legitimacy) and outcome metrics (institutional uptake of outputs, policy changes, sustained engagement), would provide the evidence base currently missing. Integration with digital tools (real-time evidence dashboards, online deliberation platforms, scenario simulation) represents a further development pathway that could enhance both the evidence immersion phase and the post-workshop follow-up mechanism. Finally, extending the framework beyond floods to other climate-related hazards (drought, wildfire, heatwaves) where analogous governance gaps exist would test its transferability across hazard domains.

6. Conclusions

This paper has developed a modular, evidence-informed stakeholder workshop framework for flood risk governance, designed to bridge the persistent gap between European flood policy and local implementation. The framework's core contribution is the a structured linkage from empirically identified governance gaps, through theoretically grounded design principles, to specific and adaptable workshop components, an integration that existing participatory approaches in flood risk management do not provide.

Four conclusions emerge from this work. First, evidence-to-engagement pipelines are feasible and should become standard practice in participatory flood governance. The framework demonstrates that literature-identified gaps can be systematically translated into structured deliberative processes, moving beyond the prevailing model of ad hoc workshop design. Second, heterogeneity in risk perception, institutional arrangements, and stakeholder priorities is not an obstacle to effective governance but a productive resource when made visible through structured deliberation. Embracing rather than smoothing over this variation enables locally differentiated and therefore more implementable governance responses. Third, building metacognitive capacity (helping stakeholders recognize their own perception biases, the salience trap, and preference instability) is as important as providing risk information, and should be a core function of participatory processes rather than an afterthought. Fourth, action-orientation with institutional accountability is essential: workshops that do not generate concrete, specified outputs with clear institutional pathways and follow-up mechanisms risk reproducing the very participation gap they aim to address.

More broadly, the framework responds to the growing recognition that the traditional linear pathway from scientific evidence through policy formulation to local implementation is too slow and too disconnected for the pace at which flood risk is evolving under climate change. As recent catastrophic events across Europe have demonstrated, the governance failures that produce devastating outcomes are failures of translation, coordination, and sustained commitment. Structured, evidence-informed stakeholder engagement offers a complementary mechanism for more responsive and adaptive flood governance, provided it is designed with the rigour and institutional awareness that the complexity of the challenge demands. The proposed framework is an attempt to provide that design. Its validation through empirical application is the necessary next step.

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