

Association of Stakeholder Dialogue Formats with Consensus Building in Environmental Planning Forums

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Abstract

Environmental planning increasingly relies on collaborative governance to address complex socio-ecological challenges. Stakeholder dialogue is widely recognized as a critical mechanism for resolving conflicts and building consensus. However, empirical evidence linking specific dialogue formats to different dimensions of consensus building remains sparse and fragmented. This study examines how three distinct dialogue formats—structured workshops, semi-structured advisory committees, and open public forums—affect consensus building outcomes. Using a comparative difference analysis framework applied to data from environmental planning forums in Southeast Asia, we assess cognitive consensus, relational consensus, and commitment to action. The statistical results show that structured workshops excel at fostering relational trust and commitment, whereas semi-structured advisory committees are highly effective for building cognitive alignment on complex technical issues. Open public forums, while valuable for democratic legitimacy, show significantly lower performance in resolving deep-seated conflicts. The findings suggest that environmental planners must strategically select and sequence dialogue formats to achieve specific consensus outcomes, balancing open participation with structured collaboration.

Keywords: Stakeholder Dialogue; Consensus Building; Environmental Planning; Difference Analysis; Multidisciplinary Research

1. Introduction

1.1 Context and Background

Environmental planning and natural resource management operate within highly complex, contested, and uncertain socio-ecological landscapes [1]. Decisions regarding watershed management, coastal preservation, urban green infrastructure, and climate adaptation strategies inevitably involve a multitude of stakeholders with divergent interests, values, and epistemic systems [2]. Traditional, top-down bureaucratic decision-making frameworks have increasingly proven inadequate for addressing these wicked problems, often leading to protracted public conflicts, administrative gridlock, and litigation [3]. In response to these systemic failures, the paradigm of collaborative governance has emerged as a dominant framework in environmental planning theory and practice [4]. Collaborative governance emphasizes the direct, meaningful engagement of public and private stakeholders in collective decision-making processes, aiming to co-create solutions that are both environmentally sustainable and socially equitable [5].

At the core of collaborative governance lies the practice of stakeholder dialogue. Dialogue serves as the primary mechanism through which stakeholders share information, articulate values, negotiate interests, and ultimately build consensus [6]. Through structured interaction, participants can move beyond zero-sum bargaining toward integrative, win-win solutions [7]. Despite the widespread theoretical endorsement of

dialogue-driven planning, the practical implementation of stakeholder engagement remains highly variable. Environmental planners employ a diverse array of dialogue formats, ranging from highly structured, small-group deliberative workshops to broad-based, open public forums. Each of these formats possesses distinct structural characteristics, communication channels, and power dynamics, yet they are often treated as interchangeable tools in the planner's toolkit.

This lack of discrimination represents a significant gap in both planning theory and practice. While the broader benefits of public participation are well-documented, the empirical links between specific dialogue formats and different dimensions of consensus building remain poorly understood. Consensus building is not a monolithic outcome but rather a multi-faceted process that includes cognitive alignment, relational trust-building, and operational commitment to action [8]. Understanding how different structural designs of dialogue influence these distinct dimensions of consensus is critical for designing effective participatory processes that can withstand the pressures of implementation.

1.2 Research Objectives and Questions

This study addresses this gap by presenting empirical evidence from a comparative difference analysis of stakeholder dialogue formats within environmental planning forums. Specifically, we investigate how three common dialogue formats—structured workshops, semi-structured advisory committees, and open public forums—affect the generation of cognitive consensus, relational consensus, and commitment to action. By evaluating these relationships, this research seeks to answer two fundamental questions. First, to what extent do different dialogue formats lead to statistically significant differences in consensus building outcomes? Second, which specific dialogue designs are most effective at fostering particular dimensions of consensus among diverse stakeholders?

To address these questions, we utilize quantitative data collected from participants across multiple environmental planning forums in Southeast Asia. These forums, which addressed critical regional challenges such as coastal zone management and watershed protection, utilized varying dialogue formats to engage government officials, non-governmental organizations, local community representatives, industry actors, and academic experts. By applying difference analysis, including analysis of variance and post-hoc pairwise comparisons, this study isolates the effects of dialogue formats on consensus outcomes, controlling for key stakeholder characteristics. The findings contribute to a more nuanced, contingency-based theory of collaborative planning, offering actionable guidance for practitioners tasked with designing participatory environmental decision-making processes.

The remainder of this paper is organized as follows. Section 2 reviews the literature on collaborative governance, dialogue typologies, and consensus dimensions, establishing the conceptual framework of the study. Section 3 outlines the research methodology, case selection, variables, and analytical techniques. Section 4 presents the quantitative results of the difference analysis. Finally, Section 5 discusses the theoretical and practical implications of the findings, highlighting strategies for optimizing stakeholder engagement in environmental planning.

2. Literature Review and Conceptual Framework

2.1 Collaborative Governance and Environmental Planning

The conceptual evolution of environmental planning over the past several decades reflects a continuous search for methods to integrate diverse forms of knowledge and resolve conflicting public values. Early models of rational-comprehensive planning, which relied almost exclusively on technical experts and centralized administrative authority, frequently failed when confronted with the socio-political complexities of environmental issues [9]. These failures catalyzed the communicative turn in planning theory, which posits that planning is fundamentally a communicative and collaborative activity rather than a purely technical exercise [10]. Within this paradigm, the quality of planning decisions is seen as directly dependent on the quality of the communicative interaction among affected parties.

Collaborative governance operationalizes these communicative principles by creating formal and informal spaces where stakeholders can engage in face-to-face deliberation [11]. In environmental planning, collaborative governance is particularly valuable because it can mobilize distributed knowledge, foster

adaptive capacity, and enhance the democratic legitimacy of decisions [12]. By bringing resource users, scientific experts, regulators, and advocates to the same table, collaborative processes seek to transcend adversarial dynamics and cultivate a shared sense of ownership over environmental resources [13].

However, the transition from theory to practice has revealed that collaborative processes are highly sensitive to institutional design and structural context. The mere invitation of stakeholders to a meeting does not guarantee meaningful collaboration. Issues of power asymmetry, strategic behavior, representation, and resource constraints can undermine the deliberative quality of dialogue, sometimes exacerbating existing conflicts instead of resolving them [14]. Therefore, understanding the specific structural conditions under which collaborative dialogue leads to positive planning outcomes has become a central focus of contemporary planning scholarship.

2.2 Typology of Stakeholder Dialogue Formats

Stakeholder dialogue formats can be classified along several structural dimensions, including group size, level of facilitation, frequency of interaction, and the degree of structural constraint on communication. In this study, we focus on three primary dialogue formats that represent distinct points along this structural spectrum: structured workshops, semi-structured advisory committees, and open public forums.

Structured workshops are typically designed for small to medium-sized groups and are characterized by intensive, highly facilitated interactions over a short duration, such as one or two days [15]. These workshops rely on professional facilitators who use specific techniques, such as joint fact-finding, scenario planning, and small-group breakout sessions, to guide participants through a systematic problem-solving process. The primary objective is to cultivate deep, focused deliberation on specific planning tasks. The highly structured environment is intended to mitigate power imbalances and ensure that all participants have equal opportunities to speak and contribute to the final outputs.

Semi-structured advisory committees, by contrast, involve a stable, selected group of stakeholder representatives who meet periodically over a more extended timeframe, often spanning several months or even years [16]. These committees are semi-structured in that while they follow formal agendas and terms of reference, their long-term nature allows for more organic, flexible, and iterative communication to develop. Advisory committees often serve as a bridge between technical experts and the broader community, tasked with evaluating complex data and making policy recommendations. The continuity of interaction is hypothesized to build strong interpersonal networks and deeper understandings of technical issues.

Open public forums represent the most traditional and widely used format for public participation in planning. These forums, which include public hearings, town hall meetings, and open-access community workshops, are open to all interested individuals without pre-selection [17]. They are characterized by low barriers to entry, large and shifting participant populations, and relatively low levels of interactive structure. Communication in open forums is often unidirectional or hub-and-spoke, with participants presenting statements to planning officials rather than engaging in sustained dialogue with one another. While highly democratic in terms of access, the lack of interactive structure and the large scale of these forums can limit the depth of deliberation and make consensus difficult to achieve.

2.3 Consensus Building Processes and Measures

Consensus building is widely understood as the primary goal of collaborative dialogue, yet defining and measuring consensus remains a complex task. Drawing on planning and public administration scholarship, this study conceptualizes consensus not as a simple, binary agreement on a final document, but as a multidimensional construct that develops throughout the collaborative process [18]. We identify three distinct dimensions of consensus building: cognitive consensus, relational consensus, and commitment to action.

Cognitive consensus refers to the degree of shared understanding and cognitive alignment achieved among stakeholders regarding the nature of the environmental problem, its underlying drivers, and the viability of potential solutions [19]. It involves the synthesis of different types of knowledge, including scientific data, local experiential knowledge, and administrative expertise. Achieving cognitive consensus requires stakeholders to move past purely subjective interpretations and arrive at a common definition of the problem landscape.

Relational consensus focuses on the interpersonal and inter-organizational dynamics that develop during the dialogue process. It is measured by the growth of mutual trust, respect, empathy, and social capital among stakeholders [20]. In highly contested environmental arenas, historical mistrust between industry, environmental advocates, and government agencies is a major barrier to collaboration. Relational consensus represents the repair of these relationships and the creation of a communicative foundation that can support cooperative actions even after the formal planning forum concludes.

Commitment to action capture the operational dimension of consensus, representing the willingness of stakeholders to support, implement, and defend the agreed-upon planning outcomes [21]. It reflects the transition from verbal agreement to physical and institutional action. High levels of commitment to action mean that stakeholders are willing to allocate resources, adjust their internal organizational behaviors, and champion the planning decisions within their respective networks.

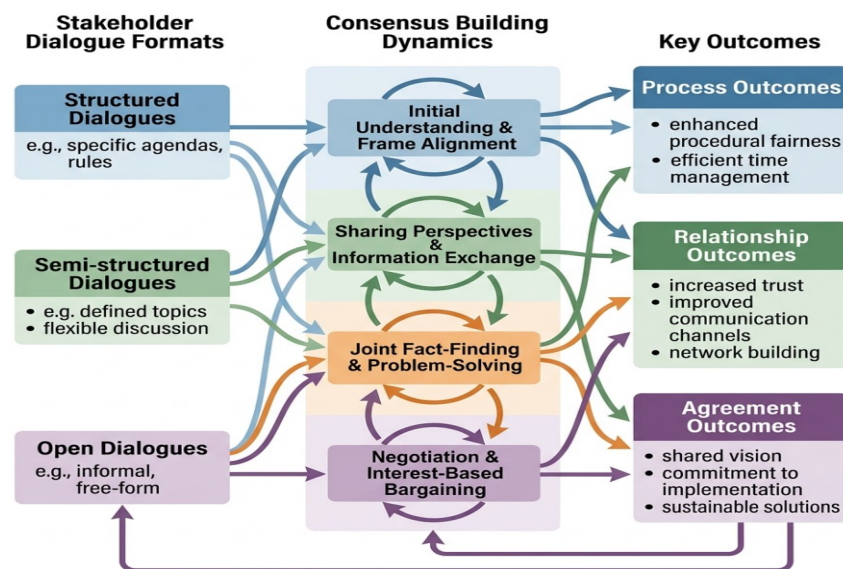


Figure 1: Comprehensive Conceptual Model of Stakeholder Dialogue Formats and Consensus Building Dynamics

As illustrated in Figure 1, the conceptual framework of this study posits that the structural characteristics of the chosen stakeholder dialogue format directly influence the quality and depth of communication. This communication quality, in turn, drives the development of cognitive consensus, relational consensus, and commitment to action. This model suggests that the structural design of planning forums is a critical leverage point for planners seeking to cultivate durable collaborative agreements.

3. Methodology and Research Design

3.1 Research Context and Case Selection

This research utilizes a comparative, cross-sectional design to analyze data collected from participants in several environmental planning forums across Southeast Asia between 2021 and 2023. This region presents a highly relevant context for studying stakeholder dialogue, as rapid economic development, urbanization, and climate vulnerability have created intense conflicts over land use, water resources, and coastal protection. To address these conflicts, governments and non-governmental organizations have increasingly deployed collaborative planning initiatives.

A total of twelve distinct environmental planning forums were selected for analysis. These cases were selected to ensure variation in the primary dialogue format used while holding other contextual factors relatively constant. All selected cases met the following criteria: they focused on regional-scale environmental or natural resource planning issues, involved a diverse array of stakeholders representing at least four distinct interest groups, and had a clear mandate to produce planning recommendations or policy guidelines.

The twelve forums were distributed evenly across the three dialogue formats, resulting in four forums analyzed for each format:

First, structured workshops, which consisted of highly facilitated, multi-day design and planning charettes focused on coastal resilience and urban river rehabilitation.

Second, semi-structured advisory committees, which were formal, long-term working groups established to draft integrated water resource management plans and forest conservation strategies.

Third, open public forums, which were large-scale public consultation meetings organized by municipal and regional governments to solicit feedback on environmental impact assessments and master planning initiatives.

To gather empirical data, a structured questionnaire was distributed to participants immediately following the conclusion of the final session of each planning forum. The survey was translated into local languages and administered both digitally and in paper format to ensure maximum accessibility. Out of 550 surveys distributed, 342 valid responses were retrieved, yielding an overall response rate of 62.2 percent. The respondent pool was highly diverse, comprising government officials, local residents, NGO representatives, private sector operators, and scientific researchers.

3.2 Data Collection and Variables

The survey instrument was developed based on established scales in the collaborative governance literature and adapted to the specific context of environmental planning. It comprised three main sections: respondent demographics and background, characteristics of the planning forum, and evaluations of the consensus building outcomes.

The independent variable of interest is the stakeholder dialogue format, categorized as a nominal variable with three groups: structured workshops, semi-structured advisory committees, and open public forums. Respondents were assigned to these groups based on the specific forum they attended.

The dependent variables are the three dimensions of consensus building, operationalized as multi-item indexes measured on a five-point Likert scale, where one represents strong disagreement and five represents strong agreement.

Cognitive consensus was measured using a four-item scale assessing the extent to which the dialogue helped participants understand other perspectives, clarify technical facts, define common goals, and establish a shared understanding of the planning problem [22].

Relational consensus was measured using a four-item scale assessing changes in mutual trust, respect, communication quality, and the resolution of historical conflicts among participants [23].

Commitment to action was measured using a three-item scale evaluating participants' willingness to support the decisions publicly, align their organization's actions with the plan, and assist in implementation [24].

To ensure the reliability and validity of the measurement scales, we conducted exploratory factor analysis and calculated Cronbach's alpha coefficients. All three construct scales demonstrated strong internal consistency, with alpha values well above the acceptable threshold of 0.70. Control variables included the respondent's stakeholder group, their prior level of involvement in environmental planning, and their self-reported level of pre-existing conflict regarding the planning issue. Table 1 provides the detailed operationalization, descriptive statistics, and reliability scores for the key measurement variables.

Table 1: Descriptive Statistics and Operationalization of Variable Measures

Variable Name	Number of Items	Measurement Description	Mean Value	Standard Deviation	Cronbach Alpha
Cognitive Consensus	4	Degree of shared understanding of planning problems, scientific facts, and strategic goals	3.74	0.81	0.84
Relational Consensus	4	Development of trust, respect,	3.52	0.93	0.88

Variable Name	Number of Items	Measurement Description	Mean Value	Standard Deviation	Cronbach Alpha
		and mutual respect among participating stakeholders			
Commitment to Action	3	Stakeholder willingness to implement, defend, and support plan outcomes	3.61	0.88	0.81
Prior Involvement	1	Frequency of past participation in environmental planning (1 to 5)	2.85	1.12	Not Applicable
Initial Conflict Level	1	Perceived severity of dispute prior to the start of the dialogue (1 to 5)	3.68	0.95	Not Applicable

The data collected through these instruments provide a robust foundation for examining how the structural characteristics of dialogue formats translate into tangible collaborative outcomes. By measuring consensus along these three distinct pathways, we can capture the nuanced ways in which planning processes succeed or fail to build lasting agreement.

4. Difference Analysis and Quantitative Results

4.1 Statistical Comparison of Dialogue Formats

To determine whether different stakeholder dialogue formats yield statistically distinct consensus outcomes, we performed a series of difference analyses. Since the dependent variables were constructed from multi-item Likert scales that exhibited normal distributions based on Shapiro-Wilk tests, we utilized one-way analysis of variance as our primary parametric testing method. Homogeneity of variances was verified using Levene's test.

Table 2: Analysis of Variance for Dialogue Formats and Consensus Outcomes

Consensus Dimension	Dialogue Format	Sample Size	Mean Score	Standard Error	F-Statistic	Significance
Cognitive Consensus	Structured Workshops	118	3.91	0.07	18.54	Less than 0.001
Cognitive Consensus	Advisory Committees	104	4.02	0.08	18.54	Less than 0.001
Cognitive Consensus	Open Public Forums	120	3.34	0.08	18.54	Less than 0.001
Relational Consensus	Structured Workshops	118	3.88	0.08	34.12	Less than 0.001
Relational Consensus	Advisory Committees	104	3.58	0.09	34.12	Less than 0.001
Relational Consensus	Open Public Forums	120	3.12	0.08	34.12	Less than 0.001
Commitment to Action	Structured Workshops	118	3.95	0.08	29.87	Less than 0.001
Commitment to Action	Advisory Committees	104	3.62	0.08	29.87	Less than 0.001
Commitment to Action	Open Public Forums	120	3.28	0.08	29.87	Less than 0.001

The results of the one-way ANOVA, presented in Table 2, reveal highly significant differences across all three dimensions of consensus building based on the dialogue format utilized. For cognitive consensus, the F-statistic of 18.54 indicates that the variation in shared understanding across the three formats is highly unlikely to be the result of random chance. A similar pattern is observed for relational consensus, which shows an even larger variation among groups, suggesting that the relational dynamics of trust and mutual respect are highly sensitive to the structural format of the dialogue. Finally, the commitment to action also

exhibits a highly significant F-statistic, confirming that the willingness of stakeholders to support and implement planning decisions is strongly associated with how the dialogue was structured.

Comparing the mean scores across the formats provides initial insights into their relative performance. For cognitive consensus, semi-structured advisory committees achieved the highest mean score, closely followed by structured workshops, while open public forums scored substantially lower. In contrast, for both relational consensus and commitment to action, structured workshops outperformed both advisory committees and open public forums, with open public forums consistently recording the lowest mean scores across all three dimensions.

4.2 Impact of Formats on Consensus Dimensions

To identify which specific pairs of dialogue formats exhibited statistically significant differences, we conducted post-hoc pairwise comparisons using Tukey's Honest Significant Difference test [25]. This analysis allows us to look deeper into the comparative performance of each format and isolate where the significant variance lies.

For cognitive consensus, the Tukey post-hoc test indicates that the mean score for open public forums is significantly lower than both structured workshops and semi-structured advisory committees. However, the difference between structured workshops and semi-structured advisory committees is not statistically significant. This suggests that both structured workshops and advisory committees are highly effective at facilitating joint fact-finding, sharing complex information, and building a common understanding of the planning problem, whereas open public forums are significantly less capable of achieving this cognitive alignment.

For relational consensus, the pairwise comparisons reveal statistically significant differences between all three dialogue formats. Structured workshops achieved a significantly higher mean score than semi-structured advisory committees, which in turn achieved a significantly higher score than open public forums. This hierarchical result indicates that the intense, highly facilitated interaction characteristic of structured workshops is uniquely powerful in cultivating interpersonal trust and breaking down historical conflicts, outperforming even the long-term, sustained engagement of advisory committees.

For commitment to action, the post-hoc analysis again shows that structured workshops scored significantly higher than both advisory committees and open public forums. Additionally, semi-structured advisory committees scored significantly higher than open public forums. This indicates that the intense, task-oriented environment of facilitated workshops, combined with the high level of personal interaction, is highly effective at securing concrete stakeholder buy-in and motivating participants to actively support the implementation of planning outcomes.

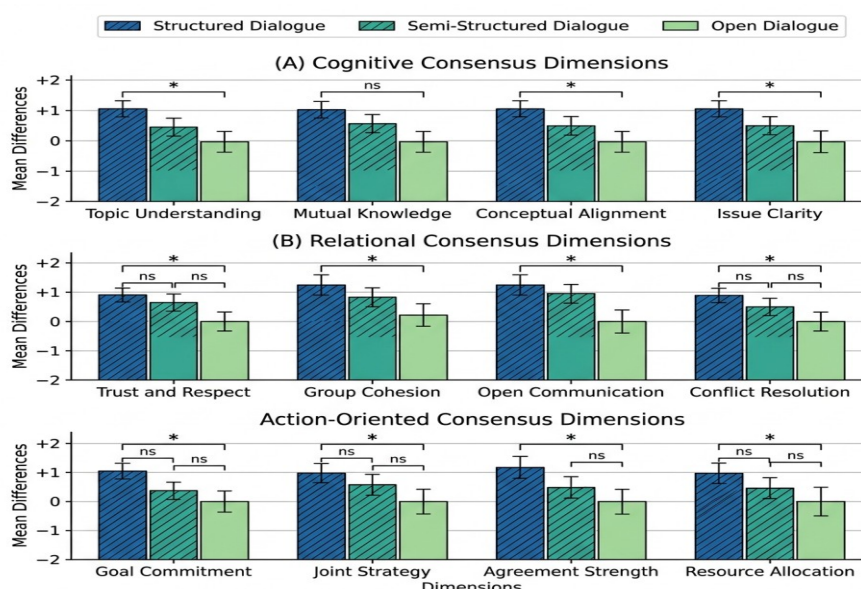


Figure 2: Mean Difference Comparison of Consensus Building Dimensions Across Dialogue Formats

Figure 2 visually summarizes these differences, showing the distinct performance profiles of the three dialogue formats. It illustrates that while structured workshops and advisory committees perform comparably well on cognitive consensus, structured workshops maintain a clear advantage in building relationships and securing commitments, while open public forums lag behind across all metrics.

To ensure that these differences were indeed driven by the dialogue formats themselves and not confounded by other variables, we performed a series of multivariate analysis of covariance tests, controlling for stakeholder group types, prior planning experience, and initial conflict levels. The results of the ANCOVA confirmed that the main effect of the dialogue format remained highly significant across all three dependent variables, even after controlling for these individual-level covariates. This robust finding suggests that the institutional design and structural format of stakeholder dialogue play an active, independent role in shaping consensus outcomes in environmental planning.

5. Discussion and Planning Implications

5.1 Mechanisms of Consensus Generation

The statistical evidence presented in this study demonstrates that stakeholder dialogue formats are not neutral platforms; rather, their structural design fundamentally shapes the dimensions of consensus that emerge from collaborative planning processes. These findings have important theoretical implications for collaborative governance and planning theory.

The superior performance of structured workshops in fostering relational consensus and commitment to action can be explained by their intense, small-group deliberative design. In a structured workshop, professional facilitators employ techniques specifically designed to promote active listening, encourage empathy, and manage power dynamics. Because these workshops often occur in concentrated sessions over one or two days, they create a highly focused environment that encourages participants to step out of their organizational silos and engage in creative problem-solving. This design aligns with theory, which suggests that intensive, face-to-face deliberation can build deep mutual trust and generate a shared commitment to a collective path forward. The structured nature of the interaction ensures that communication is not dominated by a few powerful voices, which is critical for securing buy-in from marginalized or less-resourced stakeholders.

On the other hand, semi-structured advisory committees performed exceptionally well in generating cognitive consensus. This outcome is highly consistent with the structural nature of advisory committees, which typically operate over an extended duration. Building a deep, shared understanding of complex environmental systems, technical models, and scientific uncertainties requires time and iterative dialogue. Advisory committees allow stakeholders to digest information, ask clarifying questions, and debate technical assumptions over multiple meetings. This sustained interaction allows for the development of a shared language and common cognitive frameworks. However, because these committees are often comprised of formal organizational representatives who must report back to their home agencies, they may struggle to build the same level of emotional trust and personal commitment to action as seen in the intensive workshop environments, as representatives may feel constrained by their organizational mandates.

The consistently poor performance of open public forums across all three dimensions of consensus highlights the limitations of traditional public participation models in resolving complex environmental conflicts. While open forums are essential for democratic legitimacy, transparency, and broad-based public consultation, their structural design is not conducive to consensus building. The large scale, lack of facilitation, and short duration of public forums often result in highly adversarial, performance-based communication, where participants deliver pre-prepared statements to planners rather than engaging in dialogue with other stakeholders. This format can amplify existing divisions, reinforce historical mistrust, and fail to generate the cognitive alignment or operational commitment needed to implement complex environmental plans.

5.2 Recommendations for Environmental Planning Practice

For environmental planning practitioners, these findings offer clear, contingency-based guidance for the design of participatory processes. Rather than relying on a single, standardized approach to stakeholder engagement, planners must strategically match dialogue formats with the specific consensus goals of their initiative.

When the primary challenge of an environmental planning initiative is high technical complexity and scientific uncertainty, planners should prioritize semi-structured advisory committees. These committees should be designed with stable representation, regular meeting intervals, and access to joint fact-finding resources to build a solid foundation of cognitive consensus. By giving stakeholders the time and technical support to analyze data together, planners can prevent disputes from devolving into pseudo-scientific battles during the implementation phase.

If the planning initiative is characterized by deep-seated value conflicts, historical mistrust, and the need for immediate, coordinated action among diverse stakeholders, planners should deploy structured workshops. These workshops must be led by skilled, neutral facilitators who can establish clear ground rules, design interactive small-group exercises, and guide participants through a structured negotiation process. The intensive, task-focused nature of these workshops is highly effective at breaking down relational barriers and securing concrete, public commitments to action.

Ultimately, the most effective collaborative environmental planning initiatives are likely to be those that strategically sequence multiple dialogue formats over the life of a project. For instance, an initiative might begin with open public forums to identify broad community concerns and establish democratic legitimacy. It could then transition to a semi-structured advisory committee to evaluate technical data and draft planning options. Finally, the process could conclude with a series of highly structured stakeholder workshops to negotiate trade-offs, build relational trust, and finalize commitments to implement the plan. By understanding the unique strengths and limitations of each dialogue format, environmental planners can design more resilient, effective, and collaborative decision-making processes that lead to sustainable environmental outcomes.

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