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Shaping local disaster risk governance through multi-stakeholder collaboration:
Insights from the public-private-civil partnership approach - *Application to the case
studies of the municipality of Egaleo (Greece) and Centro Region (Portugal)*

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i. Title, abstract and keywords

Title: Shaping local disaster risk governance through multi-stakeholder collaboration: Insights from the public-private-civil partnership approach - *Application to the case studies of the municipality of Egaleo (Greece) and Centro Region (Portugal)*

Abstract: In the face of growing climate-related risks, traditional top-down models of risk governance increasingly appear inadequate for enabling effective and inclusive local resilience planning. The public-private-civil partnership (PPCP®) approach was developed to foster collaborative governance by involving stakeholders from the public, private, and civil society sectors in co-designing context-sensitive strategies. This article outlines the conceptual foundations and core principles of the PPCP®, based on a review of governance models and social innovation tools, and details its implementation through a series of locally organized Labs. Drawing on experience from two case studies areas (Egaleo in Greece and two municipalities in Portugal's Centro Region), it highlights outcomes such as improved cross-sector dialogue, the co-production of local knowledge, and more collaborative governance practices. The article also identifies key challenges, including low private sector involvement, institutional inertia, and limited civil society mobilization. It concludes with recommendations to overcome these barriers and strengthen the PPCP®'s transformative potential. These findings contribute to ongoing debates on local governance for climate resilience and propose pathways for embedding more inclusive and adaptive participatory processes.

Keywords:

- Participatory governance
- Public-private-civil partnership
- Stakeholder engagement
- Co-creation and co-design
- Disaster risk reduction
- Local risk governance

Table des matières

Introduction	3
1. State of the art.....	4
1.1. Risk and climate change	4
1.2. From hierarchical risk governance to participatory and inclusive approaches.....	4
1.3. Public-private-people partnerships.....	5
1.4. Public innovation and co-design tools.....	6
2. PPCP® approach.....	6
2.1. Key principles	7
2.1.1. A multi-stakeholders approach.....	7
2.1.2. A Lab-based approach.....	8
2.2. Design features and operational ethos of PPCP® Labs	9
2.3. PPCP® approach implementation process.....	10
2.3.1. Stage 1: Scoping.....	10
2.3.2. Stage 2: Implementation of PPCP® Labs	11
2.3.3. Stage 3: Capitalization and evaluation	13
3. PPCP® implementation feedback from Egaleo and Centro Region....	15
3.1. Municipality of Egaleo, Greece.....	15
3.1.1. Background and challenges.....	15
3.1.2. Implementation of the PPCP® approach	15
3.1.3. Focus on two governance-related activities	17
3.1.4. Initial results and impacts.....	18
3.1.5. Difficulties encountered	19
3.2. Centro Region, Portugal	20
3.2.1. Background and challenges.....	20
3.2.2. Implementation of the PPCP® approach	20
3.2.3. Focus on two activities governance-related	23
3.2.4. Initial results and impacts.....	24
3.2.5. Difficulties encountered	25
4. Critical analysis and perspectives.....	27
4.1. Outlook	27
4.1.1. In Egaleo	27

4.1.2. In Centro Region	27
4.2. Cross-cutting lessons from case studies implementation	28
4.3. Recommendations for overcoming structural and operational challenges in PPCP® implementation	28
4.3.1. Mobilizing the private sector	28
4.3.2. Engaging a fragmented or fragile civil society	29
4.3.3. Navigating institutional rigidity	29
4.3.4. Sustaining participation beyond the project	29

ii. Main text

Introduction

As natural disasters become more frequent and severe (heatwaves, floods, wildfires, etc.) traditional governance models often fail to provide adaptive, inclusive, and context-sensitive responses. While scientific and technological solutions are essential to mitigating impacts, their effectiveness depends on governance frameworks that foster trust, local ownership, and cross-sector coordination. In this context, climate and disaster risk governance frameworks increasingly emphasize the involvement of non-state actors, including private sector and civil society organizations, alongside public authorities in the design and implementation of public policies (Nasiritousi et al., 2016; Bäckstrand et al., 2017; Kuyper et al., 2018).

However, putting multi-actor collaboration into practice remains challenging. Conventional participatory methods are often criticized in the literature for their limited capacity to redistribute power and to sustain diverse stakeholder engagement over time (Barnaud et al., 2016; Ernst et al., 2018). To address this, the public-private-civil partnership (PPCP®) approach was developed as a flexible, transferable framework to foster more collaborative governance for climate-related risks. It was tested in two case studies: the municipality of Egaleo in Greece and the municipalities of Figueira da Foz and Montemor-o-Velho in Portugal's Centro Region.

This article investigates how the PPCP® approach can reshape local governance for greater climate resilience by addressing the question: *To what extent can a lab-based, multi-stakeholder model foster more inclusive, collaborative, and effective territorial governance in response to climate-related challenges?* It begins with a review of governance models and participatory tools in climate and disaster risk reduction (DRR), followed by the conceptual and methodological foundations of the PPCP®. It then examines two empirical applications of the approach, and concludes by reflecting on its contributions, limitations, and future potential.

1. State of the art

1.1. Risk and climate change

Understanding and preventing disasters triggered by natural hazards (floods, earthquakes, heatwaves, landslides, wildfires) is a key contemporary challenge. Human-driven climate change exacerbates these phenomena by increasing their intensity and frequency (IPCC, 2021; United Nations, 2024). The Intergovernmental Panel for Climate Change (IPCC) highlights an unprecedented 1.1°C rise in global temperature since the pre-industrial era, largely attributable to human activity (IPCC, 2023). Notably, 2024 became the first calendar year to exceed 1.5°C above pre-industrial levels (Copernicus, 2024).

Climate risk encompasses both the probability of an event, and the vulnerability of the systems affected (O’Keefe et al., 1976). Historically, risk management followed a sectoral, top-down approach involving centralized measures such as flood defenses, evacuation protocols, or efficiency standards (Giddens, 2009). However, recent years have seen a transition toward integrated and participatory strategies. Multi-hazard approaches and the active involvement of local populations are now recognized as essential for effective adaptation (Cannon & Müller-Mahn, 2010; Hickey & Mohan, 2004; Kiss et al., 2022; Righettini & Vicentini, 2023; Grabmaier et al., 2025).

Global frameworks such as the Sendai Framework for DRR, the Paris Agreement, and the United Nations Framework Convention on Climate Change (UNFCCC) guide action on climate risks. At the European Union (EU) level, the Strategy on Adaptation to Climate Change encourages member states to develop climate-informed risk plans (European Commission, 2021). National and local strategies increasingly integrate climate issues into spatial planning (MEDDTL, 2011).

1.2. From hierarchical risk governance to participatory and inclusive approaches

Conventional governance models in disaster risk management and climate adaptation have long been characterized by expert-driven and hierarchical structures. Centralized institutions typically designed strategies with limited stakeholder involvement, privileging technical expertise over local knowledge (Scolobig et al., 2015). While such arrangements often provided clarity and speed in decision-making, they frequently failed to account for local social dynamics, place-based vulnerabilities, and contextual differences, thereby undermining their effectiveness and social acceptance (European Environment Agency, 2023). Tokenistic forms of participation and standardized solutions have been shown to perpetuate existing power asymmetries and inequities, raising concerns regarding legitimacy, responsiveness, and local alignment (Olazabal et al., 2024; Parsons, 2025).

In response to these limitations, disaster and climate risk governance is increasingly shifting towards more participatory and inclusive models. International frameworks such as the Sendai Framework for DRR and the Paris Agreement explicitly promote all-of-society approaches, calling for the active involvement of civil society, private sector actors, academia, and vulnerable groups alongside public authorities (UNDRR, 2015; UNFCCC, 2015). Within this paradigm, governments are encouraged to share responsibilities with non-state actors through multi-actor platforms, including local resilience councils and cross-sector collaboration fora.

This evolution is also reflected in the growing prominence of Community-Based Adaptation approaches, which prioritise locally grounded, needs-based solutions and community ownership of adaptation processes (Selje, 2024). Empirical studies indicate that inclusive co-planning enhances social equity, legitimacy, and the long-term uptake of adaptation measures (Grabmaier et al., 2025). Beyond emergency and climate-specific contexts, this shift aligns with the 2030 Agenda for Sustainable Development, which emphasises inclusive and durable partnerships as a cornerstone of sustainable development. In this framework, governments are increasingly expected to engage non-state actors not merely as consultants or service providers, but as institutional partners in addressing complex and interconnected societal challenges (Okitasari et al., 2020).

1.3. Public-private-people partnerships

Multi-stakeholder governance frameworks increasingly emphasize collaborative models that move beyond purely state-led or market-based solutions. Traditional Public-Private Partnerships (PPP) gained prominence in the 1990s through New Public Management reforms, which sought to improve efficiency and service delivery by mobilizing private sector resources and expertise (Hodge & Greve, 2007). While these arrangements reshaped public action in many policy domains, they have also been criticized for their ambiguous contribution to the public interest and their limited capacity to address issues of democratic accountability, social equity, and power asymmetries. In complex policy arenas such as climate adaptation and disaster risk management, PPPs have been shown to prioritize contractual efficiency over inclusiveness, learning, and long-term resilience (Hodge & Greve, 2007; Emerson, Nabatchi, & Balogh, 2012).

To tackle these limitations, DRR governance has progressively evolved towards more inclusive and collaborative approaches that explicitly recognize the role of civil society organizations, community-based actors, and informal networks alongside public and private stakeholders. International frameworks such as the Sendai Framework for Disaster Risk Reduction and the Paris Agreement promote all-of-society approaches, encouraging governments to share responsibilities with non-state actors across sectors and governance levels (UNDRR, 2015; UNFCCC, 2015). This evolution is embedded in a broader shift towards networked and polycentric governance, which emphasizes coordination across institutional levels, flexibility, and collective learning in the management of complex and uncertain risks (Ansell & Gash, 2008; Ostrom, 2010; Bodin, 2017).

From a social-ecological systems perspective, multi-stakeholder governance is increasingly recognized as a key condition for resilience, as it enables the mobilization of diverse forms of knowledge, the articulation of local and scientific expertise, and the management of interdependencies between ecological and social systems (Folke et al., 2005; Galaz et al., 2012). Empirical studies suggest that such arrangements can enhance the legitimacy, adaptability, and robustness of risk governance, particularly when sustained over time and supported by appropriate institutional arrangements (Emerson & Nabatchi, 2015).

Within this broader evolution, the concept of public-private-people partnerships (4P), introduced by Clara Irazábal in the context of Latin American urban regeneration, offers a particularly relevant framework for operationalizing multi-stakeholder governance. Drawing on case studies from São Paulo, Medellín, Chile, and Mexico, Irazábal demonstrates how 4P arrangements can foster more inclusive governance by recognizing communities and grassroots

organizations as governance actors in their own right, rather than as passive beneficiaries or external consultees (Irazábal, 2016). Beyond urban development, the application of the 4P concept to Iran's COVID-19 response further illustrates how structured coordination across public-private, public-people, and private-people interfaces can strengthen crisis management through community involvement, trust-building, and shared responsibility (Seddighi et al., 2021). Together, these bodies of work highlight the relevance of multi-stakeholder governance frameworks for addressing natural hazards and climate-related disasters in contexts where state-centred approaches alone are insufficient.

1.4. Public innovation and co-design tools

Public innovation tools such as Design Thinking and Living Labs are increasingly used to co-develop solutions with a wide range of stakeholders (Bason, 2010; Schuurman, De Mare, & Ballon, 2016). They offer promising pathways to renew participatory governance, especially in the field of natural risk management.

Design Thinking, originally from the design sector, has been adapted to public innovation by emphasizing citizen-centered approaches (Brown & Wyatt, 2009). It promotes empathy, creative reframing, and iterative prototyping, encouraging locally grounded solutions rather than top-down fixes (Liedtka & Salzman, 2018). Today, many governments and research institutions apply this approach to rethink policy challenges with end-users from the start.

Living Labs, for their part, are open innovation ecosystems that bring together researchers, citizens, public actors, and businesses to test ideas in real-life settings (Almirall & Wareham, 2008) and also co-create and validate ideas or solutions. They have gained traction in fields like urban planning, disaster preparedness, and climate adaptation, offering spaces for experimentation that align technical solutions with everyday realities.

Other co-design formats, such as participatory scenario-building, citizen assemblies, or digital platforms, also help build shared understanding and trust. Visual tools like mapping or storytelling make complex issues more accessible, especially for non-experts. Altogether, these approaches nurture democratic engagement and sustained collaboration, key to building resilient territories.

The growing emphasis on inclusive and collaborative governance highlights the limitations of traditional top-down models in managing disaster and climate risks. Approaches like 4P, Design Thinking, and Living Labs demonstrate the value of engaging diverse stakeholders through co-creation and shared responsibility. Building on these insights, the next section introduces the PPCP® approach as a structured framework to operationalize tripartite collaboration and enhance participatory governance at a local level.

2. PPCP® approach

PPCP® is a multi-stakeholder engagement approach aiming to strengthen territorial resilience to climate and environmental risks. Developed and implemented by Artelia¹ within the framework of two Horizon Europe projects, C2IMPRESS (GA 101074004) and Med-IREN (GA 101157707), it aims at creating spaces for dialogue, co-creation, and collaboration between public authorities, private sector actors, and civil society representatives. It is operationalized through a series of workshops ("Labs") where participants explore crisis scenarios, identify

¹ <https://www.arteliagroup.com/fr/>

vulnerabilities, test technical tools, and co-produce governance recommendations. While not a decision-making framework per se, the PPCP® seeks to promote collaborative and participatory governance by fostering interaction across sectors, valuing local knowledge, and supporting cooperative dynamics that can ultimately influence public policy and planning.

2.1.Key principles

The PPCP® approach is based on two core dimensions, which are the tripartite engagement of public, private, and civil society actors on one hand, and the Lab-based framework on the other hand, where these stakeholders co-design DRR governance solutions collaboratively.

2.1.1. A multi-stakeholders approach

The PPCP® aims to bring together three main categories of stakeholders: public and private actors as well as representatives of civil society. While these groups are often involved in consultation processes, effective collaboration between them remains complex due to their profoundly different statuses, roles, interests, and cultures of action.

2.1.1.1. *Roles and characteristics of stakeholder categories in PPCP®*

The public sector includes institutions at national, regional, and local levels (e.g., municipalities, government agencies, public operators) that implement risk prevention policies and play a central role in DRR through planning, regulation, and resource provision.

With its technical expertise and legislative power, it implements risk prevention policies. However, its hierarchical structure and accountability obligations may lead to inertia and hinder collaboration, especially with private actors (Hrivnák et al., 2021; Leite & Ingstrup, 2022).

The private sector comprises for-profit entities of all sizes: companies, start-ups, chambers of commerce, service providers, technology suppliers (and contributes innovation, financing, and operational capacity). Their engagement often depends on social responsibility, economic interests, or risk exposure (e.g., in flood-prone areas).

Civil society includes NGOs, associations, community groups, trade unions, and citizen collectives committed to environmental or social causes. It grounds the PPCP® in local realities, offering knowledge of vulnerabilities and uses². Often first responders during crises, these actors are key to solution acceptance and community resilience, despite limited resources and marginalization from formal decision-making.

Divergences in logic, governance, and power relations can impede collaboration and mutual recognition (Oburu & Yoshikawa, 2018). The PPCP® aims to bridge these divides by fostering spaces for dialogue and learning, supporting more inclusive and collaborative local governance.

2.1.1.2. *Beyond sectors: a role-based approach to stakeholder categorization*

While the PPCP® approach relies on the tripartite categorization of public, private, and civil society stakeholders, it acknowledges the complexity and fluidity of these boundaries in

² In sociology, the concept of usage refers to the way in which individuals or social groups appropriate the mechanisms, tools, rules, or policies that are offered or imposed on them. Usage should not be confused with the design intention or the prescribed function of a mechanism. It refers to the actual, situated and sometimes misappropriated practices through which users give meaning to, adjust, transform or circumvent an institutional framework in their daily lives. The analysis of uses thus emphasizes the gap between formal mechanisms and actual practices, and the active role of beneficiaries in the implementation of public policies, plans, tools or infrastructure (De Certeau, 1980).

practice. Universities, media organizations, and even individuals often occupy hybrid roles that blur traditional sectoral distinctions.

In their review of collaborative governance, Bryson et al. (2016) emphasize the relational function of stakeholders rather than their organizational label. They recommend identifying actors based on their actual contributions to the governance process and the stance they adopt at the moment of engagement.

Similarly, transdisciplinary engagement methodologies (Schuurman et al., 2016) advocate for the use of cross-sectoral profiles and nuanced stakeholder mappings that reflect the hybridity of roles, rather than enforcing strict sectoral classifications.

Building on participatory governance insights from scientific literature and lessons learned from previous multi-stakeholder processes, the PPCP® adopts a flexible, role-based approach to stakeholder categorization, privileging declared intent and functional contribution over rigid institutional affiliation, to foster more inclusive and context-sensitive collaborative dynamics.

2.1.2. A Lab-based approach

At the heart of the PPCP® approach lies regular events called “PPCP® Labs.”, which are structured exchange and co-creation workshops organized within the framework of resilience-focused projects, particularly those addressing disaster risk reduction and climate change adaptation.

Each Lab gathers the stakeholders mentioned above, which are identified at the early stage of the project through an exercise conducted in close collaboration with the local administration. The latter provides an initial list of relevant stakeholders, which is then reviewed and, when necessary, complemented by the Artelia consulting team to ensure that no key actor is overlooked. The objective is not to involve all possible stakeholders, but to identify, in a justified and transparent manner, those actors who are affected, concerned, influential, or vulnerable in relation to the risks and challenges addressed by the project.

Stakeholder selection is based on the following criteria: (i) exposure, direct or indirect, to the climate risks or hazards addressed by the project (such as heatwaves, wildfires or floods), and potential sensitivity to associated socio-economic, territorial, or environmental impacts; (ii) contribution, intentional or not, to local dynamics of vulnerability, risk, or resilience through practices, decisions, policies, economic models, or spatial planning choices; and (iii) involvement in the design, implementation, regulation, or influence of prevention, adaptation, response, or recovery measures discussed in the Labs, including preparedness tools and governance mechanisms.

The Labs are typically held over a half-day or full-day session and are hosted either by a municipality, a research partner, or both in collaboration. Inside a PPCP® Lab, participants engage in interactive and immersive activities such as risk mapping, scenario simulations, or co-design exercises. The Labs aim not only to share knowledge but to produce actionable outcomes: data, recommendations, feedback on tools, or collaborative roadmaps. They are deliberately designed to foster inclusive dialogue, creative problem-solving, and long-term engagement among stakeholders who may not usually work together in a coordinated manner.

The PPCP® Labs are meant to be organized regularly³ throughout the lifecycle of a project: they are designed to unfold sequentially in an incremental, co-constructive logic, whereby each Lab builds upon the outcomes of the previous one. Between each Lab, a capitalization phase is carried out to reflect on lessons learned, drawing both from the technical outputs generated and from participants' feedback and evolving expectations. While the case studies presented later in this article experimented with a four-Lab sequence, this number is not prescriptive. The number and frequency of Labs should be adapted to the project's objectives, the local governance culture, and the complexity of the issues at stake. Ideally, the same stakeholder group participates throughout the entire Lab series, fostering continuity, mutual learning, and progressively deepening collaboration and engagement.

Figure 1 outlines the incremental objectives of each Lab, as applied in the Portuguese and Greek case studies, to progressively build towards more collaborative and resilient local governance.

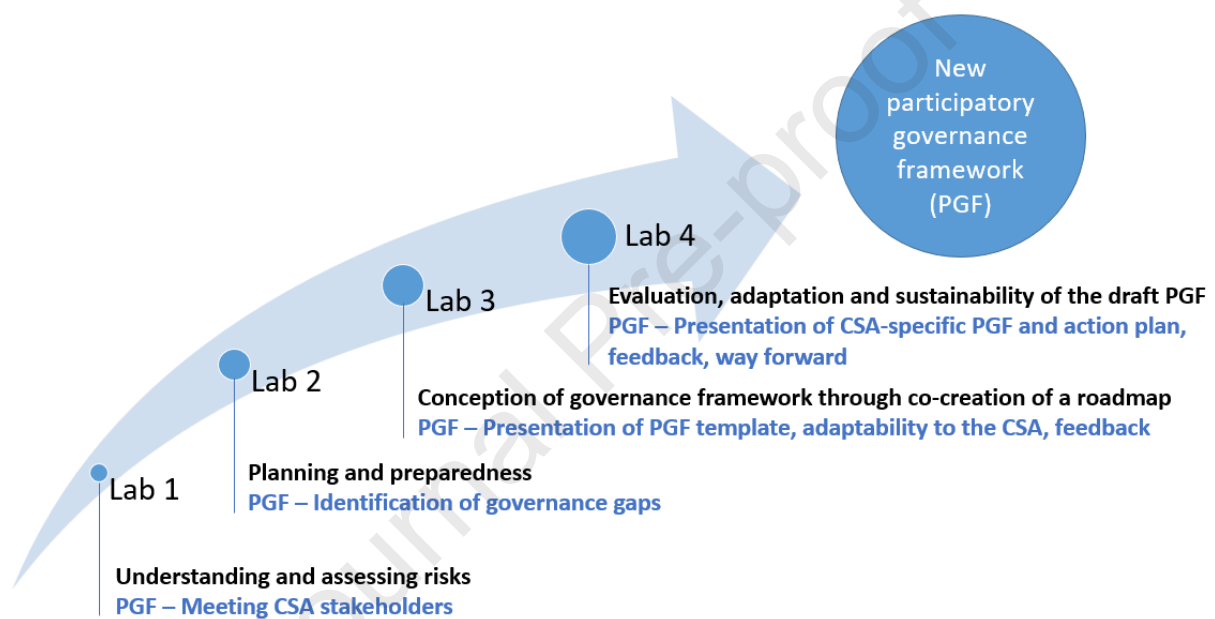


Figure 1 - Specific objectives of the Labs (in black) and sequence for building a participatory governance framework (PGF) (in blue) in the case-study areas (CSA) of the project

2.2.Design features and operational ethos of PPCP® Labs

PPCP® Labs are grounded in a set of operational principles that translate participatory intentions into tangible practices. First, they rely on accessible and inclusive facilitation instruments, called “tools”, used within the Labs, such as risk and impact prioritization matrices, participatory stakeholder mapping exercises, collective mind-mapping, or scenario-based discussion frameworks adapted to the local context. These tools are designed to be intuitive, language is kept plain, and introductory sessions are often provided, enabling both residents and institutional actors to participate on equal footing (Shanley, Gianni & Meacham, 2021). Second, co-creation and active involvement are central: participants are not simply consulted but treated as co-designers. The Labs are structured around interactive activities, such

³ In the two Horizon Europe projects for which the PPCP® was implemented (lasting 3 and 4 years, respectively), the Labs were organized at an indicative frequency of 6 months.

as workshops, scenarios, and prototyping exercises, that allow stakeholders to shape both the problems and the solutions collectively (Aili et al., 2024). Third, the use of creative and participatory tools plays a key role in fostering innovation and flattening hierarchies. Drawing inspiration from Design Thinking, the Labs integrate methods such as visual mapping, storytelling, and role play to stimulate collaboration and imaginative thinking (Schoorlemmer et al., 2023). A fourth principle is the promotion of horizontal governance, whereby public, private, and civil society actors are encouraged to interact as peers. This configuration supports mutual learning and joint agenda-setting, rather than top-down imposition (Cuomo, 2022). Fifth, PPCP® Labs aim to establish accountability mechanisms. By formalizing commitments, for example through climate charters or joint statements, and linking them to local strategies or planning documents, the Labs reinforce continuity and follow-up (Seddighi et al., 2021).

While PPCP® Labs share several methodological features with Living Labs, particularly the emphasis on co-design, real-life experimentation, and iterative learning, they differ in their underlying focus and objectives. Living Labs are generally grounded in a user-centred innovation philosophy, in which end users are placed at the core of research and experimentation processes. In the context of disaster and climate risk governance, this often translates into engaging individual citizens as end users of tools, services, or preparedness measures. By contrast, PPCP® Labs do not primarily target individual citizens as participants. They are instead designed to convene organized stakeholders, including public authorities, private actors, and civil society organizations, in order to collaboratively shape governance arrangements and territorial resilience strategies.

2.3.PPCP® approach implementation process

The PPCP® approach is based on a progressive implementation structured in three main stages:

- Scoping, focusing on analysis of local context and expectations as well as stakeholder identification;
- Operational implementation, corresponding to the organization of the PPCP® Labs, and;
- Capitalization and evaluation, both at the end of each Lab and at the end of the full bass process, aimed at measuring the results obtained, drawing lessons from them and considering the next steps to be taken.

2.3.1. Stage 1: Scoping

Scoping is essential for grounding the Labs in local realities, ensuring inclusivity in stakeholder selection, and tailoring the participatory process to both territorial needs and project objectives. It consists in three main steps: (a) territorial context analysis and needs assessment, (b) stakeholder identification and inclusion strategy, and (c) co-design of the Labs program.

2.3.1.1. Territorial context analysis and needs assessment

Each PPCP® Lab cycle is grounded in a structured understanding of the local context. This understanding is built through an initial diagnostic phase, starting with the completion by the local administration of a baseline questionnaire covering key territorial dimensions. This baseline addresses, in a structured manner, the general context (including geographical, demographic, and economic characteristics), observed and projected vulnerabilities and

impacts at both territorial and sectoral scales, the multi-level governance framework, and existing response measures, including knowledge production, participatory governance initiatives, policies and action plans, and implemented grey and green adaptation measures. Once the completed questionnaire is received, a follow-up online interview is organized between the PPCP® facilitation team and the local administration to further explore specific themes, clarify sensitivities, and jointly identify priority issues to be addressed during the Labs.

This step allows for mapping of local governance structures, climate-related challenges, territorial vulnerabilities, and expectations for the Labs. It helps facilitators tailor their approach, identify collaboration leverage points, and define priorities and engagement tools accordingly.

2.3.1.2. Stakeholders' identification and inclusion strategy

The second pillar of the scoping involves identifying the stakeholders to be invited to the PPCP® Labs. The selection process is guided by three core criteria: (a) the stakeholder's direct or indirect link to the project's thematic areas (e.g., climate risk management, urban resilience, nature-based solutions); (b) their potential influence on (or vulnerability to) the decisions discussed in the Labs; and (c) their capacity to contribute to the collective process in terms of knowledge, resources, or social legitimacy. Particular attention is paid to engaging stakeholders who are often overlooked or underrepresented (especially within the private sector and civil society) and to ensuring the inclusion of players representing vulnerable or marginalized groups. This commitment to equity extends beyond institutional roles to consider the lived experience and civic positioning of individuals (e.g., a company employee who is also an active parent in a local school community).

2.3.1.3. Co-design of the 1st Lab program

Once the stakeholders list is defined and the contextual analysis is complete, a co-design meeting is organized between the PPCP® facilitator and the local organizing team to collaboratively plan the 1st Lab agenda in a co-design session structured in three parts: (a) the PPCP® facilitator presents the results of the contextual analysis and a proposed set of participatory tools aligned with PPCP® principles; (b) the local organizing team provides feedback on the relevance of these tools in relation to their stakeholder profiles, project goals, and potential barriers to engagement or comprehension; (c) together, the facilitator and the organizing team finalize the co-construction of the detailed workshop program.

2.3.2. Stage 2: Implementation of PPCP® Labs

The implementation of PPCP® Labs constitutes the operational heart of the approach.

2.3.2.1. Content and format of the Labs

The Labs are typically held every six months⁴ throughout the duration of the project for which it is being implemented, and each Lab lasts between half a day and a full day⁵. While each Lab's

⁴ This frequency is indicative and should adapt both to territorial needs and stakeholders' availability, helping avoid fatigue from the growing number of collaborative workshops in Horizon Europe projects.

⁵ While a full-day format fosters richer exchanges and outcomes, limited availability, especially among private and civil society stakeholders, may make half-day sessions more suitable.

agenda remains flexible to accommodate local specificities and lessons learned from previous Labs, its structure generally follows a generic sequence.

A typical Lab opens with a plenary session, during which the objectives of the session are clarified by the main presenters- ideally a joint duo formed by a local authority and a research institution. This opening also includes brief presentations to set the context: recent developments in the project, emerging challenges (such as climate-related risks or urban vulnerabilities), or results from previous Labs.

Following this introduction, participants are divided into breakout groups to engage in participatory activities specifically tailored to the Lab's goals. These may include community mapping, risk chain analysis, solution prototyping, governance scenario testing, site visits to test solutions in real-life conditions, or simulation games.

After the breakout work, the Lab typically reconvenes in a closing plenary where each group presents its findings, ideas or prototypes. These collective restitutions often give rise to new perspectives, allowing for a synthesis of diverging inputs and highlighting synergies.

2.3.2.2. *Structured diversity in participation*

Despite the PPCP® approach's strong emphasis on tripartite collaboration, ensuring balanced representation across these three sectors within the Labs remains a challenge: public actors are typically more responsive, as they are often institutionally mandated to participate in local resilience initiatives. In contrast, private stakeholders and civil society representatives may encounter structural or motivational barriers to engagement. While strict numerical equality is seldom achieved, the PPCP® approach incorporates several mechanisms to mitigate these imbalances. These include early bilateral outreach to underrepresented stakeholders to highlight the concrete benefits of participation, such as increased visibility, access to project outcomes, and the possibility to influence local decision-making. The approach also encourages the inclusion of hybrid actors like universities, cooperatives, and citizen collectives that can serve as bridges across sectors. Moreover, it promotes flexible engagement formats, including brief activities integrated into existing local events, such as crisis simulation exercises, municipal forums or community of practice meetings.

2.3.2.3. *Key support roles of organizing team during Labs*

Successful implementation of a PPCP® Lab relies not only on appropriate methods and tools, but also on clearly defined and complementary roles within the organizing team.

Lead presenters and hosts are responsible for guiding participants through the Lab by introducing objectives, providing instructions, and setting the pace. Ideally, this role is shared between a local authority and a research partner, combining institutional legitimacy with technical credibility.

PPCP® facilitators play a key role in maintaining the participatory and inclusive ethos of the approach. They manage group dynamics, monitor timing, and foster active engagement. While they may not be technical experts, their task is to ensure that collaborative principles are upheld throughout the Lab.

Observers / note-takers are responsible for documenting discussions, outputs, and both formal and informal exchanges to support post-Lab analysis. They should not intervene as experts or assess the validity of stakeholders' contributions, but only to clarify instructions, reframe misunderstood exercises, or encourage participation and inclusive group dynamics.

2.3.2.4. Logistical considerations

While often underestimated, logistical aspects can significantly influence the quality of interaction and inclusiveness in PPCP® Labs.

Identification and visibility

The use of name tags, color-coded labels, or affiliation markers is highly encouraged not only to help participants quickly identify who they are speaking to (stakeholder type, institution), but also to aid observers / note-takers in linking quotes or contributions to each stakeholder category for analysis.

Room setup and subgroup configuration

The spatial organization of the venue should support interaction: round tables, mobile chairs, whiteboards and clear visual supports are preferred. Equally important is the structure of subgroup activities: the PPCP® recommends group sizes of 3 to 7 people to maintain high interactivity and prevent participants from being left out. Depending on the goals of each activity, these groups can either be mixed (with at least one actor from each sector) to foster cross-sectoral dialogue, or homogeneous (single-sector) to encourage sector-specific reflection.

The importance of informal times

Beyond the formal structure, informal moments (coffee breaks, meals, and unstructured mingling times) must not be underestimated. These seemingly peripheral intervals often prove more fertile for dialogue and collaboration than the structured activities themselves. To make the most of these moments, facilitators are encouraged to introduce light gamification elements: mini-games or challenges that are perceived as playful rather than work-related. These tools can serve as effective icebreakers, stimulate organic interactions across stakeholder categories, and even help gather valuable data on their perceptions and expectations.

2.3.3. Stage 3: Capitalization and evaluation

The third stage of the PPCP® approach focuses on capitalizing on the outcomes of the Labs and evaluating the overall effects of the approach on the territory and its governance dynamics. This phase is not limited to a retrospective exercise at the end of the process: it is also embedded throughout the PPCP® cycle, between each Lab, to enable iterative improvement and adaptive learning between each Lab session.

2.3.3.1. Iterative capitalization between Labs

After each Lab, a brief but structured capitalization is conducted to analyze the session's outcomes, gather participants' feedback and identify opportunities for improvement of next Labs. Key questions include: *What did we learn? Which tools and formats were most effective? What feedback did participants provide, both positive and negative? Were certain stakeholder groups less engaged, and if so, why?* These insights are gathered through two main channels: observation notes collected by the organizing team, and feedback surveys systematically completed by participants at the end of each Lab. This information is consolidated in post-Lab reports, which also include a record of participants, and a description of the activities conducted.

These reports serve as deliverables, enabling continuous monitoring and documentation of the PPCP® Labs.

2.3.3.2. *Final capitalization after the full cycle*

At the end of the final Lab, a comprehensive capitalization phase synthesizes the outcomes of the entire PPCP® process. While it may be too early to observe structural changes in local governance, this phase provides an opportunity to (a) identify the most relevant solutions or collective decisions, (b) assess the evolution of stakeholder dynamics (such as new collaborations, increased trust, or improved communication) (c) explore pathways for implementing the co-designed solutions and governance frameworks, and (d) reflect critically on the methodology itself: which tools and formats proved most effective, how facilitation influenced ownership and inclusion, and what barriers limited participation or continuity. This phase is key to determining the future of what has been co-created and considering its sustainability or potential replication of the approach in other contexts.

3. PPCP® implementation feedback from Egaleo and Centro Region

The following section presents feedback from two case-study areas in Greece and Portugal, which both implemented the PPCP® approach as part of C2IMPRESS, a Horizon Europe project aimed at improving understanding and awareness of multi-hazard risks to enhance local resilience. These grounded reflections offer a critical perspective not only on the approach's contributions to tripartite collaboration and participatory risk governance, but also on the practical challenges that emerged during implementation.

3.1. Municipality of Egaleo, Greece

3.1.1. Background and challenges

The Municipality of Egaleo is a densely populated urban municipality within the Athens metropolitan region, facing acute structural vulnerabilities. High building density, aging infrastructure, and longstanding socioeconomic inequalities increase exposure to natural hazards. Over one-third of its 70,000 residents are considered economically or socially vulnerable, including the elderly, low-income households, and the unemployed.

Urban vulnerability is further intensified by poorly maintained buildings (many built atop former streams, and legacy drainage systems, which compromise structural stability and flood management). These systemic weaknesses are exacerbated by climate change and prolonged economic strain.

The main hazards identified during Lab 1 include earthquakes, extreme heatwaves (amplified by the urban heat island effect), and floods. Earthquakes were perceived as the most dangerous threat, due to the widespread presence of structurally fragile buildings. Heat risks are critical in neighborhoods lacking tree cover or green infrastructure, exposing vulnerable populations to health issues. Flooding remains a major concern, particularly in low-lying or poorly drained zones such as Elaionas, Egaleo Grove's surroundings, and areas along the closed-off Kifisos river.

These risks intersect with Egaleo's social fabric, disproportionately affecting precarious populations in high-risk neighborhoods. The combination of spatial, social, and infrastructural fragility highlights the need for inclusive, multi-stakeholder resilience strategies adapted to the territory's specific challenges.

3.1.2. Implementation of the PPCP® approach

The Municipality of Egaleo implemented the PPCP® approach through a series of four PPCP® Labs held between April 2023 and February 2025.

These Labs progressively expanded the participatory planning process, bringing together representatives from the public sector, civil society, and despite challenges, actors from the private sector. In total, 24 distinct individuals from the public sector, 10 from civil society, and 7 from the private sector took part. Importantly, participants were invited as representatives of their respective institutions rather than as private individuals, which meant that while the same organizations were consistently engaged across Labs, different staff members might attend on each occasion. As the process evolved, additional institutions were also invited to join. The

purpose was to co-develop a shared understanding of the local risk landscape, formulate collaborative disaster response strategies, and explore alternative governance frameworks.

The 1st Lab focused on three stages: participatory mapping of hazards and vulnerable groups, identification of institutional strengths and weaknesses, and a reflection phase. Earthquakes, heatwaves, and floods were identified as key hazards. Participants spatially mapped the most exposed zones (such as Lioumi and Damarakia) and flagged vulnerable populations, including the elderly, low-income households, and the homeless. They also highlighted the municipality's strong social ties as a major resilience asset.

The 2nd Lab⁶ built directly on these insights, introducing a structured methodology combining three disaster phases (before, during, after) with three intervention axes (vulnerable groups, infrastructure, health/support). Participants used visual boards to propose targeted actions, identify responsible stakeholders, and assess community impact. Actions were mapped across sectors to visualize interdependencies and stimulate co-responsibility.

The 3rd Lab introduced a dual-risk scenario (earthquake and heatwave), prompting more strategic responses. Participants refined previous proposals and added new ones (e.g., panic buttons, thermal drones, school retrofits). They also discussed governance barriers such as limited municipal autonomy and institutional fragmentation. These insights helped frame the fourth Lab around prioritization.

The 4th Lab focused on consolidating and ranking the full catalogue of actions. Using real-time polling and collaborative boards, participants assessed each action's relevance and feasibility. Systemic needs (early warning tools, mental health services) were prioritized over routine measures. Discussions also addressed the implementation challenges posed by Greece's centralized governance system.

Figure 1 summarizes the timeline and main activities across the four Labs in Egaleo.

⁶ Overall, once stakeholders are identified during the initial mapping phase, the participant list remains largely stable across the entire PPCP® Lab cycle. In some cases, the Labs themselves help reveal missing stakeholders, who are then integrated into subsequent sessions. For example, in the Egaleo case, part of the participants remained the same across Labs, while others changed between sessions although representing the same institutions, and additional stakeholders were gradually included as the process progressed.

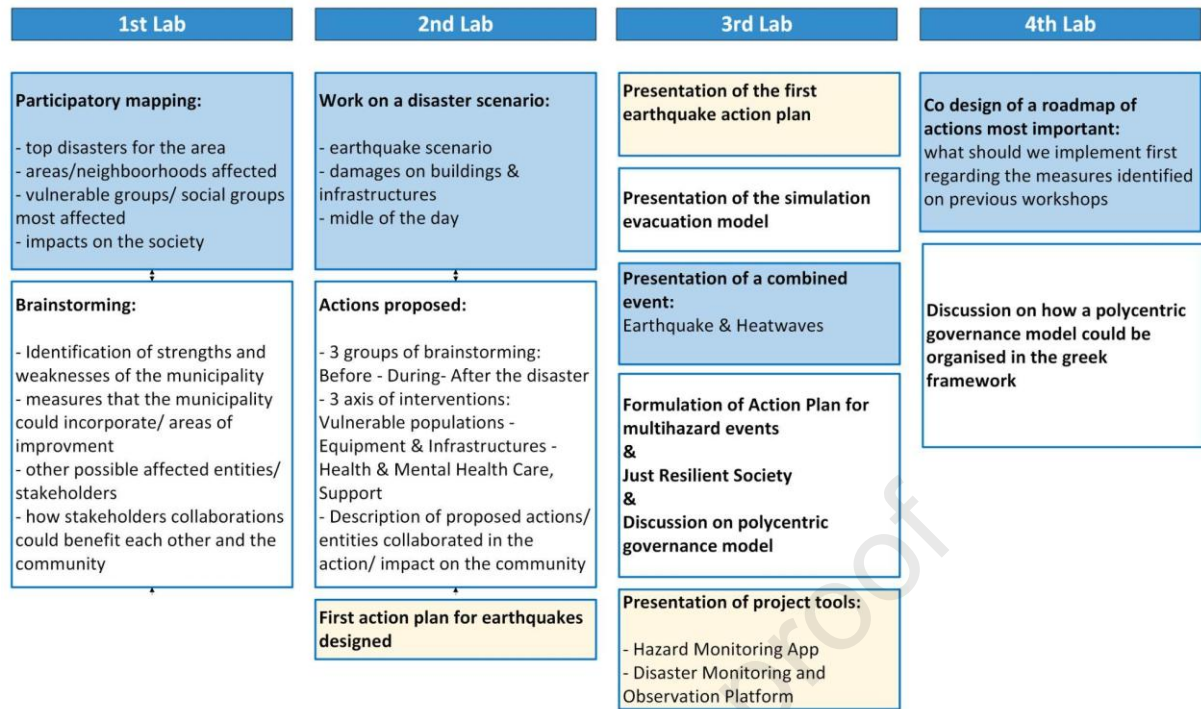


Figure 2 - Description of the activities of the four PPCP® Labs in Egaleo

3.1.3. Focus on two governance-related activities

Two governance-oriented activities stood out during the PPCP® process in Egaleo for their capacity to challenge traditional municipal routines and foster inclusive, cross-sectoral collaboration.

The first was the multi-actor visual action mapping exercise in the 2nd Lab. Building on the outcomes of the 1st Lab, participants worked with a hybrid board combining a geographic map of Egaleo and a Venn diagram of the public, private, and civil society sectors. They proposed preparedness and response actions, assigned actors to each, and assessed potential community impacts. Actions were placed at sector intersections and connected using coloured threads representing thematic axes (e.g., vulnerable groups, infrastructure, health). This visual approach revealed gaps, synergies, and interdependencies, prompting participants to reflect not just on what to do, but with whom and how. Proposals included joint building inspections (municipality, parents, contractors), evacuation drills (civil protection, fire brigade, NGOs), and awareness campaigns (educators and healthcare professionals).

The second was the prioritization and sequencing activity in the 4th and last Lab. After reviewing the catalogue of co-developed actions, participants assessed them in terms of urgency, feasibility, and logical sequencing. Using random assignment and group dialogue, they identified which measures were already underway and which required institutional or community effort. Actions like school drills were seen as routine, while systemically neglected ones, such as mental health services or energy-resilient infrastructure, were prioritized. The exercise underscored the potential of coordination between SMEs, associations, and public services.

Despite acknowledged limitations in local governance (limited crisis autonomy, rigid decision chains, funding constraints), participants emphasized Egaleo's strong social ties and civil

society engagement as key enablers. These community assets offered alternative pathways to move forward where formal institutions lag.

3.1.4. Initial results and impacts

The PPCP® process in Egaleo generated multiple positive outcomes, both in terms of stakeholder relations and governance experimentation. These initial results fall into three interconnected domains: strengthened dialogue, emergence of new governance practices, and broader impacts on community resilience awareness.

3.1.4.1. *Strengthened dialogue between stakeholders*

The series of Labs succeeded in initiating structured, repeated interactions among actors who rarely collaborated before. Many participants highlighted that this was their first opportunity to directly engage with actors from other sectors, educators speaking with municipal engineers, small business owners brainstorming with psychologists, or residents coordinating with civil protection volunteers. These encounters helped foster mutual understanding, built trust, and encouraged participants to reflect on their own institutional roles within the broader system. Throughout the workshops, especially from the 2nd Lab onward, a shift was noted from “individual voice” to “collective thinking,” as participants began connecting proposals across roles and sectors. Additionally, tools like Mentimeter (used in the 4th Lab) allowed for inclusive and anonymous expression, helping to surface shared values such as solidarity, justice, and equal access to safety.

3.1.4.2. *Towards new governance practices*

The Labs provided space for participants not only to react to municipal plans, including the municipality’s strategic plan for the management of natural disasters, more specifically the earthquake preparedness plan “Egkelados” and the municipal plans for heatwaves; but to proactively shape them. Among the public sector participants, several municipal employees were actively involved throughout the entire co-design process, ensuring continuity and institutional memory. They co-designed detailed action proposals involving multiple sectors, defined shared responsibilities, and identified overlaps and synergies. Several actions proposed during the Labs directly addressed gaps in existing governance, such as insufficient mental health provisions, outdated infrastructure, or lack of targeted communications. Participants proposed new, often hybrid approaches: combining schools as emergency shelters and green infrastructure nodes; introducing smart technologies like panic buttons and evacuation apps; and formalizing community volunteer lists by expertise. The iterative nature of the Labs also enabled self-reflection: by the 4th Lab, participants themselves reevaluated earlier ideas based on feasibility and priority, integrating community-led knowledge into a functional policy logic.

3.1.4.3. *Other results and impacts*

The PPCP® Labs helped the municipality compile a diverse portfolio of actions linked to climate and disaster resilience, accompanied by implementation timelines and key stakeholders. For participants, the process served as both a civic learning experience and a platform for local empowerment. In particular, members of civil society (e.g., youth associations, parents’ groups, volunteer rescue teams, and NGOs) reported feeling recognized as equal partners, rather than as auxiliary actors. The structured facilitation, use of accessible tools, and openness to feedback were repeatedly highlighted in evaluations as factors that made participation meaningful and motivating. Moreover, several proposals (including inter-municipal cooperation frameworks,

action toolkits, and activation of currently inactive municipal committees) have since been discussed within municipal working groups, suggesting early institutional uptake.

3.1.5. Difficulties encountered

While the PPCP® process in Egaleo produced promising results, several persistent challenges emerged, reflecting both the practical difficulties of implementing the PPCP® methodology itself and more structural challenges linked to weaknesses of local, regional, and national governance frameworks. In total, 39 participants engaged across the Labs, and this section focuses specifically on the difficulties and constraints that surfaced during implementation.

A key difficulty was the limited engagement of private sector actors. Despite targeted invitations, SME and business representatives often could not attend due to time constraints. This limited the exploration of cross-sector synergies, especially in areas like infrastructure resilience or post-disaster services. Yet, when present in significant numbers (as in the 2nd and 4th Lab, where up to 39 participants were present) private actors brought valuable perspectives on logistics, local supply chains, and neighborhood support. For instance, a catering SME and a publishing house owner highlighted the importance of local suppliers and communication networks during crises.

Another major challenge concerned institutional and financial constraints faced by local authorities. Participants emphasized the lack of municipal autonomy in Greece's centralized system, especially in crisis management. Municipalities are often implementers, not decision-makers. Coupled with unstable funding for preparedness, equipment, or training, this limits local capacity. As one participant noted in the 3rd Lab: "even if the plans exist on paper, we lack the resources to bring them to life."

Internal coordination gaps within the municipality were also raised. Overlapping responsibilities, poor interdepartmental communication, and unclear emergency protocols were seen as hindering effective crisis response.

On the public engagement side, participants noted that while civil society participation was relatively strong, broader citizen involvement remained limited. This was attributed to weak communication channels and diminished trust due to years of crisis (economic, pandemic), which have fostered apathy and low expectations for institutional responsiveness, even in civically active communities.

Nevertheless, participants agreed that social cohesion and community networks remain crucial. Strengthening civil society organizations and neighborhood solidarity was seen as a way to compensate for institutional shortcomings. As one participant stated during the 4th Lab: "when the system is slow, people step in for each other."

3.2. Centro Region, Portugal

3.2.1. Background and challenges

The Centro Region case study in Portugal includes the two adjacent municipalities of Figueira da Foz (urban/coastal) and Montemor-o-Velho (rural/inland), which share a relatively homogeneous socio-demographic and housing profile. While Figueira da Foz has nearly 59,000 inhabitants and Montemor-o-Velho around 25,000, both display similar age distributions and household sizes. Notable differences include a higher share of single-parent families and foreign residents in Figueira da Foz, and greater agricultural employment and owner-occupied housing in Montemor-o-Velho. Figueira da Foz also has more seasonal housing use and a higher number of illiterate residents.

Urban-rural contrasts influence risk exposure and disaster response. Figueira da Foz' denser population and concentration of households with children may slow evacuation and recovery. By contrast, Montemor-o-Velho's lower density and higher rate of permanent housing may facilitate community-based response. Despite these differences, the two municipalities show relative homogeneity in property ownership, mobility patterns, and basic social composition.

The selection of these municipalities is linked not only to demographic factors but also to recent major disasters. These include:

- The 2019 Mondego River floods, which affected multiple municipalities and required over 350 evacuations;
- Storm Leslie in 2018, which caused injuries and the evacuation of 800 people in Figueira da Foz;
- The deadly 2017 wildfires during Storm Ofelia, which killed 48 people and affected over 2,700 in the Mondego basin.

These events reflect the region's exposure to inland and coastal flooding, severe storms, and rural wildfires. Climate change is expected to exacerbate these risks by increasing heatwaves, droughts, sea level rise, and extreme rainfall.

In line with these threats, the C2IMPRESS project focuses on coastal flooding, river floods, and wildfires. These priorities match the concerns outlined in local emergency plans. Figueira da Foz classifies floods, inundations, coastal overtopping, and erosion as high or extreme risks, while Montemor-o-Velho gives top priority to wildfires, as reflected in its 2022–2031 Forest Fire Protection Plan. Both municipalities thus offer a relevant and complementary context for piloting integrated risk preparedness approaches.

3.2.2. Implementation of the PPCP® approach

The four PPCP® Labs were held between October 2023 and February 2025, each lasting three hours at the Figueira da Foz Port Administration meeting room. They followed a cumulative structure, where each session was built on the previous one. Attendance ranged from 21 in Lab 1 to 14–15 in later Labs, excluding six organizing team members from the Port of Aveiro Administration (APA), and the National Laboratory for Civil Engineering (LNEC). While some participants remained throughout, others rotated, ensuring institutional continuity. The drop in attendance after Lab 1 was attributed to mismatches in expectations, with the final Labs primarily attended by public sector representatives.

Each Lab combined group and individual tasks and aimed to strengthen the PPCP® working group across Figueira da Foz and Montemor-o-Velho.

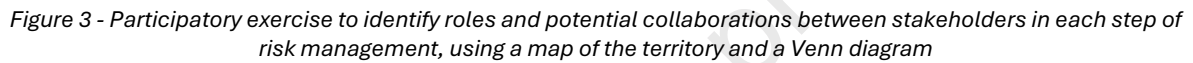
The 1st Lab focused on identifying climate risks and their impacts on local populations, as well as gathering stakeholder expectations for improved disaster management.

Participants engaged in participatory mapping, using colored stickers to indicate risk severity, affected groups, and exposed activities. A structured brainstorming followed, where individual inputs were shared and collectively discussed.

The 2nd Lab aimed to develop a disaster action plan across three phases (before, during, after) related to a simulated disaster⁷, and to identify cross-sectoral responsible stakeholders and expected community impacts.

Using maps and Venn diagrams representing public, private, and civil society sectors, participants located proposed actions and assigned roles. Results were synthesized in a plenary session to build consensus on the action plan.

⁷ 7th February 2025: After a period of intense rainfall in the Mondego basin, the Agueira reservoir reached its maximum levels and it was necessary to discharge flows that caused river flooding in the Mondego River, mainly affecting the municipality of Coimbra and the municipalities downstream (Montemor-o-Velho, Soure and Figueira da Foz). In this area of Baixo Mondego and on this day, there was also the occurrence of a storm with wind gusts of over 120 km/h, heavy rainfall of over 30 mm/hour for 3 hours, extreme sea turbulence and rising sea levels due to atmospheric uplift. These factors, combined with the high flows, caused the water level of the River Mondego to rise, causing dykes to overtop and break and flooding agricultural fields, isolating some villages and homes, forcing people to evacuate, cutting roads and railways, causing electricity pylons to fall and leaving municipalities without electricity and water. There was also flooding in some urban areas, with extensive damage to homes, businesses and infrastructure. During high tide, there was also coastal flooding that affected some marginal areas (to the north, from Cape Mondego to Tamargueira beach and Buarcos fortress, and to the south, at Cabedelo and Cova Gala Norte beaches), forcing road traffic to close. The bar was closed to navigation and harbour operations were suspended. There were some broken cables on ships moored in the harbour due to the wind and sea waves. A fishing boat broke loose and was swept away by the strong currents, crashing into one of the banks, without causing any casualties.



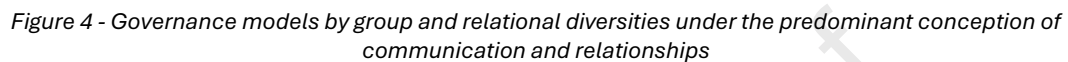
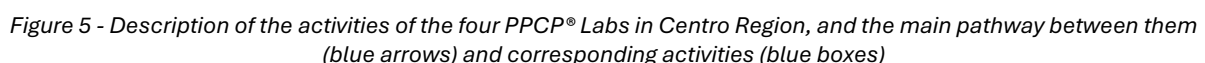


Figure 4 summarizes the timeline and main activities across the four Labs, highlighting the sequential logic between sessions.



Among the activities carried out with stakeholders throughout the project, the Portuguese team highlighted two contrasting exercises that illustrate a shift in governance perception and

practice: the participatory mapping during the 1st Lab, and the co-design of an action roadmap during the 4th and final Lab.

The initial exercise reflected a broad, perceptual understanding of risks. Stakeholders identified numerous high-severity risks, especially coastal erosion, river flooding, and coastal overtopping, which together accounted for over 50% of all environmental risk references. These were followed by other hazards such as earthquakes, forest fires, heatwaves, and landslides. The mapping often referred to imprecise territorial areas, loosely distinguishing low-density rural zones from more urbanized areas.

By contrast, the final Lab presented a more grounded and actionable perspective. The co-design of an action roadmap synthesized the group's work and focused on selecting and detailing tangible, measurable actions. This included flood preparedness, protection of coastal and inhabited areas, infrastructure and essential service continuity (e.g., water, energy, communications), and long-term strategies like environmental literacy and awareness. Particularly notable was the growing emphasis on managed retreat (relocation of people, housing, and economic activities in response to environmental threats), an idea gaining traction in Portuguese public discourse.

This evolution marks a move from generic risk perception toward a shared sense of responsibility and capacity for collective response. The final exercise revealed more precise spatial targeting -down to intra-urban zones or specific hinterlands- and greater attention to pre-disaster phases rather than emergency response. The shift in temporal focus supports a governance model based not only on multiple institutional levels but also on shared preventive responsibility and results-oriented planning.

Undoubtedly, the rigid divisions of legal competences and action hierarchies remain in place. However, the more precise socio-spatial focus and the prioritization of the pre-disaster phase enabled the emergence of future action pathways that strengthen community resilience and clarify what each sector and stakeholder can contribute toward collective safety and adaptive adjustment in territories vulnerable to human loss and physical damage. The process demonstrated a transition from collaboration to co-responsibility, laying the groundwork for more cooperative governance in climate-vulnerable territories.

3.2.4. Initial results and impacts

3.2.4.1. *In strengthening dialogue between stakeholders*

Thus, and in line with the paradigm shift described above, although these changes may not yet allow for a precise definition of new actions or entirely novel interaction models, they have nonetheless significantly strengthened the capacity for dialogue. They have also improved the understanding of environmental phenomena, their impacts on humanized and infrastructured territories, and the emergence of new interactive dynamics between sectors.

Regarding this paradigm shift, Labs participants clearly outlined the distinct responsibilities of each sector. They emphasized the public sector's role in developing "feasible support policies that take into account the specific vulnerabilities of each group." The private sector was tasked with contributing to the "identification of vulnerabilities generated by inequalities," while civil society was called upon to "implement compensatory measures."

This assignment of responsibility to civil society is particularly notable. In the Portuguese context, it may reflect mistrust toward the transparency and fairness of public actions. Traditionally, the public sector is responsible for redistributing aid and implementing corrective or compensatory measures.

Combining stakeholder's perspectives with the Portuguese team's expertise, a clearer and more engaging division of tasks and responsibilities for all stakeholders can be as summarized below:

- Public sector: Create and implement inclusive policies for vulnerable groups, including housing support and equitable access to information.
- Private sector: Develop accessible technologies (e.g., alerts for people with disabilities), support community resilience financially, and ensure continuity of essential services.
- Civil society: Mobilize volunteers, identify local needs, and serve as a liaison between communities and authorities for people-centered responses.

This more precise attribution of roles reflects the overcoming of a long-standing obstacle marked by inertia and mutual blame: private and civil actors often accuse public authorities of acting too late, while public institutions perceive others as unprepared and unaware of self-protection practices.

3.2.4.2. *Towards new governance practices*

Through a structured selection process, participants prioritized key interventions addressing environmental risks, aligned with regional needs and available resources. Measures included disaster preparedness, coastal protection, and long-term planning, such as environmental literacy and planned retreat from high-risk zones.

A strong emphasis was placed on the tangibility of actions and measurability of results. Stakeholders, including local authorities, refined action plans, previously co-created by themselves, to improve their feasibility, accountability, and effectiveness. This fostered a governance model that is multi-level, participative, and co-responsible.

Moving forward, reinforcing the jointly designed roadmap is essential. The project team is developing consultation tools and improving data access to support informed decision-making. This sustained engagement is expected to enhance cooperation, facilitate timely implementation, and improve resilience.

This reflects a methodological shift: from generic to specific considerations, from broad spatial-temporal frames to ones defined by stakeholders, and from a public-sector-dominated emergency response to interdependent actions emphasizing the pre-disaster phase. The process favors both collaborative and descriptive methodologies, supporting a shift from engagement to a cooperative metric rooted in committed action.

3.2.5. *Difficulties encountered*

Throughout the PPCP® process and the development of the research project, certain constraints and limitations to progress have arisen. One such challenge is the difficulty in mobilizing or even involving Portuguese civil society, which is marked by low levels of associativism, volunteering, and civic participation. This is partly due to the lingering influence of public authoritarianism, significant regional asymmetries and the absence of critical masses outside major urban and densely populated areas, and a seeming civil apathy. As a result, civil society tends to remain passive, only emerging in response to catastrophes -situations for which it is

largely unprepared- expecting to be rescued, relocated, or compensated by public authorities. Despite high levels of digital literacy, particularly among young people in Portugal, this does not translate into more active or less passive civic participation (Sebastião, 2021). The Portuguese literature on civil society thus reflects its fragility, which in part explains one of the constraints experienced by the C2IMPRESS team during its implementation of PPCP®.

In this context, despite repeated efforts and the identification of contacts in the region, it proved quite difficult to secure the presence of civil society associations in the PPCP® Labs. Another challenge (less sociological and more administrative and political in nature) was the need to counter the prevailing pattern of disaster planning, which is heavily focused on the emergency and response phase. This focus also hindered, particularly in the absence of collaborative sessions and especially at the outset, the full engagement of stakeholders in the exercises (not so much in terms of how they were conducted or implemented, but rather due to doubts regarding their usefulness and real practical outcomes).

4. Critical analysis and perspectives

The following section synthesizes the feedback from the two case studies and explores ways to address the structural and operational barriers encountered to PPCP® implementation and sustainable participatory governance shifts.

4.1. Outlook

4.1.1. In Egaleo

The PPCP® approach in Egaleo demonstrated the value of sustained, well-facilitated participation in resilience planning. Over the course of four Labs, participants moved from identifying vulnerabilities to co-producing realistic, locally rooted solutions. The participatory tools and structured scenario planning helped establish a common language among stakeholders and nurtured a culture of cooperation across institutional boundaries.

Looking ahead, participants expressed a strong desire for continuity, both in terms of methodology and stakeholder involvement. Several emphasized the need for institutionalizing participatory practices, such as regular co-creation workshops, thematic municipal committees with cross-sector representation, and structured consultation processes for emergency planning. There was also wide support for the creation of an open-access “living repository” of proposed actions, mapped by sector, timeframe, and feasibility, which could be updated as conditions evolve.

At the same time, participants acknowledged that the sustainability of such processes depends on concrete support: political commitment, financial investment, dedicated facilitation staff, and legal frameworks that enable bottom-up contributions to influence municipal decision-making. Ideas such as expanding school-based preparedness programs, strengthening inter-municipal coordination, and developing local emergency toolkits were seen as “early wins” that could anchor broader systemic change.

Crucially, the Labs reaffirmed the importance of trust, proximity, and civic responsibility as cornerstones of local resilience. Even in the absence of complete institutional autonomy, participants believed that strong community bonds and the active role of civil society could compensate for systemic weaknesses. As one participant noted during the closing session of Lab 4, “If we plan together, we’re already more resilient, even before the crisis comes.”

4.1.2. In Centro Region

The overall feedback for the Labs implementation in Centro Region was positive, with several stakeholders demonstrating a high interest level in the Labs they attended. Also, the information given by the stakeholders was very important for the team's perception of the challenges felt by stakeholders when dealing with natural hazards. Stakeholders preferred more dynamic and visual activities, such as posting stickers on maps or drawing within a group and felt less motivated during individual reflecting activities: even when the activities were supposed to be individual, many times the participants immediately started to discuss the answers in small groups. Another condition for success in the Portuguese case-study was to have Labs that are not too long: a morning or an afternoon seemed to be the preferred duration for increased engagement and maintenance of participants' attention. The number of activities scheduled within each Lab proved to be another critical factor. Participants expressed greater satisfaction when they had sufficient time to voice their opinions; whether in small groups or plenary sessions, and to engage meaningfully with others. Interaction emerged as a key element of their experience. To enable this, the Labs had to limit the number of activities, ensuring enough time was allocated for broader dialogue and exchange.

Towards the end of the project, the Portuguese team planned a final PPCP® Lab to present the project outcomes to stakeholders involved in the Labs and to explore possibilities for continuing the collaborative dynamic beyond the project. The organization of this additional session, however, depends on the motivation and cooperation of local actors, now operating without the coordination and support of the C2IMPRESS project and its research teams.

Overall, a major risk related to institutional constraints -such as the rigid allocation of legally defined competencies and responsibilities- may limit stakeholders' willingness to engage further. In addition, the stakeholders who participated in the Labs were primarily technical representatives, often lacking decision-making authority. The limited strength of civil society in Portugal also presents a challenge, making it unlikely that the collaborative spirit fostered during the Labs will translate into ongoing interaction or coordination in daily practice. As a result, the transformative potential of the Labs may dissipate, reverting to a segmented logic in which public and private actors operate within separate mandates, missions, and operational models.

4.2. Cross-cutting lessons from case studies implementation

The implementation of the PPCP® approach in both Egaleo and the Centro Region has confirmed the added value of the PPCP® approach as a vehicle for building inclusive and context-sensitive resilience strategies. Through a series of four Labs in each pilot, the PPCP® facilitated dynamic collaboration among diverse stakeholders, leading to the identification of locally relevant risks, co-design of practical solutions, and the strengthening of mutual understanding and shared responsibilities.

Key benefits consistently highlighted across both contexts include the accessibility of the methods used, the safe and inclusive atmosphere created for discussion, and the capacity of the Labs to foster shared language and trust across sectors. In Egaleo, these dynamics led to the articulation of specific roles and actions across the disaster cycle, while in Centro Region, they created opportunities for cross-sector interaction and deliberation. In both sites, participants emphasized their desire for continuity, particularly for maintaining collaborative spaces beyond the scope of the project.

At the same time, both territories revealed persistent limitations that, while rooted in different socio-political and cultural contexts, point to broader challenges in operationalizing participatory governance at the local level.

4.3. Recommendations for overcoming structural and operational challenges in PPCP® implementation

The practical implementation of the PPCP® approach in Portugal and Greece revealed four major challenges that limited its transformative potential. The following recommendations emerge directly from the observed dynamics during the Labs and stakeholder engagement processes in both territories.

4.3.1. Mobilizing the private sector

In both countries, private actors (especially small businesses) were underrepresented in the Labs. While some expressed interest when contacted directly, many faced structural constraints such as limited time, staff availability, or unclear alignment between the Labs' agenda and their immediate priorities.

To address this, future PPCP®s should focus on sectors directly exposed to local risks, such as construction, agri-food, or healthcare, and involve them through tailored, topic-specific Labs (e.g. “resilient supply chains” or “business continuity under heat stress”) that resonate with their operational challenges. In addition, complementary mechanisms, such as the delivery of certificates or labels of community engagement in resilience, could also offer reputational value and encourage participation by giving visibility to their contribution in both public and commercial communication channels.

4.3.2. Engaging a fragmented or fragile civil society

Civil society engagement across the Labs was uneven. In most cases, participation came from institutional actors or stakeholders already involved in other EU-funded initiatives, generating a degree of consultation fatigue and limiting the diversity of voices. More informal or vulnerable groups remained absent or peripheral, despite efforts to broaden inclusion.

To strengthen their involvement, PPCP® should be anchored in existing community dynamics by identifying and partnering with grassroots initiatives from the outset. Offering immediate and tangible incentives (such as micro-grants, training opportunities, or public recognition) can also help build trust and foster sustained commitment among actors less accustomed to formal consultation processes.

4.3.3. Navigating institutional rigidity

In both countries, several co-created ideas faced difficulties when it came to implementation, often running into procedural inertia or dispersed institutional responsibilities. Despite efforts to align Labs with existing governance frameworks and include relevant stakeholders, some proposals lacked a clear operational route or institutional anchor.

This highlighted the importance of better connecting participatory outputs with the concrete mandates of local institutions. Follow-up sessions specifically dedicated to exploring feasibility, available resources, and interdepartmental coordination could help define who does what, when, and how; turning shared ideas into tangible next steps.

4.3.4. Sustaining participation beyond the project

The Labs generated genuine enthusiasm among participants, but in both case studies, there were no guarantees of continuity once the project ended: without dedicated resources or institutional anchoring, the PPCP® runs the risk of remaining a one-off experiment rather than leading to lasting change.

To counter this, the PPCP® cycle should culminate in a formal consolidation phase, aimed at embedding co-produced actions into municipal workplans or local budgets, and supporting existing groups in carrying certain initiatives forward. This phase could also include the adoption of local partnership charters or jointly validated documents that clearly define follow-up roles and responsibilities.

Conclusion

This article introduced the PPCP® approach as an inclusive, lab-based method for fostering collaborative and participatory governance in climate resilience planning. By situating PPCP® within evolving paradigms of stakeholder engagement and public innovation, we highlighted its theoretical and practical relevance. Empirical feedback from Egaleo and Centro Region demonstrated both the strengths and the limitations of the model. While the Labs encouraged cross-sector dialogue and local empowerment, challenges related to institutional constraints and uneven participation remain. Addressing these barriers will be essential for scaling and sustaining PPCP® beyond the project context to which it was originally designed for. On this matter, nine new case studies are currently in the process of implementing the approach across the Mediterranean basin through Med-IREN, a Horizon Europe project focusing on nature-based solutions. These new implementation opportunities are expected to help overcome some of the identified barriers, contribute to the consolidation of the PPCP® approach, and support its long-term qualification and institutionalization on a larger scale.

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iv. Tables

No tables

v. Appendices

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ii. Conflicts of Interest Statement

Manuscript title: Shaping local disaster risk governance through multi-stakeholder collaboration: Insights from the public-private-civil partnership approach - *Application to the case studies of the municipality of Egaleo (Greece) and Centro Region (Portugal)*

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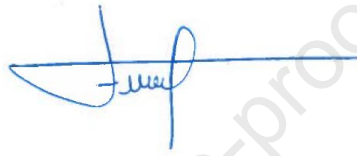
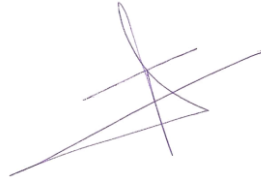
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Public-private-civil partnership approach
Interest statement

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Declaration of interests

☒ The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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