NEUROCLIMA

Policy Brief #1
Models of Enhanced Civic Participation in Climate Change and Climate Change Adaptation (2019-2024)

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Policy Brief #1

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ABBREVIATIONS

Abbreviation	Full name
AI	Artificial Intelligence
EU	European Commission
GD	Green Deal
XAI	Explainable AI

EXECUTIVE SUMMARY

Climate change poses one of the most pressing global challenges of our time, hence necessitating collective action from governments, institutions, civil society and citizens. Civic participation is being increasingly recognized as a crucial element in addressing climate change and fostering climate change adaptation. Policy Brief 1 presents a synthesis report of the current landscape of climate governance and democratic participation models and approaches, examining the various models of civic participation that have emerged and have been used between 2019 and 2024, with a focus on their relevance to climate change mitigation and adaptation efforts

A range of theoretical frameworks and models were studied, including Arnstein's Ladder, IAP2's Participation Spectrum, Habermas' Theory of Communicative Action, and Fung's Democracy Cube. These were assessed alongside participatory tools such as citizens' assemblies, co-production of knowledge, participatory budgeting, and digital platforms like social media and mapping tools.

The findings reveal that effective civic engagement hinges on three factors: inclusivity (DEI practices), structured deliberation, and a learning process that fosters climate literacy. However, challenges such as limited accessibility, unequal participation, and risk of reinforcing the status quo remain prevalent. New trends highlight climate justice, youth participation, and the role of AI and data in public engagement.

Recommendations include reinforcing participatory infrastructures through EU support, linking community engagement with national adaptation plans, and incorporating marginalized voices early in the policy process. The brief also advocates for increased evaluation of participatory impact on climate outcomes and policy legitimacy.

1. Introduction

The present policy brief emerged from a literature review on “Models of Enhanced Civic Participation in Climate Change and Climate Change Adaptation (2019-2024)” as part of Task 3.3. / WP3 of the NeuroClima project and thus its purpose is to examine and assess models that have been developed and implemented to enhance civic participation when addressing climate change in the European context. By exploring various approaches and frameworks, this policy brief focuses on understanding how these models have engaged communities, fostered public participation, and contributed to climate action bringing together policymakers and citizens. The goal is to identify effective strategies that can be applied or adapted to improve civic engagement in climate-related issues, ultimately supporting more collaborative and impactful responses to the challenges posed by climate change and climate change adaptation.

Climate change poses one of the most pressing global challenges of our time, hence necessitating collective action from governments, institutions, civil society and citizens. Civic participation is being increasingly recognized as a crucial element in addressing climate change and fostering climate change adaptation. This policy brief examines the various models of civic participation that have emerged and have been used between 2019 and 2024, with a focus on their relevance to climate change mitigation and adaptation efforts.

The key questions and themes driving the review focus on the paradox that although climate change is a global issue that needs that all affected be part of setting and implanting solutions (Doelle and Majekolagbe, 2023), “the approach to climate is often top-down, high-level, and elitist” and that “climate apathy is still prevalent, support for climate actions is tepid, and climate literacy is low” despite the value and importance of public participation and engagement in the process (Cattino and Reckien, 2021). There are also questions regarding whether public participation leads to more ambitious and transformative climate change adaptation practices, policy and decision-making, or rather it reinforces and repeats the status-quo. In this direction, another question that this review addressed is how the political and other landscape conditions prepare the ground of successful public participation regarding climate action (Cattino and Reckien, 2021).

We have opted for a thematic analysis which offers a critical review of significant themes and those directly relevant to the research questions, particularly focusing on public participation and climate action. In the final section of the brief, gaps and issues in current research are depicted and elaborated on. We have also included some gray literature such as policy guidance notes and toolkits, with the hopes that conducting a systematic study of this material in future stages of the NeuroClima project and other projects could complement this review.

2. Theoretical Framework

There are many nuanced definitions of **public participation**, and not a single universally accepted one, although Hügel and Davies (2020) argue that "public participation is primarily viewed as an umbrella term incorporating various forms of interaction with people, from informing and listening through dialogue, debate, and analysis, to implementing jointly agreed solutions". They state that there is a plethora of synonyms and different understandings depending on geographical contexts, academic disciplines, and professions. Cattino and Reckien (2021) use the terms **community participation** or **citizen participation** as synonyms for public participation and acknowledge that public participation benefits local government decision-making with the involvement of interested or affected citizens, civil society organizations, and government actors with different types, forms and levels of participation (see Ladder of Participation by Arnstein discussed below). This interaction has a wide scope of involvement "from informing and listening at one end, to implementing jointly agreed solutions at the other; and in between there is dialogue, debate and analysis" with the result of a potential "for involved citizens to come to a shared understanding of problems and potential solutions, and with that to change one's mind throughout the process, instead of just exchanging or listening to other views" (Cattino and Reckien, 2021).

It has to be noted that the explicit articulation of public participation and engagement in relation to climate change adaptation is more pronounced from the landmark year for climate change policy in 1992 and it increases from then on with an exponential increase from 2000 onwards (Hügel and Davies, 2020).

2.1 Models of Civic Engagement

Civic participation involves the ways in which individuals and groups participate in activities intended to improve their communities and the quality of life for others. Various theoretical models and frameworks have been developed to understand and categorize civic engagement, public participation, and community involvement. Here are some prominent examples:

Arnstein's Ladder of Citizen Participation (1969)

Sherry Arnstein's ladder is a foundational model that categorizes types of public participation into eight levels, ranging from non-participation to degrees of citizen power:

- Non-participation: Manipulation, Therapy
- Tokenism: Informing, Consultation, Placation
- Citizen Power: Partnership, Delegated Power, Citizen Control

The ladder illustrates how engagement can range from passive involvement to full citizen control over decision-making processes.

Figure 1: French Student Poster from Arnstein's Ladder of Citizen Participation (1969)

IAP2 Public Participation Spectrum

The International Association for Public Participation (IAP2) has created a spectrum that describes the different levels of public participation, ranging from minimal influence to active decision-making power in order to assist organizations to select the appropriate level of engagement depending on the goal and includes the following:

- Inform: Providing information to the public.
- Consult: Seeking public feedback on decisions.
- Involve: Engaging directly to ensure concerns are understood.
- Collaborate: Partnering with the public in decision-making.
- Empower: Placing decision-making in the hands of the public.

Putnam's Social Capital Theory

In his work " "Bowling Alone: America's Declining Social Capital", Robert Putnam introduced the concept of **social capital** as a concept that plays a central role in civic engagement. This concept refers to the networks, norms, and trust that facilitate coordination and cooperation among people. According to this theory, communities that have high social capital have higher levels of civic engagement, leading to a more vibrant democracy and stronger social networks.

Checkoway's Model of Youth Participation

Barry Checkoway places emphasis on the importance of youth engagement in community activities, highlighting the need to tailor civic engagement strategies based on age group and power dynamics and his model includes the following:

- Consultative Participation: Young people are consulted and provide input, but adults make the final decisions.
- Collaborative Participation: Youth and adults share power, making decisions together.
- Youth-Led Participation: Young people have control over decisions and initiatives.

Fung's Democracy Cube

Archon Fung's "Democracy Cube" forms a model for analyzing public participation along three axes that allow for understanding the variations in how citizens can be involved, including the impact they can have on policy as per below:

- **Who Participates:** From expert administrators to randomly selected citizens.
- **How Participants Communicate and Make Decisions**: From deliberative forums to adversarial debates.
- **Link to Final Decision**: From providing advice to directly determining outcomes.

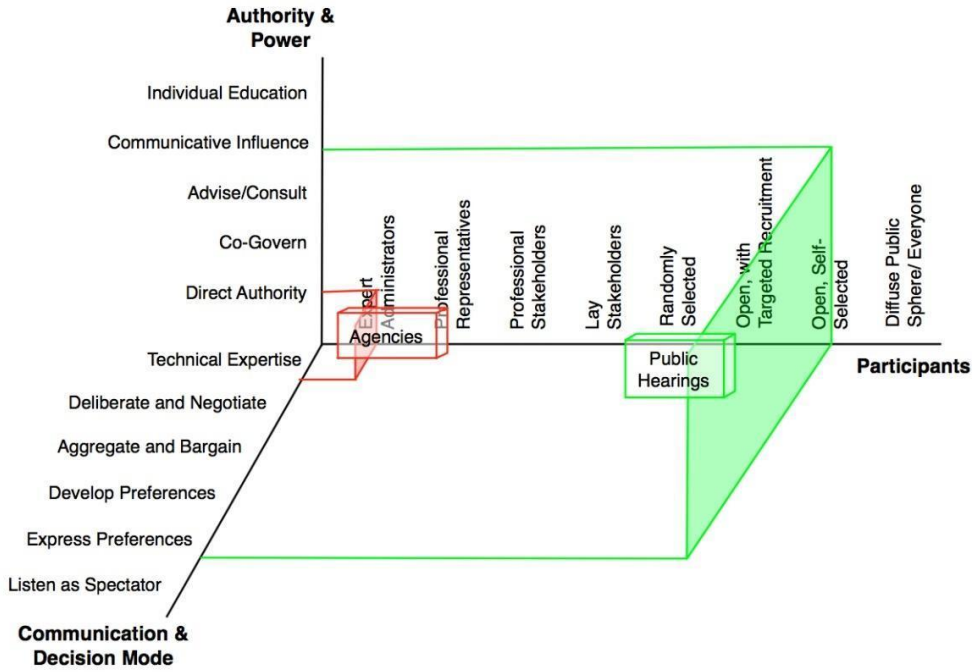


Figure 2: The democracy cube as introduced by Archon Fung (2006)

Theory of Communicative Action (Habermas)

Jürgen Habermas introduced the *Theory of Communicative Action*, which is often applied to understanding civic engagement and is often quoted. Habermas argued that true democratic participation requires inclusive, rational discourse free from domination. Civic engagement, therefore, should be seen as a communicative process where all participants can engage equally, leading to consensus-based decisions.

The Civic Voluntarism Model (Verba, Schlozman, and Brady)

The Civic Voluntarism Model explores why people engage in civic activities, emphasizing three key factors:

- **Resources:** Time, money, and civic skills.
- **Engagement:** Political interest and understanding.
- **Recruitment:** Invitations to participate, often by groups or networks.

This model highlights how individual capabilities and recruitment by others play key roles in participation levels.

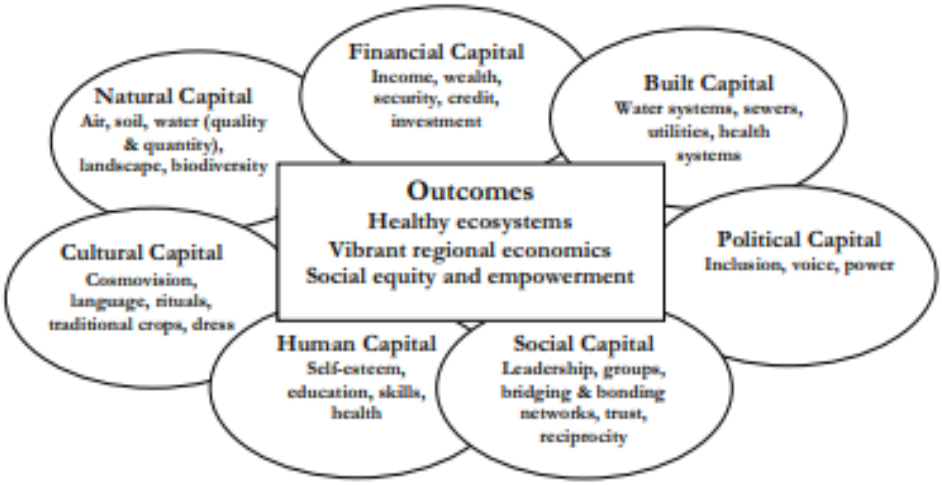
Community Capitals Framework

Developed by Flora and Flora, this framework focuses on the seven types of "capital" that communities have, such as:

- Natural Capital: Environment, natural beauty, lakes, forests.
- Social Capital: Relationships and networks.
- Cultural Capital: Values, traditions, and heritage.
- Human Capital: Education and skills of the population.
- Political Capital: Connections to people in power, access to resources and leverage.
- Built Capital: Buildings and infrastructure, schools, roads.
- Financial Capital: Money, charitable giving, grants, access to funding.

The Community Capitals Framework is often used to assess community assets and plan engagement activities that strengthen underutilized capitals, fostering community involvement.

The seven types of community capital can also be depicted by the following model:



Olson, David P. 2006. *Factors Contributing to the Growth of a Small Town*. Ph.D. dissertation, Department of Rural Sociology, South Dakota State University, Brookings, SD. Adapted from Cornelia Flora's presentation slides (2005).

Figure 3: The Community Capitals Framework

Civic Culture Model (Almond and Verba)

Gabriel Almond and Sidney Verba outlined a model of Civic Culture, identifying three types of political culture:

- Parochial: Low awareness of political systems.
- Subject: Awareness without active participation.
- Participant: High levels of awareness and engagement.

The model suggests that a healthy democracy is supported by a mix of these cultures, with a strong component of participant culture.

Asset-Based Community Development (ABCD)

Developed by Kretzmann and McKnight, ABCD forms a model that shifts focus from needs to assets – and this is its shift from other models, emphasizing the strengths and resources within a community as the basis for development. This model empowers community members by encouraging them to recognize and mobilize their own resources, promoting a high level of local engagement. It is a strategy

for sustainable community driven development. Beyond the mobilization of a particular community, ABCD is concerned with how to link micro-assets to the macro-environment. The appeal of ABCD lies in its premise that communities can drive the development process themselves by identifying and mobilizing existing, but often unrecognized assets, and thereby responding to and creating local economic opportunity

2.2 Contextualizing Climate Change Engagement

The importance of public engagement in climate change has long been documented and praised as it is tied to notions such as "legitimacy, justice and equity of planning processes and outcomes" especially in the context of climate crisis where it is deemed as a factor of success (Cattino and Reckien, 2021) in preparing and changing societies to become more climate resilient and carbon-neutral. Examples can range from the youth climate movement to grassroots mobilizations to digital engagement platforms (Irwin, 2021).

And although there is research on citizen engagement having the opposite result (Cattino and Reckien, 2021) as citizens can reinforce the status quo and thus hinder climate change practices (D'Alisa and Kallis, 2016), public participation leads to more ambitious climate policy and decision-making at the local level and the regional level (Cattino and Reckien, 2021).

3. Methodology for Literature Selection

The methodology of this literature review, which focuses on examining the developments and trends in civic participation models related to climate change over the past five years was selected in agreement with other WP Task leaders. Through examining databases, such as Scopus, Web of Science and Google Scholar, among others, the aim has been to understand how civic participation models have evolved in fostering climate engagement, public participation, and community involvement in alignment with the Climate Adaptation Strategy and Mission and climate adaptation needs at a global scale. The chosen keywords - civic participation models, climate engagement, public participation, and community involvement - have been crucial in identifying relevant studies and insights that map and illustrate the current landscape of climate-related public engagement efforts.

This literature review examines the various models of civic participation that have emerged between 2019 and 2024, with a focus on their relevance to climate change mitigation and adaptation efforts.

4. Recent Trends in Civic Participation Models (2019–2024)

In order to investigate the effectiveness of models that enhance civic participation in climate change mitigation and adaptation, we have explored the different approaches used to engage citizens actively in environmental decision-making and action. During the past five years, a growing body of literature has emerged, focusing on models that range from grassroots mobilizations to digital engagement platforms. These models have as an aim to mobilize individuals, enhance public awareness, and integrate community input into climate policies (Irwin, 2021). We will be exploring participatory governance models, digital participation models, and community-based models in the following parts.

4.1 Participatory Governance Models

Deliberative Democracy

Deliberative democracy has gained traction as a model for enhancing civic participation in climate change decision-making (Dryzek and Niemeyer, 2019) given that this model emphasizes the inclusion of diverse voices in structured dialogues, where citizens can deliberate on climate policies. Studies including those by Dryzek et al. (2019) emphasize how deliberative democracy can bridge the gap between public opinion and policy-making, particularly in climate change adaptation. For instance, citizens' assemblies on climate, held in various countries, have shown the potential of this model to foster informed public engagement and produce actionable recommendations for policymakers (Smith, 2021). Willis states that “in essence, greater democratic engagement is a crucial ingredient in climate action—that, simply put, there is a need for “more democracy, not less” (Willis et al., 2021).

The most active academic and practical work on deliberative democracy through research is arguably on **democratic innovations**. By this term, we refer to “institutions designed specifically to increase and deepen participation in political decision-making”, such as the prominent “deliberative mini-publics” such as citizens' juries and citizens' assemblies which bring together randomly selected citizens (Willis et al., 2021). There have been many examples of citizens' assemblies on climate change, and especially the much-publicized assemblies in France and the UK that are examples of deliberative mini-publics (DMPs) of randomly selected citizens to represent diversity that come together to address, deliberate and decide on a matter of public interest (Willis et al., 2021).

Co-production of Knowledge

Co-production of knowledge is another commonly used participatory governance model that has been implemented in many climate change adaptation projects and activities. This approach involves collaboration between scientists, policymakers, and local communities to generate knowledge that is both scientifically robust and contextually relevant, taking into account the knowledge of actors that are affected by climate change.

Research by Norström et al. (2020) suggests that co-production can enhance the legitimacy and effectiveness of climate adaptation strategies, particularly and of essence in vulnerable communities. This governance model also supports the integration of traditional and indigenous knowledge systems, which are critical for sustainable adaptation and sustainable development at large.

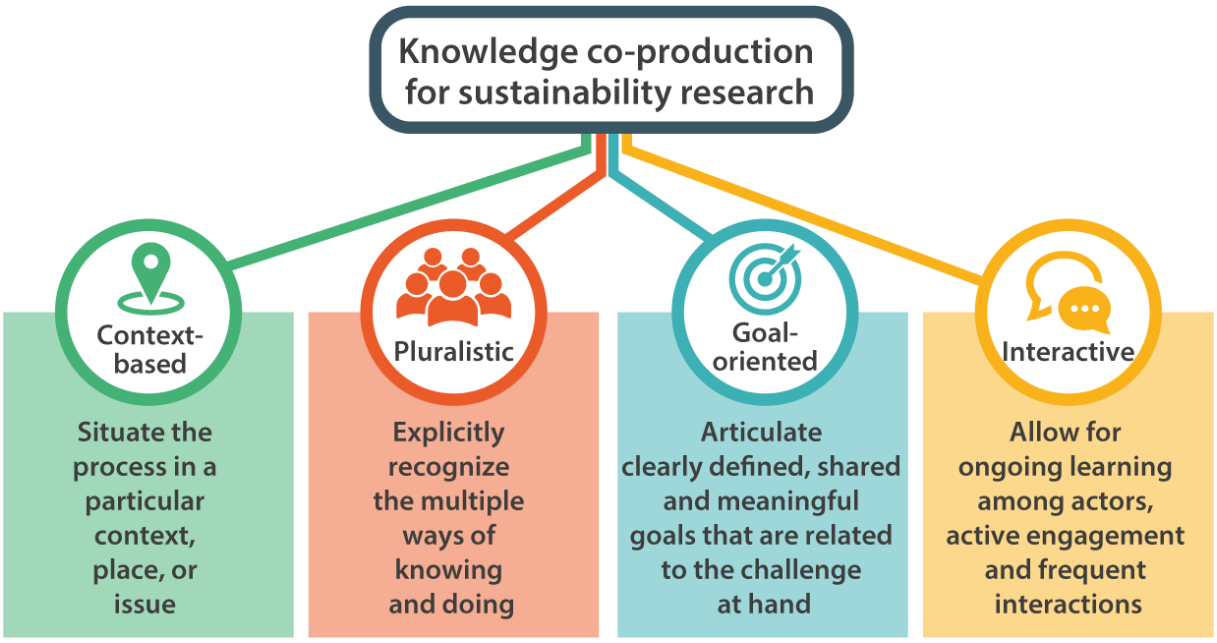


Figure 4: Knowledge Co-Production for Sustainability Research, Norström et al. (2020)

Some of the advantages of co-production include among others (Satterthwaite et al., 2024) the following:

- better quality of research and conceptualization of complex systems
- strengthening ownership and buy-in
- building public trust in evidence-based decision-making
- stronger inclusion and equitable knowledge generation. and strengthening innovation, implementation, and overall success of sustainability initiatives

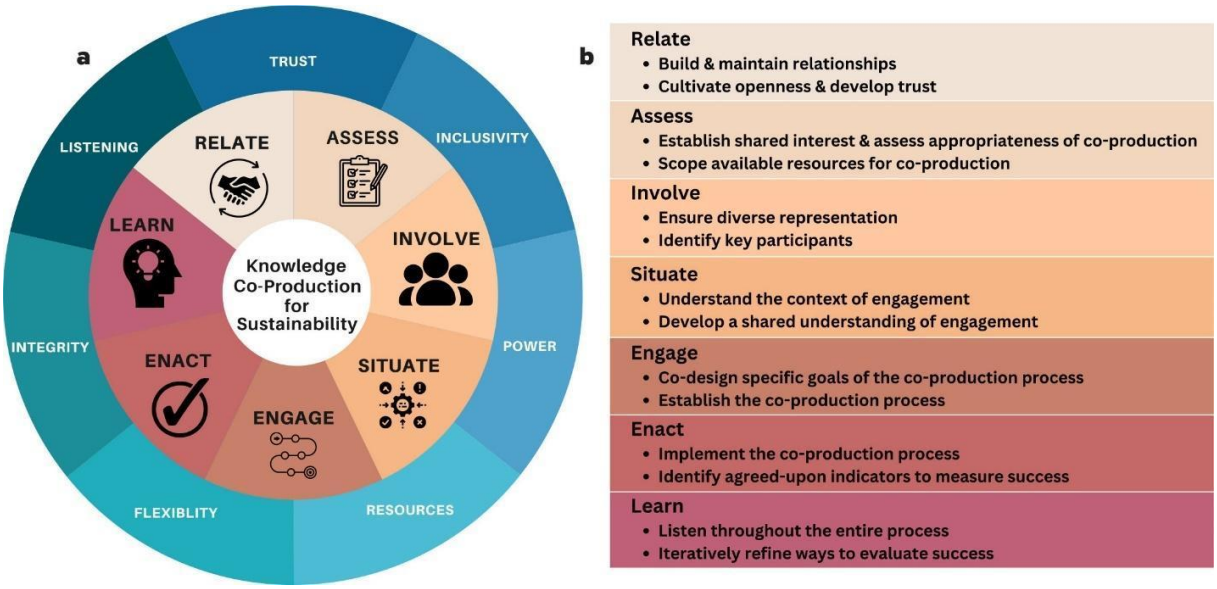


Figure 5: Wheel of Knowledge Co-Production for Sustainability, Satterthwaite et al., 2024

Participatory Mapping and Citizen Science

Participatory mapping, referred to as 'community mapping', that is the creation of maps by local communities "with the involvement of supporting organizations including governments (at various levels), non-governmental organizations (NGOs), universities and other actors" (IFAD, 2009) and citizen science initiatives, that is the practice of public participation and collaboration in scientific research to increase scientific knowledge, have also gained prominence as models for civic engagement in climate change adaptation.

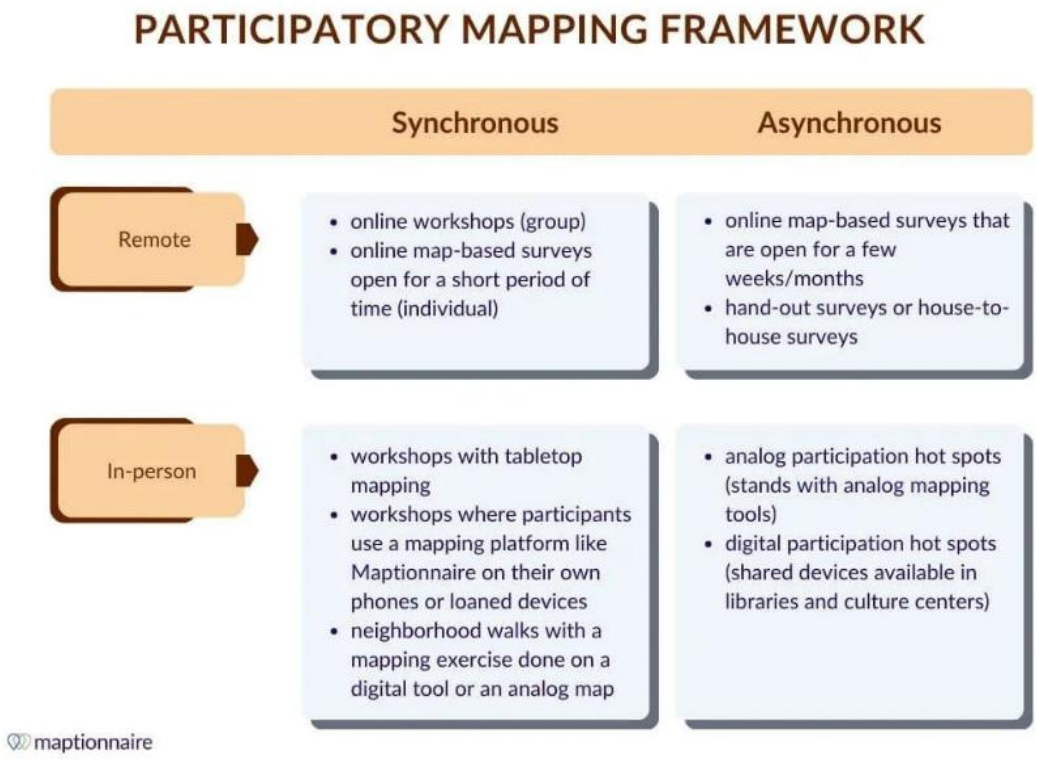


Figure 6: The framework shows the types and tools of participatory mapping

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These aforementioned approaches involve activities to engage citizens in collecting, analyzing and disseminating and sharing climate-related data and thus involve them in climate action. For instance, projects such as the "Climate Watch" initiative have empowered communities to monitor environmental changes and report their findings to local authorities, thereby influencing climate adaptation planning and participating in policymaking and decision making. The extensive use and development of mobile apps and online platforms by different social groups and the easy access to them has further facilitated the scaling and dissemination of such initiatives, enabling broader participation across different demographics and geographies.

4.3 Digital Participation Models

Digital Platforms and Social Media

Social media platforms like X [former Twitter] can serve multiple functionalities as regards climate change: as a discussion forum, a soft power tool and a vehicle for transnational advocacy and climate

action whilst being the main vehicle, especially X [former Twitter], for policymakers' engagement to frame the debate and to showcase particular achievements, according to Dellmuth & Shyrokykh (2023).

In this context, digital platforms and social media have emerged as powerful tools for citizens to be engaged and involved in climate change discourse. Between 2019 and 2024, these tools have become more popular as regards mobilizing public opinion, coordinating climate strikes, and facilitating grassroots movements like Fridays for Future enabling mobilization and inclusion of marginalized groups, such as indigenous peoples (Hopke & Paris, 2022) and using these new modes of communication to "create new forms of protests, new ways of engaging with potential adherents, and ways to potentially bypass the media as gatekeepers" (Haßler et al., 2021) . Platforms such as X [former Twitter], and Facebook have enabled large-scale, decentralized participation, allowing individuals to engage in climate action and activism and thus engage and contribute to the global climate discourse. The COVID-19 pandemic has not had an impact on the extent of mobilization on X [former Twitter], and it has created thematic norm diffusion, where norms are crucial guiding principles for policymakers (Haßler et al., 2021).

However, the effectiveness of digital participation in influencing policy still remains a subject of debate, with some studies pointing to the potential for **misinformation** and **polarization** (Dellmuth & Shyrokykh, 2023).

4.4 Community-Based Models

Community-Led Adaptation

Community-led adaptation is a model that puts local communities at the forefront of climate change adaptation efforts and is grounded in recognizing that communities are best positioned to identify their vulnerabilities and develop context-specific solutions. This approach brings in the element of localization as well. The literature examined from 2019 to 2024 for the needs of this policy brief highlights numerous examples of successful community-led adaptation projects, particularly from the Global South. For instance, the "Eco-Village" movement in sub-Saharan Africa has demonstrated how community-driven initiatives can lead to sustainable adaptation outcomes as they integrate local knowledge with innovative practices, and Ecological Sustainability (ECO) with the simplicity and closeness of Village life (Farkas, 2017, Feng et al., 2017) that has led to projects such as the Creating a model eco-village Project by GIZ (2022-2025).

Participatory Budgeting

Participatory budgeting is another community-based model that has been often used as a tool in the process of mitigating and adapting to climate change (Rocha & Costa, 2022). Participatory budgeting (PB) "broadly refers to the many ways in which the general public is able to interact directly with government in the design and implementation of budgetary and fiscal policy" and forms a process to localize the Sustainable Development Goals (SDGs) "at the community level", according to the CEPA Guidance Note (2022). The process is two-fold: citizens and stakeholders better understand the nexus of policies in governance and policymakers better understand the diversity of needs of society. Studies have shown that participatory budgeting can enhance transparency, accountability, and public trust in climate adaptation efforts. Moreover, this model allows for the direct inclusion of marginalized groups in the allocation of resources, ensuring that adaptation measures address the needs of the most vulnerable populations, as it resonates with SDG 11 (Make cities and human settlements inclusive, safe, resilient and sustainable) and in Target 16.7 (Ensure responsive, inclusive, participatory and representative decision-making at all levels) and "expansion of PB is widely considered an important enabler of progress towards many other Goals, among them: tackling poverty, lowering child mortality rates, facing the consequences of and preventing further damages from climate change and fostering the conditions needed for gender equality" (CEPA Guidance, 2022).

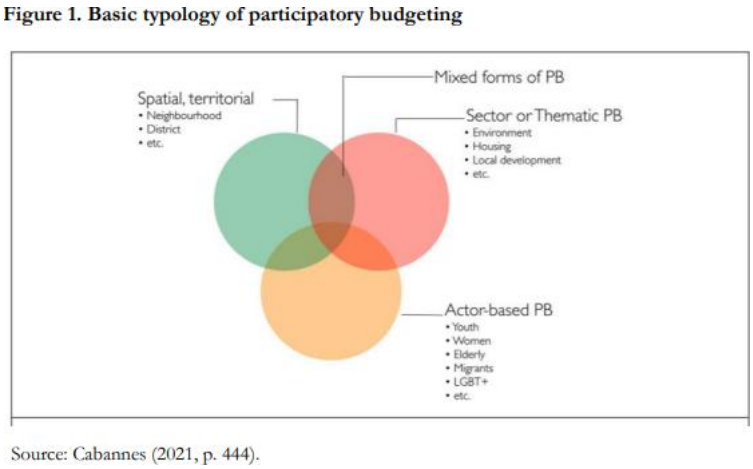

Figure 7: Basic Typology of Participatory Budgeting from the CEPA Guidance (2022)

5. Key Components of Effective Models

Some key aspects of successful public participation models from the literature reviewed for this policy brief include DEI practices, deliberation, and learning on climate change.

Diversity, equity and inclusivity (DEI) are concepts that recur in the participatory models described above in order to include and engage diverse and marginalized communities in climate discussions, as the most vulnerable communities are the least resilient to climate change adaptation, according to the UN. For instance, Satterthwaite et al. (2024) state that the success of knowledge co-production is based on ensuring diverse representation, which can be "achieved through random sampling to enable the inclusion of a broad range of perspectives and experiences and to ensure that no social group within a population is systematically excluded" (Willis et al., 2021). A best practice "to identify key participants and ensure diverse representation is to collaborate with established community organizations, such as boundary organizations1 and community-based groups" (Satterthwaite et al., 2024).

According to Willis et al. (2021), an important method is **deliberation**— trained facilitators-led, structured discussions, between participants and with experts and that enable "participants to consolidate their knowledge, develop their views and collaborate in generating ideas for action. The final feature is the production of conclusions or recommendations, which may be reached through consensus building, voting, or a combination of both" (Willis et al., 2021). During this stage, it is important to designate the "outcome or output oriented" goals of the co-production process through open, constructive dialogue among participants (Satterthwaite et al., 2024). Some of the outcomes could be overcoming conflict, developing a shared understanding of an issue, defining a common vocabulary to address an issue, or ownership of research; outputs could include development of an actionable research tool or generating a publication of relevant/responsive/actionable research (Chambers et al., 2021). The established goals could be short-term within the planned project timeline or they may be longer term, achieved through continued partnership over time (Satterthwaite et al., 2024).

All models that have been reviewed have a **learning phase** that promotes **climate literacy** and encourages **behavioral change** among citizens. This phase is important for listening, evaluation, and reflection (Satterthwaite et al., 2024) and for evolving their understanding of the issue in discussion (Willis et al., 2021).

6. Challenges and Limitations of Existing Models

Some of the limitations and thus challenges of the existing models include the barriers to effective civic participation, the most prominent one being lack of access as substantiated in Hügel & Davies (2020) who state that "formal participation by unorganized publics around climate adaptation remains stubbornly limited despite increased research into communicating climate change". Willis et al. (2021) further refer to evidence that points towards gender bias ("women's arguments are less likely to be taken up") and lower income individuals may have rare contributions and less capacity to engage in deliberations topped with racial dynamics that can shape deliberation.

The nexus of science and policy-making has been put to the forefront through processes such those spearheaded by UNESCO (see International Symposium of the United Nations Regular Process on strengthening the ocean science-policy interface https://oceandecade.org/events/international-symposium-un-regular-process-strengthening-ocean-science-policy-interface/), where non-technical language used for policy-makers is a prerequisite for effective policy-making. The same is true for citizens as there has been arguments that "everyday people do not have the capacity to consider the complexity of climate change", so the findings of co-production processes cannot be relied on (Willis et al., 2021).

Effective knowledge co-production may not always be the best approach for a given context as clear incentives for engaging in co-production may not exist or may not align across participants. The reason being that not all audiences value diverse forms of knowledge. There may be reluctance to engage in actionable science due to lack of training or interest or the right venues for building initial relationships across people in different sectors or communities may not exist (Satterthwaite et al., 2024).

Some of the criticism of the citizen assemblies includes that recommendations coming from participatory processes do not possess rigour and in effect their impact on the transition required for climate change is not enough, putting the blame on the task of the assembles rather than the capacity of participants (Willis et al., 2021).

There has also been criticism that "citizens being part of environmental decision-making that support the status-quo" (Cattino and Reckien, 2021). Along with skepticism, contrarianism, and denial are concepts often associated with climate change misinformation (Treen et al., 2020) that can spread through new modes of communication, such as social media. However, there is evidence that these participatory methods can reduce polarization, increase satisfaction with policy outcomes and help to build trust and the perceived efficacy of public institutions, thus combating misinformation.

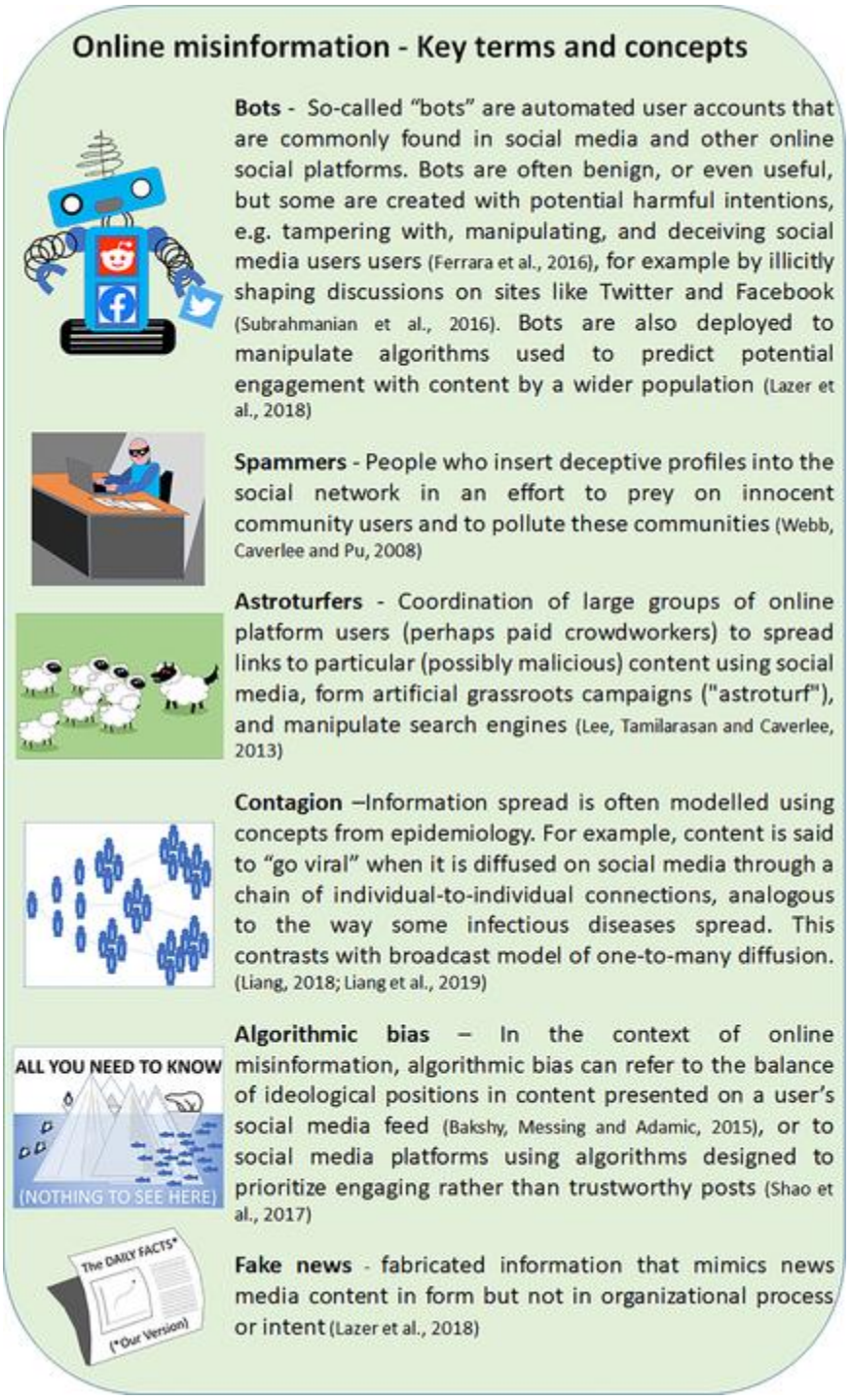

Figure 8: Online Misinformation Key Terms and Concepts from Treen et al., 2020

7. Emerging Trends and Future Directions

Some of the emerging trends in civic participation include the **intersection of climate justice and civic participation**. Foregrounding justice and inclusion considerations, while actively addressing racial and social injustice, is crucial for public engagement on climate change. Effective climate justice places justice and inclusion at the center of both public discourse and decision-making, ensuring that the most vulnerable are protected and that burdens and benefits are equitably shared.

Meaningful public engagement must start by forming diverse and representative participant groups that provide everyone the agency to express their lived experiences, capacities, and priorities. This inclusiveness is essential to amplify marginalized voices that have historically been left out of environmental policymaking and to ensure that solutions are grounded in the realities faced by those most affected.

Moreover, it is necessary to address the structural conditions, including the formal and informal power dynamics that influence people's ability to engage meaningfully. This includes acknowledging systemic inequities and making space for marginalized communities to be heard in decision-making processes. Without recognizing these underlying disparities and creating mechanisms to overcome them, public engagement efforts risk reinforcing the injustices they seek to dismantle. In essence, climate justice not only involves addressing environmental concerns but also requires the dismantling of social, racial, and economic inequalities to create sustainable, resilient communities that thrive together.

The role of Artificial Intelligence and Data Analytics is also becoming increasingly important in engaging in climate action especially through social media.

There have also been policy shifts, including in international collaboration, especially as regards international agreements (e.g., Paris Agreement, COPs, COP29) that have been influencing national and local civic participation models.

8. Conclusion

In this policy brief, various models of enhanced civic participation developed and applied in the context of climate change and climate adaptation have been explored in length. These models range from deliberative democracy and co-production of knowledge to digital participation, community-led adaptation, and participatory budgeting, reflecting social shifts and norms during recent years with rapid technology advancements. Each model has its strengths and limitations; however, they collectively highlight the importance of involving citizens in the climate change discourse. While climate change continues to intensify, the role of civic participation in shaping adaptive responses will likely become even more critical and more central in decision-making and deliberations.

Some recommendations for further research include public participation in climate change adaptation, as addressed in gray literature and policy documents, that often involves varied levels of community engagement, including in national adaptation plans. More study in the evaluation of such participatory efforts on understanding the impact of broadening public involvement on the effectiveness and acceptance of adaptation measures. Furthermore, recent discussions have expanded to consider cultural and emotional aspects, acknowledging that climate change adaptation is not just a technical challenge but also an experience deeply intertwined with community values, beliefs, and emotional responses (Hügel & Davies, 2020).

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