The CLIMAS project toolbox for climate adaptation and resilience

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Abstract

The ambition of the CLIMAS project is to support the transformation to climate resilience by offering an innovative problem-oriented climate adaptation toolbox, co-designed together with the stakeholders by applying a value-based approach, design thinking methods and citizen science mechanisms. The Toolbox is expected to anticipate possible tensions, points of controversy, and dilemmas regarding the adaptation to resilience. The CLIMAS toolbox is composed of seven tools, including a citizen-collaborative future scenario building and a scenario prioritisation tool, methodological guidelines for setting up and facilitating the climate assemblies, and a citizen science tool for supporting the deliberation processes. The aim of this paper is to discuss the utility of the tools in servicing the discussions at the climate assemblies. It builds on the experience gathered from the co-creation, testing, calibration and validation of the tools in the three living labs and the three climate assemblies of CLIMAS project.

Introduction

Climate change is among the most urgent and complex challenges of our time, with far-reaching environmental, economic, and social consequences. The increasing frequency and severity of extreme weather events—such as floods, droughts and heatwaves—highlight the limitations of existing top-down policy responses (EEA 2021; IPCC 2022). These events expose a critical gap in current climate governance: the insufficient inclusion of citizens in shaping strategies for adaptation and resilience. Addressing this gap requires a fundamental transformation in the way climate decisions are made, moving toward inclusive, participatory approaches that empower individuals and communities to co-create solutions (Fischer 2000; Moser and Ekstrom 2010).

In recent years, citizens' assemblies and Living Labs have emerged as promising models for fostering deliberative democracy in climate policymaking. These formats enable a more democratic and inclusive dialogue on climate action by bringing together randomly selected citizens, experts, and stakeholders to deliberate on complex environmental issues. Evaluations of such initiatives—such as the UK Climate Assembly, the French Convention Citoyenne pour le Climat, and various regional pilot projects across Europe—have demonstrated their potential to enhance legitimacy, trust, and policy innovation (Courant 2021; Smith 2022; OECD 2020; Delap 2021).

However, for these deliberative processes to be effective and scalable, they must be supported by structured, evidence-informed, and adaptable tools that ensure meaningful participation and integration into policy frameworks (Bussu and Bartels 2014; Chilvers and Kearnes 2016).

The CLIMAS project (Climate Adaptation and Resilience Toolbox for EU Regions) addresses this need by developing and testing a co-created, problem-oriented Climate Change Citizens' Engagement Toolbox—hereafter referred to as the CLIMAS Toolbox. The core ambition of the project is to support a shift toward a "resilient by design" society, where citizen engagement is not an afterthought but a foundational component of climate adaptation planning. By adopting a values-based approach, design thinking methods, and citizen science mechanisms, the Toolbox offers innovative strategies to anticipate tensions, resolve dilemmas, and co-create locally tailored climate adaptation pathways.

Methodology

The CLIMAS Toolbox comprises seven tools designed to guide participatory processes in regional and local settings across Europe (table 1). These include: (1) a collaborative future scenario-building methodology, (2) guidelines for establishing and facilitating Climate Assemblies, (3) a tool for integrating citizen science, (4) a scenario prioritization tool based on citizen and expert values, (5) follow-up mechanisms to embed deliberative outcomes in adaptation planning, (6) a Knowledge and Evidence-Based Support (KEBS) tool for informed agenda-setting, and (7) a digital Climate Assembly Portal. Together, these tools support multi-stakeholder engagement, knowledge co-production, and dynamic adaptation strategies as envisioned in the European Union (EU) Adaptation Strategy (European Commission 2021). These tools were co-created, tested, calibrated, and adapted in the context of three Climate Assemblies (Catalunya, Riga and Edermünde in Spain, Latvia and Germany respectively) and three Living Labs (Ebro Delta LL in Spain, Chios LL in Greece and Vilnius LL in Lithuania).

Results and discussion

The tools that resulted in the project are presented in Table 1 and described in the following paragraphs.

Tool 1: Citizen-Collaborative Future Scenario Building Methodology. This tool enables the co-creation of diverse future scenarios of climate-resilient societies by involving all segments of the population in participatory workshops. Adopting a future studies approach, it facilitates exploration of the underlying values and power dynamics embedded in these imagined futures. The output consists of distinct and socially relevant climate-resilient scenarios.

Table 1. The CLIMAS Toolbox

Tool No.	Tool Title	Description
1	Citizen-Collaborative Future Scenario Building Methodology	Co-creation of future climate-resilient scenarios via participatory workshops using a sociotechnical imaginaries framework.
2	Guidelines for Setting-Up and Facilitating Climate Assemblies	Methodological guide for designing, organizing, and facilitating inclusive and deliberative Climate Assemblies.
3	Tool for Applying Citizen Science in Climate Assemblies	Guide to integrate citizen science tools and methods, adapted to diverse geographic contexts.
4	Scenario Prioritization Tool Based on Citizen and Expert Values	Tool using multi-criteria analysis (AHP-based) to evaluate and prioritize scenarios.
5	Tool for Integrating Assembly Outcomes into Dynamic Adaptation Planning	Supports follow-up by linking outcomes to adaptive climate change planning, monitoring, and evaluation.
6	Knowledge and Evidence-Based Support (KEBS) Tool for Agenda Setting	Ontology-based knowledge base for agenda setting, integrating data from citizens and authoritative sources.
7	Multilingual Digital Climate Assembly Portal	Participatory portal integrating tools, citizen engagement features, databases, and visualization functions.

Tool 2: Guidelines for Setting-Up and Facilitating Climate Assemblies. This tool provides two interlinked guides: (1) a guide for structuring and framing Climate Assemblies; and (2) a facilitation methodology guide that supports collaborative learning, consensus-building, and value-based deliberation. It emphasizes inclusivity by addressing barriers to participation for underrepresented groups and includes participatory rules, mechanisms for citizen topic selection, and documentation of barriers and enablers through roundtable discussions.

Tool 3: Tool for Applying Citizen Science in Climate Assemblies. This tool offers guidance on adapting and utilizing existing citizen science tools in the Climate Assembly context. It enables identification of climate-relevant citizen science data and themes that can enhance meaningful and actionable processes within the assembly.

Tool 4: Scenario Prioritization Tool Based on Citizen and Expert Values. This interactive tool supports participants in exploring and prioritizing elements of climate-resilient scenarios based on multiple parameters. Using a Multi-Criteria Analysis (MCA) framework, specifically the Analytic Hierarchy Process (AHP), it allows for structured value elicitation and scenario ranking through a customizable web application.

Tool 5: Tool for Integrating Assembly Outcomes into Dynamic Adaptation Planning. This tool connects the outputs of Climate Assemblies with short- and long-term adaptation strategies. It enables dynamic monitoring and adjustment of adaptation plans, incorporating scenario rankings and participatory outcomes. The tool provides benchmarks and performance indicators to support policy tracking.

Tool 6: Knowledge and Evidence-Based Support (KEBS) Tool for Agenda Setting KEBS is a semantic, ontology-driven platform aggregating climate data from multiple sources—including citizen contributions, social media, and open access databases (e.g., Copernicus, NextGEOSS). Designed in line with FAIR principles and INSPIRE directives, it supports agenda setting, scenario development, and knowledge co-creation by ensuring data findability, accessibility, interoperability, and reusability.

Tool 7: Multilingual Digital Climate Assembly Portal. The portal integrates the outputs and functionalities of all Toolbox components. Developed with open-source CMS platforms and authentication systems (e.g., Apero CAS), it includes visualization of citizen science data, KEBS integration, the MCA prioritization tool, wikis, event listings, and participatory features.

Conclusions

As the urgency to address climate change intensifies across Europe and globally, citizen engagement has emerged as a critical pillar for designing effective, inclusive, and context-sensitive adaptation strategies. The CLIMAS project contributes to this shift by providing a structured and innovative Climate Change Citizens' Engagement Toolbox that enables bottom-up, values-based, and deliberative processes in climate policymaking.

Through the co-creation, testing, and refinement of seven interrelated tools, the CLIMAS Toolbox empowers local and regional Climate Assemblies to become more than consultative spaces—they evolve into dynamic arenas for collaborative knowledge generation, scenario building, and priority-setting. Each tool is purpose-built to address specific phases of the deliberation process, from agenda setting and citizen science integration to scenario co-creation and adaptive policy follow-up.

By testing the Toolbox in diverse regional Climate Assemblies and Living Labs, it is possible to generate scientifically grounded guidelines for transitioning from expert-driven to society-driven deliberations in climate governance. This shift is essential for strengthening the acceptance, legitimacy, and effectiveness of climate policies in the EU.

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