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Assessing drivers of sustained engagement in collaborative governance arrangements

Graham Ambrose[1,*], [ID], Saba Siddiki[2], [ID]

[1]School of Public and International Affairs, North Carolina State University, Raleigh, NC 27607, USA
[2]Maxwell School, Syracuse University, Syracuse, NY 13244, USA
*Corresponding author: gwambros@ncsu.edu

Abstract

The formal engagement of diverse stakeholder groups in policy design and implementation has become a mainstay governance strategy. While much has been learned about collaborative governance arrangements in terms of their structure, processes, and participant dynamics, one particularly salient dynamic has been relatively underexplored: the factors contributing to sustained participation in collaborative venues. Public administration and policy have developed a variety of conceptual theories which draw attention to interpersonal interactions and the ability of stakeholders to garner political wins as important contributing factors to sustained participation. In this article, we test four theoretically rooted hypotheses to investigate stakeholder attendance in the collaborative governance case of an environmental justice council. We analyze council meeting minute data using computational text analysis tools and a Stochastic Actor-Oriented Model to assess: (1) conflict and concord, measured in terms of repeated (dis)agreement with others and (2) interest advancement, or the extent to which a stakeholder makes positive, neutral, and negative comments toward topics which become the council's annual objectives in relation to an individual's attendance. Our interpersonal interaction results show that increased positive relationships are associated with increased attendance, and increased negative relationships are associated with decreased attendance, but, for both cases, only when interactions are repeated and not one-off. Our interest advancement results show: (1) an increase in supported annual objectives is associated with decreases in attendance for an individual stakeholder, but (2) increased oppositional and neutral annual topics are associated with a greater likelihood of attendance. This article contributes to existing scholarship on collaborative governance by offering additional insights into individual factors associated with sustained engagement in the collaborative venue. Furthermore, the article offers a generalizable methodological approach for analyzing these dynamics drawing on computational text analysis of meeting minute data.

Key words: collaborative governance; stakeholder engagement; conflict; environmental justice council; computational text analysis.

Introduction

Collaborative governance, defined here as the engagement of diverse arrays of policy stakeholders for the purpose of advising or carrying out policy formulation and/or policy implementation activities (Innes and Booher 2003), is increasingly ubiquitous (Ansell and Torfing 2022; Innes and Booher 2003). Extant scholarship points to the many benefits that accrue to participants in collaborative governance arrangements[1]; for example, exposure to diverse viewpoints, resources, knowledge, and policy preferences held by individuals and entities in and outside of government who have vested interests or direct experiences with policy issues being deliberated (Kim and Siddiki 2018), social learning (Ostrom 2009; Resh et al. 2014), and relationship building (Bryson, Crosby, Stone 2006; Emerson and Nabatchi 2015). The potential to fully realize such benefits is heightened through sustained engagement in collaborative venues, calling for descriptive assessments of whether and to what extent participants engage in collaborative venues over time as well as the factors that contribute to sustained engagement (Siddiki and Ambrose 2023).

A variety of factors can aid or hinder sustained engagement in collaborative arrangements. Collaborative governance is often engaged to deal with complex public sector issues associated with uncertainty and interdependent causes and consequences. When dealing with such issues, stakeholders may encounter difficulty in coming to agreement on the actual problems, and what actions should be taken to address commonly recognized problems (Emerson and Nabatchi 2015; Sabatier and Weible 2019). Furthermore, because of problem and action disagreement, there is increased potential for groups to become adversarial and unable to advance individual interests, which may in turn influence whether and how stakeholders participate in shared venues (Koski et al. 2018; Sabatier and Weible 2019). In some cases, disagreement among participants in collaborative governance can be polarizing and lead to intractable conflicts. Scholars of collaborative governance have specifically sought to assess the conditions under which conflict arises and/or its impact on the work of collaboratives (Weible and Heikkila 2017). The presence of conflict and the ability of individuals to resolve conflict is expected to influence an individual's decision to continue engaging in a collaborative process (Karjalainen and Rapeli 2015; Pondy 1967).

Another factor influencing whether individuals sustain engagement in collaborative venues is less relational, and more

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[1]In this article, collaborative governance is identified as a form of governance, whereas collaborative governance arrangements identify specific instances where collaborative governance is instituted.

personally strategic. Policy stakeholders strategically choose the venue in which they participate as a means to pursue their own interests and goals (Berardo and Lubell 2019; Emerson and Nabatchi 2015; Lubell 2013). Whether they continue to participate in collaborations may reflect their (dis)satisfaction with the policy and/or political gains they are able to achieve therein.

Testing expectations about the association between interpersonal conflict and interest advancement and sustained engagement in collaborative venues, in this article we explore how: (1) conflict and concord, measured in terms of repeated (dis)agreement with others and (2) interest advancement, or the extent to which a stakeholder makes positive, neutral, and negative comments toward topics which become the council's annual objectives, influence the stakeholder's sustained engagement in a collaborative venue. We apply manual and computational text analysis approaches to collect data from the council's meeting minutes and use Stochastic Actor-Oriented Models (SAOM or colloquially called SIENA models) to specifically analyze these phenomena given this data.

We explore these dynamics in the context of a publicly mandated environmental justice council, which we treat as a case of collaborative governance. Environmental justice councils exemplify collaborative governance in that they convene government, nongovernment, and community stakeholders in ongoing processes aimed at designing and implementing policies. Environmental justice councils are specifically focused on advising the development and implementation of policies that prevent communities of color and low-income communities from disproportionately bearing environmental burdens.

Both the methodology and results reported in this article are useful for public administration and scholars of collaborative governance. First, the methodology advanced offers a robust means to describe conflict encountered within collaborative governance. Further, the analytical approach used allows for an analysis of conflict among actors through interpersonal communications across time. Second, the article contributes to understanding of factors that lead to enduring participation in collaboration, which has been understudied in extant collaborative governance research, but which may be considered a critical mechanism for attaining many other collaboration benefits. Understanding this dynamic is also important to designers of collaborative venues.

This article proceeds as follows. In the second section, we provide a brief overview of scholarship on collaborative governance and the study of conflict therein. In the third section, we provide an elaborate discussion of environmental justice councils. In the fourth section, we describe the methods by which we studied interpersonal conflict and interest achievement within a single environmental justice council case. In the fifth section, we provide an overview of key findings. The sixth section provides a discussion of key findings. Finally, in the seventh section, we conclude with a discussion of contributions to scholarship and practice, identify key limitations, and present an agenda for future work.

Conceptual background

Collaborative governance

Over the last twenty years, public administration and policy scholars have paid considerable attention to studying cases

of collaborative governance (Ansell and Gash 2008; Sabatier et al. 2005). Enduring attention to the study of collaborative governance reflects its continued prevalence in public sector decision-making, as well as its promise for generating contextually appropriate and representative solutions to complex public sector challenges. To develop the already sizable body of scholarship on collaborative governance, scholars have recently sought to extend or pursue new lines of inquiry into understanding how collaborative processes evolve over time (Imperial et al. 2016). Efforts to characterize such are part of a wider effort to capture the life cycle stages of collaborative governance arrangements (Imperial et al. 2016; Siddiki and Ambrose 2023; Ulibarri et al. 2020). According to Imperial et al. (2016), collaborative governance (or what they refer to as networked governance) arrangements transition between different life cycle stages throughout the duration of their existence as indicated by their purpose, emphasis, membership and social system, commitment among members, level of resistance to change among members, and leadership characteristics. This work examines how collaborations evolve over time at the group-level (Imperial et al. 2016; Siddiki and Ambrose 2023; Ulibarri et al. 2020; Weible et al. 2011). Complementary individual-level analyses that examine, for example, how individuals' participation in collaborative arrangements fluctuates over time and factors contributing thereto have been limited (Ansell et al. 2020). If one acknowledges that a collaborative group's actions are directly related to those that are included/present for the decision-making (Cohen, March, and Olsen 1972; Howlett 2018; Kingdon 1995), we must also acknowledge a change in attendance in the actors that comprise the group is expected to influence the evolution of the collaboration at the group-level. Thus, understanding the factors influencing sustained engagement at the actor-level adds to the recent work exploring collaborative governance evolution over time.

As identified earlier, collaborative governance venues can be viewed as formalized venues in which individual actors advise or carry out policy formulation and/or policy implementation activities (Innes and Booher 2003). While these venues may be seen as means to advance individual interests, they often are not venues of common interests. This means, there is no guarantee collaborative venues will lead to effective decision-making and individual interest advancement for all members engaged (Emerson and Nabatchi 2015), thus begging the question of what motivates individuals to continue participating in collaborative venues and expending resources despite no guarantee of policy and/or political wins.

Building on the preceding discussion, in the following two subsections, we offer further discussion of two factors that may have bearing on whether and how individuals engage in collaborative governance arrangements over time: (1) individual interest advancement and (2) interpersonal relationships and interactions over time.

Interest advancement

Extant research on collaborative governance explores the role of interest advancement in shaping participation in collaborative settings. Scholars studying collaborative processes through the lens of the Ecology of Games framework focus on actors' choices regarding which collaborative venues to engage in, as well as how they engage within and across venues (Berardo and Lubell 2019; Lubell 2013). Lubell

(2013) argues that actors strategically choose to engage in policy venues with the goal of advancing their own or their group's interest. Yet, given the diverse array of actors in the venue and their diverse policy interests, all policy interests cannot feasibly be addressed (Jones 2001; Simon 2013). Thus, stakeholders must vie for policy interests they favor to become the interest of the collaboration (Lubell 2013; Lubell et al. 2010). Given this framing, one might expect actors to continue to expend personal resources when the issues they favor are advanced in a collaborative venue (Agranoff 2006; Berardo and Lubell 2019). Furthermore, when actors perceive that the process of decision-making does not adequately incorporate their favored viewpoints, they are expected to participate less frequently or move to another policy venue entirely (Lubell 2013). Thus, we propose *Hypothesis 1a* and *Hypothesis 1b*:

Hypothesis 1a: If a member expresses support toward policy issue(s) included in the council's annual objectives, measured as the use of affirming statements regarding the topic, in a given year, members will attend more meetings in the following year.

Hypothesis 1b: If a member expresses support toward policy issue(s) not included in the council's annual objectives, measured as the use of affirming statements regarding the topic, in a given year, members will attend fewer meetings in the following year.

Existing research on collaborative policymaking also points to a relationship between the investment of personal resources into a collaborative venue and the perceived probability of policy losses (Sabatier et al. 1987; Sabatier and Weible 2019). Referencing instances of adversarial, policy coalitions vying to advance interdependent and conflicting policy interests, sometimes within collaborative settings, scholars applying the Advocacy Coalition Framework highlight ways in which actors seek to translate their interest into policy before their opponents can do the same, and/or invest resources where political opponents have made policy gains (Sabatier and Weible 2019). Grounding this research is the assumption that stakeholders are motivated both by supporting their favored policy interests, as well as by opposing the interests of their opponents. (Sabatier et al. 1987; Weible, Siddiki and Pierce 2011). Thus, we propose *Hypothesis 2a* and *Hypothesis 2b*:

Hypothesis 2a: If a member expresses opposition toward policy issue(s) included in the council's annual objectives, measured as the use of dissenting statements regarding the topic, in a given year, members will attend more meetings in the following year.

Hypothesis 2b: If a member expresses opposition toward policy issue(s) not included in the council's annual objectives, measured as the use of dissenting statements regarding the topic, in a given year, members will attend fewer meetings in the following year.

Interpersonal relationships: conflict and concord

Collaborative governance arrangements are venues in which diverse arrays of policy stakeholders engage, debate, and seek to advance their policy goals (Weible and Heikkila 2017, 26). They are, thus, analytical focal points in which to evaluate conflict and concord among actors, as diverse arrays of actors bring differing policy interests, knowledge, and beliefs to the venue (Emerson and Nabatchi 2015; Innes and Gruber 2005; Weible 2008). In recent years, scholars engaged in the study of collaborative processes have called for further inquiry into the phenomenon of policy conflict and policy concord (Weible and Heikkila 2017; Yi et al. 2022). Policy conflict is defined as disagreement among policy actors about the content and or purpose of policy, whereas policy concord is defined as general agreement among policy actors along the same elements (Yi et al. 2022). Yi et al. (2022) argue the concepts of policy conflict and concord are theoretically identified (Schattschneider 1960) but are rarely engaged directly. Additionally, Weible and Heikkila (2017) argue "theories and frameworks of policy and politics typically treat conflict as a background concept where it is . . . measured indirectly as political mobilization, political activities, or competing values" (24).

While scholars acknowledge the importance of conflict in collaborative groups, current scholarship (Ansell and Gash 2008; Emerson and Nabatchi 2015; Weible and Heikkila 2017; Yi et al. 2022) offers limited actor-level hypotheses that address the influence of conflict and concord on future, individual behavior. Insights on this can be drawn from Pondy (1967) and Ostrom (2003).

Pondy's (1967) seminal work theorized individual behavior in response to interpersonal conflict within an organization, recognizing that conflict should not be outright suppressed and avoided, as it naturally emerges in all organizations. It is the process in which conflict is engaged that ultimately leads to functional or dysfunctional conflict. Conflict, thus, can be seen as a shift from equilibrium within an organization to disequilibrium. Conflict-causing disequilibrium is needed at times for an organization to adapt and innovate, but it is suggested that chronic and unresolved conflict leads to dysfunction. While a level of conflict might be embraced if inducements (e.g., political wins when favored individual interests are converted into collaboration objectives) are great enough to bring conflict into equilibrium, it is expected that actors will work to resolve conflict. When conflict remains chronic and there is little perceived likelihood of reestablishing a lower level of conflict in a relationship, actors will reduce their conflict by dissolving the relationship. More recent work highlights this avoidance behavior linking increased conflict to reduced engagement in political settings (Karjalainen and Rapeli 2015; Neblo et al. 2010; Ulbig and Funk 1999).

While conflict can be measured in many ways, in this article we leverage a mix of sentiment analysis (i.e., level of (dis) agreement) and manual coding of communication between individual actors in a collaborative venue to evaluate conflict. In doing so, we work to measure the amount of conflict individuals experience directly to examine its relation to sustained engagement at the actor-level. Therefore, we propose *Hypothesis 3*:

Hypothesis 3: Members experiencing repeated conflict interactions, measured as instances of an actor's repeated dissenting statements toward another actor, across council meetings in a given year will attend fewer meetings in the following year.

While Hypothesis 3 aims to fill a clear gap in the literature regarding the effect of conflict generated in collaborative venues, Hypothesis 4 is reflective of an often-studied

phenomenon in collaborative governance literature. Many collaborative governance scholars have touted the importance of repeated, positive interactions through face-to-face dialogue (Ansell and Gash 2007; Emerson and Nabatchi 2015; Ostrom 2009). Yet, little work has been done to explore the influence of repeated, positive interactions on future behavior in collective action situations outside of Ostrom's lab experiments and associated work (Ostrom 2009). This work highlights the importance of both communication across actors as well as the influence of positive action on future sustained engagement at the actor-level. Like our measurement of policy conflict, we measure policy concord directly by evaluating communication between individual actors in the venue. Thus, we propose *Hypothesis 4*:

> Hypothesis 4: Members experiencing repeated concord interactions, measured as instances of an actor's repeated affirmative statements toward another actor, across council meetings in a given year will attend more meetings in the following year.

Figure 1 depicts the framework that informs the analysis in this article, including the four hypotheses tested. The top half of the framework relates to "Policy Interest Advancement" addressed by Hypotheses 1 and 2. The bottom half of the framework relates to "Interpersonal Interactions" addressed by Hypotheses 3 and 4. We theorize that revealed preferences for policy issues as well as conflict and concord through communication observed in one year of venue meetings will result in various levels of meeting attendance in the next year.

Study context: state-level environmental justice councils

This article reports on an in-depth case study of a state-mandated environmental justice council. Environmental justice (i.e., EJ) is defined by the US Environmental Protection Agency as "the fair treatment and meaningful involvement of all people regardless of race, color, faith, national origin, or income, in the development, implementation, and enforcement of environmental laws, regulations, and policies" (US EPA 2021). Environmental justice first gained prominence in the US political system when Executive Order 12898, passed in 1994, charged federal agencies with addressing the disproportionate burden of pollution and other environmental externalities on communities of color and low-income communities (Petersen

et al. 2006). Environmental justice has continued to gain attention across all levels of government in the US over the past three decades (Grafton et al. 2015). Evidence of this is the growing prevalence of publicly (e.g., policy) mandated environmental justice councils at different levels of government.

Environmental justice councils (hereafter also called "EJ councils" or "councils") are venues in which citizens, government actors, nongovernmental organizations, and other parties are convened to collectively advise on the design and implementation of EJ policies. In contrast to other forms of EJ collaboration such as citizen climate juries (Ross et al. 2021) and community-based collectives (Petersen et al. 2006), EJ councils are unique as they are formally created through policies, such as executive orders, legislation, or regulation, which specifically identify key aspects of their design, such as their stakeholder composition, duties, expected activities and outputs, and requirements for a minimum number of meetings in a year.

From diverse arrays of actors, EJ councils solicit advice on social, scientific, policy, and other issues related to environmental justice. More specifically, EJ councils are charged with addressing topics related to climate change planning, disaster management, reduction of pollution in overburdened communities, equitable conservation and public lands use, clean energy transitions, sustainable infrastructure, and civil rights. Fundamentally, these councils are meant to include low-income and minority viewpoints in the discussion, decision-making, and implementation of policies that have traditionally adversely and disproportionately affected them, aligning with the fundamental foci outlined in the definition of EJ. In doing so, EJ councils intend to support diverse representation in information sharing in an attempt to facilitate collective decision-making and joint problem solving.

Given these specific characteristics of EJ councils, they prove to be an appropriate case in which to evaluate this research for several reasons. First, because EJ councils are mandated through a governing document, the permissions, constraints, and required frequency of meetings are formally identified. From a research design perspective, tracking both participants and conflict over time is easier as the actors are consistently and formally identified, given that the number of council members and positions are established through legislation. Second, they are ideal for studying the influence of interest advancement and interpersonal conflict given EJ's orientation toward diverse inclusion in knowledge sharing, discussion, and decision-making. While these concepts are important to all collaborative governance arrangements, the orientation of diverse representation is particularly prevalent in EJ council policies, thus one might expect participants to hold diverse perspectives rooted in different knowledge and experiences. Better understanding the link between actor attendance and their ability to advance their interest and their level of relational conflict is fundamental to better understanding EJ councils and can lend insights about collaborative governance more broadly. In the following section, we offer additional information regarding the selection of the case as well as the methods used to study conflict in EJ councils.

Methods

Sample selection

This study focuses on a single EJ council in the eastern US mandated at the state-level by the state's legislature. The
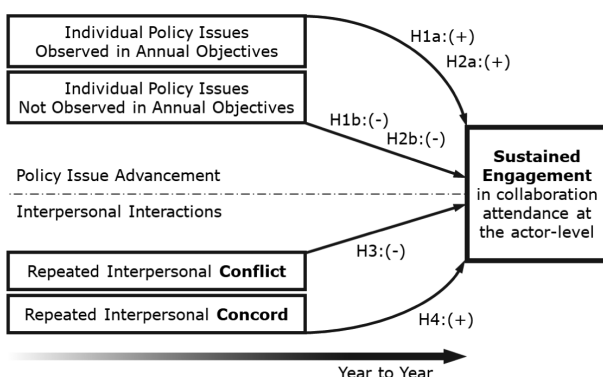

Figure 1 Theoretical framework.

council selected for this study bears features comparable to those of other EJ councils publicly mandated at the state-level with respect to purpose, structure, and duties. The rationale for selecting the particular council case reported on in this article is based on data availability, as discussed in more detail below.

The EJ council fits the definition of collaborative governance used in this article, as diverse actors are brought together in a formalized setting to recommend policies and programs as well as advise implementation. Encouraged by the diverse memberships of the case council and its broad mandated charge (both are discussed below), members bring a diversity of interests and knowledge to the venue. With limited attention and resources, actors vie for their interests resulting in interpersonal relationships of concord and conflict as well as the advancement of individual interests to council objectives. While this article examines one EJ council, the qualitative description is generalizable to many collaborative governance venues mandated to engage complex policy issues. Given the complexity of the issues, the diversity of the actors, and the broadness of the mandate often observed in collaborative governance venues, attention must be given to why diverse actors continue to engage in complex topics in such venues.

Table 1 identifies key attributes of the EJ council case evaluated for this article. The council is mandated by the state legislature to provide advice to the state government and its agencies regarding environmental justice and related community issues. The mandate requires at least six meetings per year and identifies 20 positions on the council. These positions are made up of two members representing affected communities, 10 members representing various public interests (e.g., nonprofits, business, local government, etc.), as well as six agency heads or their delegates (i.e., Department of the Environment, Department of Health and Mental Hygiene, Department of Housing and Community Development, Department of Planning, Department of Business and Economic Development, Department of Transportation), a representative from the state senate, and a representative from the state house. Thus, the council represents a mix of an interpersonal (i.e., appointed citizens) and an interorganizational (i.e., agency delegates) collaborative governance venue. The affected community members as well as the public interests are appointed by the Governor and their office, but often recommended by the council itself.

For these members of the council, there is no stated per diem or compensation. Additionally, while the mandate for the council identifies six agency heads or their delegates, it is often an agency delegate who attends consistently over multiple years. For all 20 members, there are no sanctions for absences and there are no term limits to their membership. In this case, there is variation in attendance across actors but also across years. Furthermore, while turnover is observed, it rarely occurs along the identified term lengths, again, occurring variably across actors and positions. A twenty-first actor, the staff liaison, is habitually present at the meeting, and, thus, is also included in the analysis. While the individual actors holding each of these positions might change over the eight-year study period, the positions themselves remain consistent. Finally, the mandate calls for the coordination of all members to achieve the mandated goals of the council. The information provided above aligns closely with Emerson and Nabatchi's (2015) definition of an externally directed collaborative governance regime, as the venue is appointed by legislation establishing the structure and stakeholders to be included. Furthermore, while ambiguous, the mandate also defines the purpose of the council (see mandated charge in Table 1) as well as its externally identified strategy for changing—that is, advising state government and agencies.

At the end of each year, the council was mandated to construct a report to the governor's office. In this report, the council outlined its activities over the prior year, as well as identified three to six annual objectives for the upcoming year. The annual objectives were established internally by the council itself and offered specific items within the broad charge of the council. Furthermore, while some of the objectives are observed multiple times, the objectives broadly change from year to year, showing a variation in policy interests being identified as council objectives (see Supplementary Table A1).

Data collection

Three types of data were collected for the EJ council case. First, the governing document mandating the creation of the council, which identifies the number of council members and identifies the required sectoral affiliation of each member (e.g., community member, government representative), was retrieved. Second, the annual reports for each year since the council was established were collected from the council's website. These documents allowed for the connection of individual names to each member position in each year. Furthermore, the council's "annual objectives" were coded in each of the annual reports to identify the policy goals of the council in each year. Finally, minutes for each council meeting since the council was established were collected from the council website. Each set of meeting minutes was coded to identify participant attendance and the type of communication in which participants are engaging, as well as the EJ topic, action, and target associated with each statement (defined in more detail in section 'Data Processing and Coding') being communicated. The process for coding these documents is described systematically. Furthermore, the sample period was truncated to 2012 through 2019. While the council first started meeting in 2011, the first meeting was in November, thus 2011 is not represented by a full year of meetings. Similarly, given the COVID-19 pandemic in 2020, the council did not meet on a

Table 1 Key attributes of the case.

Variables	Directives from the case's mandate
Mandated charge	Mandated by State Legislature to advise State government agencies on environmental justice and related community issues
Mandated structure and process	
Frequency of meetings	At least six per year
Size of membership	20 members and 1 staff liaison
Guidance on co-ordination among council member	All members coordinate to achieve mandated goals
Stakeholder positions	12 appointed citizen members and 8 government delegates

regular basis thereafter. The 2012 through 2019 period was defined by regular meetings meaning changes in the number of meetings a stakeholder attended from year to year are not indicative of fewer meetings held by the council.

Meeting minute documents were originally collected in either PDF or word processor format. The structure and prose of the documents were consistent over time, which reduces concerns that the results of this article are driven by changes in reporting rather than changes in actions. Furthermore, the documents reflected full sentences for each statement rather than bulleted actions and or reports. The raw meeting minutes were converted to a tabular format where each row represented a single statement using R text mining and natural language processing applications and through manual processing and checking. A statement, in this study, is defined as an individual sentence captured in the meeting minutes. Thus, larger sections of the meeting minutes associated with a single individual were subdivided into individual statements. This is done as an individual might have differential sentiments based on the EJ topic, action, and target associated with each statement. For example, an individual might agree an EJ topic is important but disagree with the policy instrument suggested to address it. These two statements are stated by the same individual and linked to the same statement recipient but are considered separately.

The following information was identified for each statement extracted from the meeting minutes: (1) who made the statement, (2) whether the statement conveyed a form of one-way communication (i.e., announcement) or two-way communication (i.e., discussion with another person, asking of a question, or answering of a question) (Nabatchi 2012), and (3) who was the single recipient of the statement communicated (if the statement was identified as reflecting two-way communication). When the speaker of the statement was not clear, this assignment was left blank. 96.6% of statements coded for the EJ council were coded to a participant. Table 2 exemplifies how meeting minute data were arranged and coded to support downstream analysis thereof.

Data processing and coding

Once the meeting minutes were coded and manually checked, the dataset was reentered into R to calculate the sentiment associated with each individual statement. Sentiment analysis broadly captures qualities embedded in the language of statements. In our study, we leverage sentiment analysis to examine the qualities between (1) an actor's affirmative or dissenting statements toward a topic and (2) dyadic relationships that emerge as an actor makes affirmative or dissenting statements toward another actor. In this way, sentiment analysis is leveraged to measure our operationalization of interest advancement and interpersonal relationships. First, because this article is interested in conflict between council members and the network-based methods, all announcements (i.e., instances of one-way communication) are dropped from the dataset as they do not represent a direct link between actors. Using the R package *sentimentr* (Rinker 2017), the sentiment for each statement was calculated. There are several advantages to using the *sentimentr* package over other packages. Whereas other packages use a basic dictionary lookup approach, counting the presence of words in the observed sentence, *sentimentr* uses weighting from valence shifters, which effectively reverse, increase, and decrease the sentiment of the dictionary words (Naldi 2019; Rinker 2017). Example sentences depicting and discussing the

effect of these valence shifters through the *sentimentr* package are identified in Supplementary Appendix 1, along with the scores of other prevailing sentiment dictionaries in R for comparison. The standard *sentimentr* dictionary was iteratively refined to better fit the data sample—including the use of acronyms and different names for the same entity (i.e., council vs. EJ council). The scores calculated by the *sentimentr* package are constrained between –1 and 1.

Finally, two-way communication statements identified within the meeting minutes were further coded and/or analyzed for type of conflict (*conflict type*), magnitude of conflict (*conflict severity*), and an integrated measure of *conflict type* and *conflict severity* (*conflict intensity*) once sentiment scores were calculated (Table 3). *Conflict type* is coded in trinary terms (–1:0:1), denoting disagreement, neutrality, or agreement with the referenced speaker in the meeting minutes. There is a single referenced speaker, which is often the prior speaker. However, at times, it is a different actor as statements can reference information and/or a statement that is noncontiguous in the data table (i.e., actors returning to a point made earlier in the conversation). *Conflict severity* is defined as the magnitude of positive or negative sentiment as calculated using *sentimentr*. The coding of *conflict type* directly interacts with *conflict severity* resulting in the measure of *conflict intensity*. *Conflict intensity* can be understood as the magnitude of sentiment calculated using *sentimentr* where the sign aligns with the trinary coding of conflict, as it engages a single actor's sentiment score for a single statement and their level of agreement with the referenced speaker. Conflict severity is used for annual objectives as it represents the positive, neutral, and negative sentiment value attached to the topic which the actor is discussing. Returning to Table 2, one can see a practical example of this coding where statements #3 and #5 are positive in sentiment regarding the Act report and statements #4, #6, and #7 are negative in sentiment toward the report. In contrast, conflict intensity represents not the positive, neutral, and negative sentiment value attached to the topic but the relational concord, neutrality, and conflict between actors. For example, in statements #6 and #7, two linked actors make statements negative in conflict severity (i.e., they have negative sentiment toward the Act report), and thus statement #7 has a positive conflict intensity (i.e., they concord in their negativity toward the report) and a positive interpersonal relationship linkage. Furthermore, the sign of conflict intensity is solely related to conflict type. For example, in statement #6 conflict intensity is negative as the speaker conflicts with the linked speaker; whereas in statement #7 conflict intensity is positive as the speaker is in concord with the linked speaker.

It is important to know that, given this operationalization, conflict severity represents the measurement of affirmative and dissenting statements made by an individual toward a topic, whereas conflict intensity represents the measurement of affirmation and dissent between two individuals. As a result, the dyadic nature of the conflict intensity is leveraged to construct the networks discussed below. Because there is no dyadic nature for conflict severity, it is evaluated in the study as a count. Furthermore, in this article, positive conflict intensity sentiment scores are indicative of interpersonal policy concord between the statement speakers and referenced speakers, whereas negative conflict intensity sentiment scores are indicative of interpersonal policy conflict.

Each statement as well as the "council objectives" found in the annual reports for each year were also coded to reflect the

Table 2 Example of the tabular formatting from the EJ council.

	Participant name	Other participant referenced	Statements	Type of statement				Statement coding					
				Announcements	Discuss	Ask	Answer	Environmental justice topic	Action	Target	Conflict type	Conflict severity	Conflict intensity
1	Part. #1		The Vice Chair of the commission gave an overview of the Executive Summary of the report introducing all of the stakeholders involved in the report.	1	0	0	0	Regulation	Value Alignment	Council	0	0.000	0.000
2	Part. #2	Part. #1	asked why is this report coming to the commission?	0	0	1	0	Regulation	Value Alignment	Council	0	0.000	0.000
3	Part. #1	Part. #2	said because stakeholders have ask the council for advise and recommendations on how to integrate environmental justice and equity into their consideration for the Act, and the report helps do that.	0	0	0	1	Regulation	Value Alignment	Council	0	0.200	0.000
4	Part. #2	Part. #1	said the report was way too long and lengthy	0	1	0	0	Regulation	Value Alignment	Council	−1	−0.472	−0.472
5	Part. #1	Part. #2	The strategies in the Act are good for the community and could create about 37,000 jobs by 2020	0	1	0	0	Regulation	Value Alignment	Council	0	0.390	0.000
6	Part. #2	Part. #1	I disagree. The fact of the matter is jobs will be created but how do we get them to the folks that are systemically are under unemployed and the people who transitioning from extracted industries get other jobs.	0	1	0	0	Regulation	Value Alignment	Council	−1	−0.739	−0.739
7	Part. #3	Part. #2	These recommendations do not make sure that we are not displacing people to really creating opportunities in this new green economy and it is only going to happen if we are thoughtful and sit down with our stakeholders and think about how that could happen	0	1	0	0	Regulation	Value Alignment	Council	1	−0.377	0.377

Table 3 Key definitions and operationalizations.

Term	Definition	Operationalization
Conflict type	The assessment of agreement, neutrality, and disagreement as coded in a two-way communication statement linking the speaker and a referenced stakeholder	Trinary code denoting disagreement (–1), neutrality (0), or agreement (1)
Conflict severity	The magnitude of positive or negative sentiment within a two-way communication statement	Assessed through a refined *sentimentr* model (continuous from –1 to 1)
Conflict intensity	The integration of both the conflict type and conflict severity resulting in both the direction of conflict (i.e., agreement, neutrality, and disagreement) and the magnitude of sentiment	Magnitude: Conflict Severity (continuous from –1 to 1) Polarity: Conflict Type (denoting disagreement {–1}, neutrality {0}, or agreement {1})

main EJ topic addressed therein. The EJ topics coded for are identified below. These topics were identified both deductively through literature (Grafton et al. 2015; Ross et al. 2021) as well as inductively through the coding process. The topics are:

Regulation: Statements reflecting discussion of policy and/or programs being considered by the council or the state or local governments.

Land use and planning: Statements reflecting discussion of land use and development.

Justice: Statements reflecting discussion of issues such as justice, inclusion, diversity, and/or Title VI of the Civil Rights Act.[2]

Internal process: Statements reflecting discussion of council aims, orientation, and process.

Health: Statements reflecting discussion of health and/or health impacts related to environmental justice topics.

Environment: Statements reflecting the discussion of natural resources or related conditions (e.g., water, waste, pollution, and climate change).

Engagement: Statements reflecting discussion of engaging various stakeholders.

Statements were coded by two different coders and differences in coding were reconciled. Where statements appeared to address multiple EJ topics, a main topic was selected for each statement based on the specific wording and interpretation of the statement, as well as statement context.

Each statement and annual objective were also coded for its action. Actions reflect specific activities of the council. Like topics, actions were identified both deductively through literature (Ambrose et al. 2022; Siddiki et al. 2015) as well as inductively through the coding process. The actions are:

Value alignment: Statements/objectives discussing the members' or councils' orientation toward problem definition and available actions.

Policy design: Statements/objectives discussing policy design.

Plan development: Statements/objectives discussing what actions the council should take and how to take those actions.

Membership: Statements/objectives discussing handling of membership, member vacancies, and appointments.

Council logistics: Statements/objectives discussing the specific process of the council (e.g., date and time of next meeting)

Information gathering: Statements/objectives referencing information gathering.

Information dissemination: Statements/objectives discussing the dissemination of specific information (e.g., producing an EJ 101 brief for legislators).

Engagement: Statements/objectives discussing outreach and engagement activities to broad or specific stakeholder groups.

Compliance: Statements/objectives discussing compliance and permitting of actions across both government agencies as well as stakeholders (e.g., businesses and local government).

Ally identification: Statements/objectives discussing allies and advocates in the council's mission and aims.

Advise: Statements/objectives discussing recommendations but not advancing specific policy language.

Finally, each statement and annual objective was coded based on the target of the policy. Those targets include the state government (i.e., the governor and the governor's office), local government (city- or county-level), state legislators, state agencies, businesses, academia, specific communities or locales (i.e., communities and/or regions of citizens), stakeholder groups (e.g., nonprofits and other organized groups), specific EJ advocates, and the council itself.

Variable construction and model specification

The processing and coding of the data resulted in the different types of data used in our co-evolution SAOM. Given the many recent advancements in network modeling, there are many advanced models to engage network data. SAOM can evaluate the likely count of the outcome rather than the structure of the network. We model the co-evolution of the network and attendance, but we focus narrowly on the model predicting the ordinal, behavioral outcome of attendance. The output of the SAOM is reported in log-odds, identifying the different odds of attendance between actors who are the same except across the parameter of interest. Each variable of interest is identified in Supplementary Table A2.

There are four independent variables of interest used to model the factors identified in our theoretical framework. First is the number of annual objective topics an individual discusses in a year, as a means to evaluate their interest advancement in the council. This variable captures positive conflict severity (i.e., stated support, measured as the use of affirming statements regarding the topic, for an annual objective), neutral conflict severity (i.e., neutral information exchange regarding an annual objective), and negative conflict severity (i.e., stated opposition, measured as the use of dissenting statements regarding the topic, for an annual objective). In practice, if the annual report in a year presents five annual objectives with distinctive topics, actor i, in the same year, could have supported two topics, opposed one, and did not discuss the other two;

[2]Title VI of the Civil Rights Act of 1964, prohibits, for any program or activity that receives Federal funds or other Federal financial assistance, discrimination on the basis of race, color, or national origin (Civil Rights Act, 1964).

thus, their number of annual objectives topics discussed would be equal to two for Positive Objectives, equal to zero for Neutral Objectives, and equal to one for Negative Objectives. Furthermore, we acknowledge that policy topics are often made up of complex components, thus, an actor's support and opposition for the same topic can be observed. The measure of interest advancement is oriented to the number of topics rather than the number of comments to avoid potential endogeneity given a positive correlation between increased attendance and an increased number of comments.

Second, we include three network measures to represent relationship effects in the collaboration in association with Hypotheses 3 and 4: out-degree ties, in-degree ties, and an Alter's average of dyadic covariate weighted. First, actors can experience communication relationships as either speakers (out-degree ties) or receivers (in-degree ties). Furthermore, the hypotheses also highlight the repeated-interaction dynamics within a relationship. As such, we also examine the weighted value of a communication relationship to explore the differential dynamics of one-off interactions against repeated interactions within a relationship.

The first network measure is the number of out-degree ties of actor i calculated as,

$$s_{i1}^{net}(x, z) = z_i x_{i+} = z_i \sum_j x_{i \to j}$$

where $s_{i1}^{net}(x, z)$ is the relationship between behavior z, that is, attendance, in the network of interest, z_i is the ordinal attendance of actor i, x_{i+} is a means-centered calculation of out-degree ties for actor i, and $x_{i \to j}$ represents all communication relationships from actor i to all other connected actors j (Ripley et al. 2022). This represents all communication relationships where actor i is talking to another actor. Relationships, in this article, are defined as connections or ties between individuals. Thus, if any number of statements are made from actor i to actors j, actor i has an out-degree relationship with actor j. The second network measure is the number of in-degree ties of actor i calculated as,

$$s_{i1}^{net}(x, z) = z_i x_{i+} = z_i \sum_j x_{j \to i}$$

where all variables are the same as the out-degree calculation but $x_{j \to i}$ represent all communication relationships connecting actors j to actor i (Ripley et al. 2022). This represents all communication relationships where actor i is receiving communication from other actors.

Because out-degree and in-degree measures calculate the number of relationships, but not the number of interactions within a relationship, we also calculate an Alter's average of dyadic covariate weighted by the number of interactions, calculated by:

$$s_{i1}^{net}(x, z) = z_i w_i \quad \text{where } w_i = \begin{cases} \frac{\sum_h x_{ih} w_{ih}}{x_{i+}} & \text{if } x_{i+} > 0 \\ 0 & \text{if } x_{i+} = 0 \end{cases}$$

where all variables are the same as out-degree and in-degree calculations and w_i represents all communication relationships weighted by the average number of interactions between actor i and all other actors h (Ripley et al. 2022). In this article, interactions are defined as the individual statements between actors within relationship. Furthermore, Alter's average of dyadic covariate measure does not consider out-degree (i.e., $x_{i \to h}$) and in-degree (i.e., $x_{h \to i}$) separately; rather, it considers the covariate weight (i.e., w_{ih}) associated with all communication relationship ties (i.e., x_{ih}).

Across out-degree, in-degree, and Alter's average of dyadic covariate calculations, conflict intensity is used as a measure for interpersonal conflict, as it links the sentiment of statements to the concord, neutrality, and conflict coded in a two-way communication statement linking the speaker and a referenced stakeholder. A positive, neutral, and negative conflict intensity networks were constructed for each of the years included in this study. Practically, a directional tie in the network represents a directional relationship between two actors in the network, and the weight associated with that tie represents the count of interactions observed in that relationship over the given year. The number of statements within each network across each year can be found in Supplementary Table A3.

Finally, we include six control variables in the modeling exercise. The first, average in-degree Alter's attendance, considers the likelihood of attendance given the rate of attendance by those communicating with actor i (i.e., is an actor more likely to attend given those talking to them attend more frequently?). The second considers the behavioral influence of the number of one-way communication statements or Announcements actor i gives in a year. The third considers differential attendance outcomes given the sectors of the actors. The fourth and fifth variables identify the shape of the behavior function in SAOM models, where a linear shape is the value of the attendance of actor i and a quadratic shape is the effect of the attendance upon itself such that the change in actor i's attendance behavior depends on actor i's current attendance behavior (Ripley et al. 2022).

The variables identified accord with the conceptual framework of figure 2. In the top box, the number of positive objectives operationalizes Hypothesis 1, whereas the negative objectives operationalizes Hypothesis 2. The measured network dynamics across each of the positive communication, neutral communication, and negative communication networks operationalizes the conflict hypotheses (e.g., Hypotheses 3 and 4). Finally, the number of announcements and other actor attributes are added as controls. We use the *RSiena* package in R (Ripley et al. 2022) to model the conceptual framework of figure 2.

Results

Model results and fit

First, Table 4 outlines the descriptive statistics for each of the variables of interest. All variables are right-skewed, as the mean is closer to zero, but larger value outliers exist. The means and standard deviations are used later in this section to depict realistic differences in annual objectives, communication relationships (i.e., degrees), and average interactions across communication relationships (i.e., covariate weighted ties). Finally, in-degree and out-degree are not reported in Table 4, as they are equal in count and reported simply as the number of degrees.
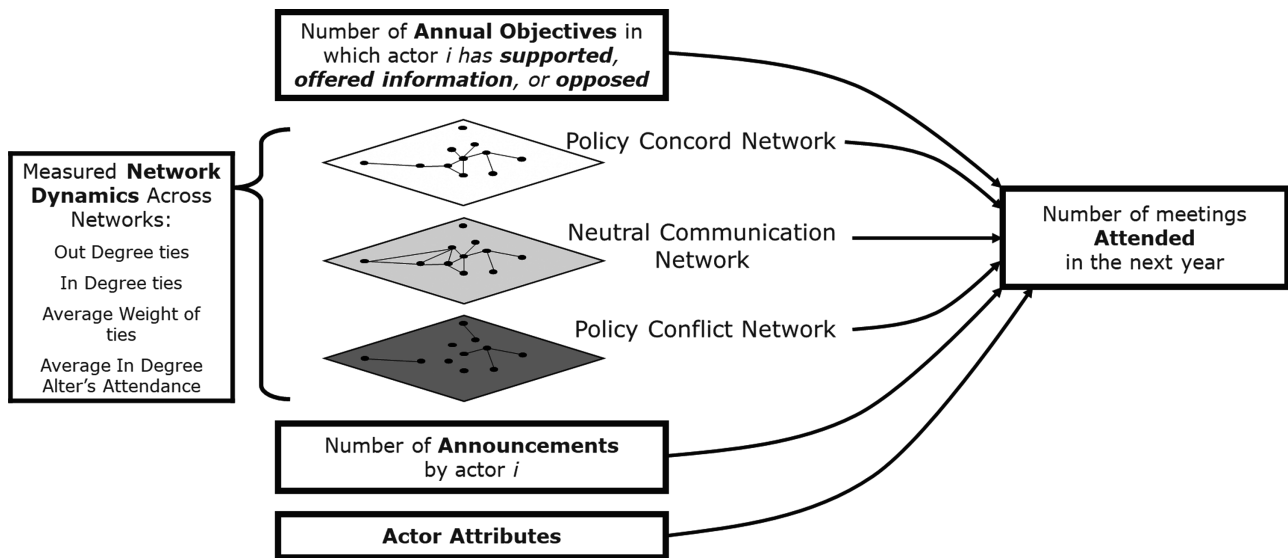
Figure 2 Conceptual framework.

Table 4 Descriptive statistics.

Variables	Mean	SD	Min.	Max.
Attendance	3	2.717	0	10
Number of annual objectives supported (positive)	1.302	0.971	0	4
Number of annual objectives offering information (neutral)	1.186	0.998	0	4
Number of annual objectives opposed (negative)	0.593	0.726	0	2
Positive degrees	1.338	2.043	0	12
Positive weighted ties	1.641	1.224	1	9
Neutral degrees	1.346	2.079	0	11
Neutral weighted ties	2.405	2.578	1	20
Negative degrees	0.823	1.364	0	7
Negative weighted ties	1.589	1.380	1	10
Number of announcements	3.246	7.377	0	73

Note: Because there is a single in-degree recipient and out-degree sender for each tie, they are equal in count, thus simply the number of degrees is reported.

Table 5 depicts the result of the SAOM. All t-ratio values across the model are, in absolute terms, less than 0.1, which is considered an acceptable level of model convergence (Ripley et al. 2022). As a stricter indicator of convergence (Ripley et al. 2022), our SAOM results have an overall maximum convergence ratio of 0.2465, where 0.25 is a threshold for adequate convergence across the full model.

We present a representation of goodness of fit for the outcome behavior, attendance, in figure 3 using the *sienaGOF* function in *RSiena* (Ripley et al. 2022). The function calculates goodness of fit statistic based on the actual attendance values identified at the end of each time period and simulated values given the results of the SAOM model (Lospinoso and Snijders 2019; Ripley et al. 2022). The gray solid lines denote the actual number of participants falling into each of the attendance bins across the x-axis. The violin plots represent the results of the simulated attendance given our calculated SAOM. Lastly, the function calculated a *P*-value of .4481 suggesting an acceptable goodness of fit across the SAOM model.

Announcements and peer effects

Before discussing our four hypotheses, results will be presented for the number of announcements made as well as the average in-degree alter. First, the estimate for the number of announcements made by an individual in a given year is statistically insignificant in its association with the number of meetings attended. This suggests that the model is not driven purely by more communication activity; thus, the type of communication seems to be important for sustained attendance.

Unlike the number of announcements made by an individual, the average in-degree alter for both neutral and negative communication networks proves to be statistically significant. More specifically, neutral average in-degree alter has a positive magnitude (i.e., $\beta = .090$, SE = 0.043) suggesting that if the actors who share information with a stakeholder attend more, the stakeholder is likely to attend council meetings more. In contrast, negative average in-degree alter has a negative magnitude (i.e., $\beta = -.093$, SE = 0.049) suggesting that if the actors who make negative conflict statements toward a stakeholder attend more, the stakeholder is likely to attend

Table 5 Stochastic actor-oriented model results.

Variables	Estimate	P-value	t-ratio
Rate (period 1)	17.149*	.018	−0.007
Rate (period 2)	10.687***	~.000	0.065
Rate (period 3)	23.003*	.022	0.019
Rate (period 4)	60.697**	.008	−0.010
Rate (period 5)	21.464***	~.000	0.026
Rate (period 6)	8.238***	~.000	−0.029
Linear shape	−0.119*	.018	0.004
Quadratic shape	−0.177*	.035	−0.016
Number of annual objectives supported (positive)	−0.132*	.012	0.032
Number of annual objectives offering information (neutral)	0.204***	.002	0.043
Number of annual objectives opposed (negative)	0.205**	.009	−0.006
Positive in-degree (spoken communication relationships)	−0.026*	.029	−0.011
Positive out-degree (received communication relationships)	0.004	.468	0.001
Positive weighted ties (count of statements)	0.194***	~.000	−0.026
Neutral in-degree (spoken communication relationships)	−0.001	.481	−0.005
Neutral out-degree (received communication relationships)	−0.044	.082	0.003
Neutral weighted ties (count of statements)	−0.028	.234	−0.016
Negative in-degree (spoken communication relationships)	0.001	.493	0.007
Negative out-degree (received communication relationships)	0.134**	.008	−0.014
Negative weighted ties (count of statements)	−0.227***	~.000	−0.033
Positive average in-degree Alter	0.056	~.000	0.015
Neutral average in-degree Alter	0.090*	.234	−0.056
Negative average in-degree Alter	−0.093*	~.000	−0.046
Number of announcements	−0.002	.378	−0.006
Agency delegates (DEL)	0.229***	.003	−0.021
Turn over	−0.026	.423	−0.010
Overall maximum convergence ratio			0.2465

Note: Total of 5,383 iteration steps.
*P-values < .05,
**P-values < .01,
***P-values < .001.

council meetings less. Finally, the positive average in-degree alter's estimate is not statistically significant.

Annual objectives

[Figure 4](#) depicts the influence of the number of annual objectives for which the participant engaged and the number of meetings attended. Given the descriptive statistics, the log-odds are calculated across one, three, and five objectives to offer a realistic depiction of attendance outcomes. The number of annual objectives supported (i.e., topics in which they communicated positive conflict severity; top panel), the number of annual objectives offered information (i.e., neutral conflict severity; middle panel), and the number of annual objectives opposed (i.e., negative conflict severity; bottom panel) are all statistically significant (see [Table 5](#)). For stated support, one sees a decrease in attendance as an actor supports more annual objectives (i.e., β = −.132, SE = 0.059). In contrast, one sees an increase in attendance given an increase in neutral information offered regarding an annual objective (i.e., β = .204, SE = 0.071) and an increase in stated opposition to an annual objective (i.e., β = .205, SE = 0.087).

Relationships and interactions

There are mixed results across the significance of the out-degree relationships (i.e., where the actor is making statements), in-degree relationships (i.e., where the actor is receiving statements), and Alter's average of the dyadic covariate (i.e., average number of interactions per relationship) estimates across the positive, neutral, and negative communication networks. For the neutral communication network, none of the estimates prove to be statistically significant, and, thus, are not further discussed below. For the positive communication network, one can see the in-degree relationship estimate is statistically significant and negative in magnitude (i.e., β = −.026, SE = 0.014); whereas the estimate for the average number of interactions per positive relationship is statistically significant but positive (i.e., β = .196, SE = 0.042). Furthermore, the estimate for out-degree relationship is not statistically significant in the positive communication network (i.e., β = .004, SE = 0.054). This suggests, for the positive communication network, relationships where actors receive statements are influential but relationships where they make statements are not. While the estimate for the average number of interactions per negative
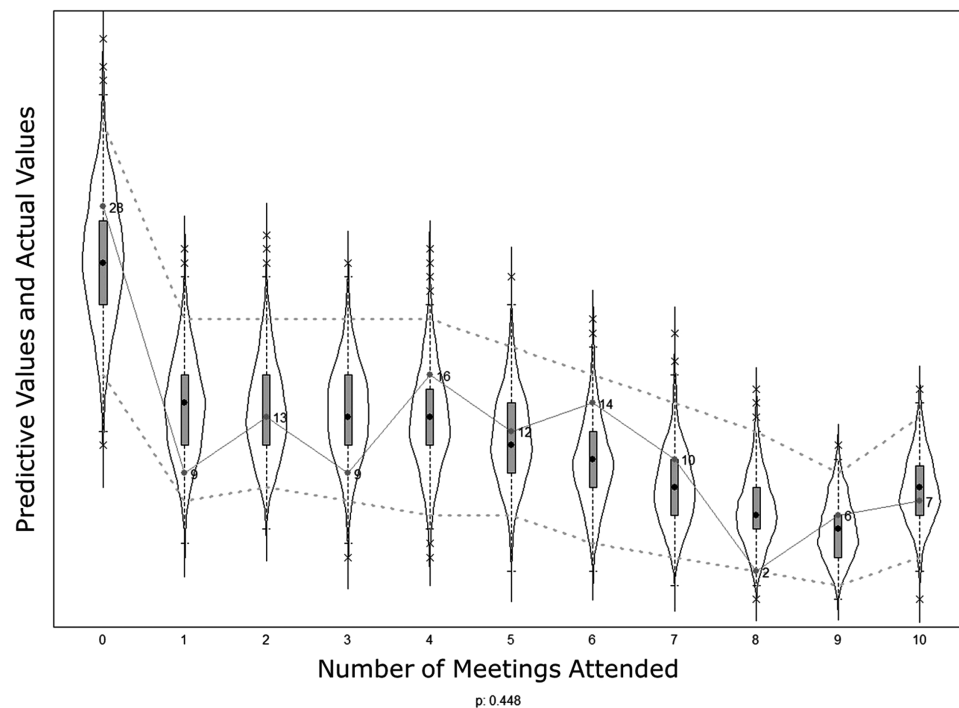
Figure 3 Goodness of fit for attendance. Note: Gray solid lines denote the actual number of participants and violin plots display the results of the simulated attendance from the calculated SAOM.

relationship is also statistically significant (i.e., $\beta = -.227$, SE = 0.059), in the negative communication network out-degree relationships are statistically significant (i.e., $\beta = .134$, SE = 0.056) and in-degree relationships are statistically insignificant (i.e., $\beta = .001$, SE = 0.042). Thus, for the negative communication network, relationships where actors receive statements are not influential but relationships where they make statements are.

Because the number of individuals an actor talks to (i.e., out-degree), the number of individuals that talk to the actor (i.e., in-degree), and the average number of statements across those relationships (i.e., Alter's average of dyadic covariates) are interrelated estimates, each line in figure 5 represents three individual variables. First, OD# identifies the number of out-degree relationships (i.e., relationships where the actor is speaking); ID# identifies the number of in-degree relationships (i.e., relationships where the actor is receiving); and W# identifies the weighted covariate for average interactions (i.e., the average number of repeated interactions across the identified relationships). Thus, the solid black line in the positive communication network figure can be interpreted as such: an actor who has one relationship where they are stating positive communication, one relationship where they are receiving positive communication, and, across these relationships, they average three interactions per relationship.

To emphasize the estimated differences in single-interaction relationships (i.e., W = 1) and repeated-interaction relationships (i.e., W = 3) in figure 5, single-interaction relationships are gray lines, whereas repeated-interaction relationships are black lines. The variation across these variables was selected to offer realistic variation as identified in Table 4. Furthermore, since the estimate for in-degree relationships is statistically significant and the estimate for out-degree relationships is statistically insignificant in the positive communication network, only

in-degree relationship values (i.e., ID#) vary. Similarly, only out-degree relationship values (i.e., OD#) vary for the negative communication network.

In the top panel of figure 5, one sees a smaller variation in the difference across single-interaction relationship estimates for the positive communication network. While small in magnitude, the attendance decreases as the actor increases in single-interaction-in-degree relationships. In contrast, as repeated interactions in the positive communication network increases, attendance increases.

Depicted in the bottom panel of figure 5, variation is estimated in the negative communication model across both the single-interaction relationship and repeated-interaction relationship estimates. First, there is little difference between few single-interaction relationships (i.e., OD1_ID1_W1) and few repeated-interaction relationships (i.e., OD1_ID1_W3). This suggests actors engaging in few negative relationships—single-interaction or repeated—are expected to attend a similar number of meetings in the following year. Single-interaction relationships move right as they increase, whereas repeated-interaction relationships move to the left. Stated differently, as actors have many relationships with one negative statement, they are more likely to attend more meetings the following year; whereas actors within many relationships with many negative statements are more likely to attend fewer meetings in the following year.

Discussion

How do positive statements toward annual objectives influence attendance?

Interest advancement is assumed to be a salient factor within collective action settings, such as collaborative governance
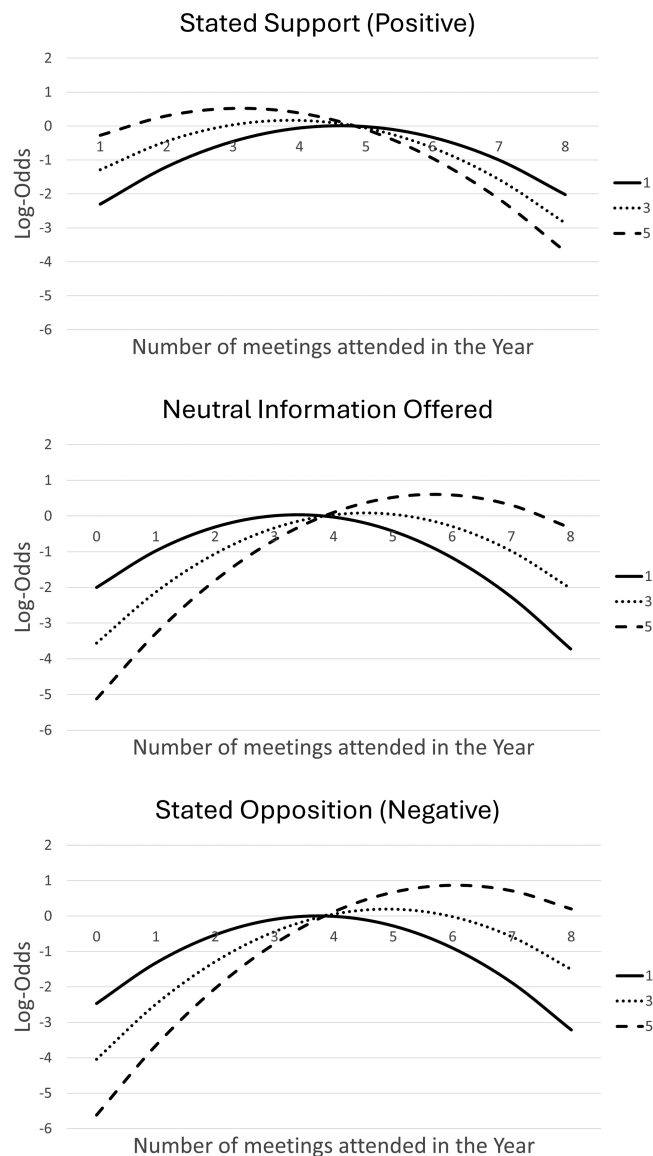
Stated Support (Positive)

Neutral Information Offered

Stated Opposition (Negative)

Figure 4 Influence of the number of annual objectives in which the participant engaged on attendance.

Concord (Positive Communication Network)

Conflict (Negative Communication Network)

Figure 5 Positive and negative influence of relationships and interactions on attendance. Note: OD# identifies the number of out-degree relationships; ID# identifies the number of in-degree relationships; and W# identifies the weigh covariate for average interactions across the identified tie relationships. Lines: Single-interaction relationships are gray lines and repeated-interaction relationships are black lines.

arrangements (Emerson and Nabatchi 2015; Lubell 2013). Whether the decision is deemed rational or boundedly rational, actors have limited tangible resources (e.g., money and staff) and intangible resources (e.g., time and effort) and must decide how to allocate those resources. Hypothesis 1a suggests that actors will remain in a collaborative governance arrangement if they see initiatives they support being advanced therein. In the case of Hypothesis 1b, when actors see initiatives they support not being advanced by the council, they will attend less frequently.

The top panel of figure 4 is a representation of the log-odds results which estimate the association between the number of annual objective topics for which an actor made statements of support in a year and the number of meetings they attended (Table 5). One sees a decrease in meetings attended given an increase in supported topics making it into the annual objective (i.e., $\beta = -.132$, SE = 0.059). In practical terms, this means that as an actor moves from supporting one annual objective to three annual objectives, they are expected to attend 23.2%
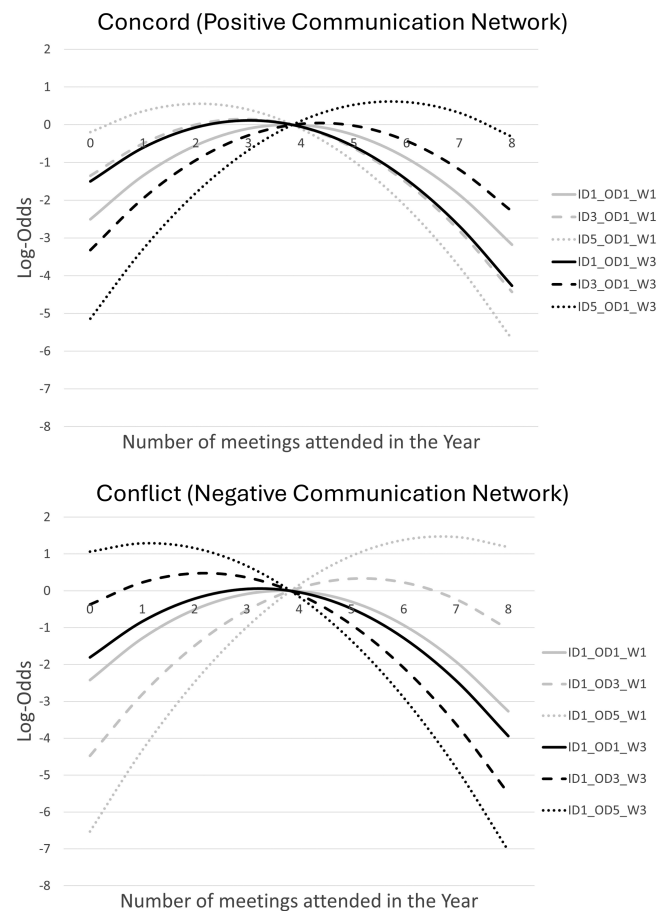
fewer meetings (i.e., roughly 2 less meetings per year), holding all other factors constant. As such, the result suggests an opposite influence on attendance compared to that expected in Hypotheses 1a and 1b.

Furthermore, the results suggest actors come less frequently when their topics are represented in the annual objectives of the council. While this result might be counter-intuitive to the interest achievement hypothesis as originally presented, the outcome may still be reflective of an individual actor's cost–benefit estimate via a free-rider problem. As Olsen (1965) identifies, and Ostrom (2009) elaborates, actors are motivated to receive goods without expending resources. Thus, if the good (i.e., supported interests) will be provided without expending resources (i.e., attending), it is in the actor's best interest to attend less frequently. This idea is seen elsewhere in collaborative governance literature; namely through the notion of core and peripheral members (Carboni et al. 2017; Koski et al. 2018; Weible 2008). While core members, who have a dedicated understanding of the council's purpose, possess political and relational skills, and engage consistently (Crosby and Bryson 2005; Koski et al. 2018; Weible 2008), the literature suggests peripheral members selectively choose to engage (Weible 2008; Zafonte and Sabatier 2004). In this way, if the interests of peripheral members overlap with those of core members who are

already translating their interests into annual objectives, the cost–benefit decision is for the peripheral member to become a free-rider and not attend future meetings.

How do negative statements toward annual objectives influence attendance?

Hypothesis 2 hinges on the notion that an actor will be spurred to attend more meetings in the following year if they oppose a topic which makes it into the annual objectives (Sabatier et al. 1987; Weible 2008; Weible, Siddiki and Pierce 2011). In the bottom panel of figure 4, we see support for this hypothesis. As the representation of the estimated log-odds shows, one sees the number of meetings attended in the following year increase given the increase in opposing topics making it into the annual objective (i.e., β = .205, SE = 0.087). This represents a 50.7% increase in meetings attended in the following year (i.e., roughly 4 meetings per year) when an actor offers stated opposition to three annual objectives compared to an actor who offers opposition to one annual objective, all else held equal. As such, this result offers support for Hypothesis 2.

How does interpersonal conflict influence attendance?

While policy process scholars have called for better representations of the mechanism for and outcomes of conflict in the policymaking process (Weible and Heikkila 2017), there currently is a theoretical vacuum specifically regarding conflict as current policy process theories and frameworks treat conflict as a background concept, detached from its sources, and measured indirectly as political mobilization, political activities, or competing values (Weible and Heikkila 2017). Leveraging Pondy's (1967) notions of actor conflict within an organization and through Hypothesis 3, we bring conflict amongst collaborative actors to the fore, attaching conflict directly to the sender and receiver of communication, and directly measuring how conflict associates with attendance in the venue.

For the negative communication network, the estimates in Table 5 suggest that only out-degree relationships (i.e., β = .134, SE = 0.056) and not in-degree relationships (i.e., β = .001, SE = 0.042) are associated with changes in attendance, as the estimate for in-degree relationships effectively suggests a null relationship to attendance in the following year. This suggests that conflictual statements made by actors are more salient toward future attendance than statements received. The associated log-odds representation for the negative communication network results in the bottom panel of figure 5 suggest interesting trends for both single-interaction relationships and repeated-interaction relationships (negative weighted ties = –0.227, SE = 0.059). More specifically, as negative single-interaction relationships increase, attendance is estimated to increase, while attendance is expected to decrease when negative repeated-interaction relationships increase. As an illustrative example, given two actors who have five negative out-degree relationships, the actor engaging in single-interaction relationships is expected to attend just under seven meetings, whereas an actor engaging in repeated-interaction relationships is expected to attend just over one meeting, *ceteris paribus.*

These results broadly support Hypothesis 3 since the results identify the association between different types of conflict and attendance. The single-interaction case might be seen as movements from conflict equilibrium to disequilibrium, and back to equilibrium. In contrast, the repeated-interaction cases might be seen as chronic conflict cases. Our results suggest short spells of conflict are associated with increased attendance, whereas chronic conflict is associated with large decreases in the number of council meetings a stakeholder attends.

How does interpersonal concord influence attendance?

Repeated interactions are a hallmark of Ostrom's (2009) model of individuals overcoming collective action issues, and are the theoretical root for Hypothesis 4. In contrast to the negative communication network, the positive communication network estimates suggest in-degree relationships (i.e., β = –.026, SE = 0.014) and not out-degree relationships (i.e., β = .004, SE = 0.054) are associated with changes in attendance. Furthermore, the associated log-odds representations in the top panel of figure 5 suggest different association trends for single-interaction relationships and repeated-interaction relationships. While there is a smaller variation in attendance for single-interaction relationships, the results depict decreases in meetings attended as the number of single-interaction-in-degree relationships increases. In contrast, as actors engage in more repeated-interaction relationships the results show the likelihood of meetings attended increases (positive weighted ties = 0.196, SE = 0.042). Thus, given two actors who have five positive in-degree relationships, the actor engaging in single-interaction relationships is expected to attend just under two meetings, whereas an actor engaging in repeated-interaction relationships is expected to attend just under six meetings, *ceteris paribus.*

This suggests there is value in not only the number of positive relationships but in the repetitiveness of interactions within relationships, as repeated-positive-interactions prove to be salient for increased attendance. While case studies often identify face-to-face dialogue as an important mechanism for successful collaboration (Ansell and Gash 2008; Ostrom 2009), our results suggest repeated, positive interactions through face-to-face dialogue are associated with more committed attendance when analyzing the actor-level.

How do neutral associations and the attendance of peers influence attendance?

In this article, we set out clear hypotheses for both positive and negative statements but make no assertions regarding the influence of neutral statements and the attendance of peers on a stakeholder's attendance. Yet, the results for neutral statements linked to annual objectives as well as the estimates regarding peer attendance in the neutral and negative communication networks prove to be interesting, and, thus, they are discussed below.

While not explicitly stated in the hypotheses, it is of note that an increase in the number of annual objectives for which an individual offered neutral information is estimated to increase the number of meetings an actor attends (i.e., middle panel figure 4). Lubell (2013) suggests actors participate in policymaking venues and form networks to gain key political resources such as political advancements as well as information (Berardo and Scholz 2010). In subsequent work, he and colleagues argue learning takes place when actors

can effectively communicate a range of new information (Berardo and Lubell 2019; Bodin 2017) leading to a better understanding of the problem as well as how other actors are thinking about the problem (Berardo and Lubell 2019). While we do not measure the level of learning in this study, our results suggest sharing information regarding a topic that makes it into the annual objectives is more salient to attendance than supporting the topic. Free-riders may be able to achieve similar political advances without frequent attendance, but it is less likely they can achieve similar levels of information exchange without frequent attendance.

Furthermore, the attendance of peers who speak to a stakeholder is statistically significant in the neutral communication network (i.e., β = .090, SE = 0.043) and the negative communication network (i.e., β= −.093, SE = 0.049). One might expect the logic for the neutral communication network to supplement the argument made in the last paragraph—there must be other stakeholders from whom to receive information. Thus, the results from our model suggest if actors from whom a stakeholder receives information attend more meetings, the stakeholder is more likely to attend more meetings as well. Finally, while the estimate for in-degree relationships did not prove to be statistically significant in the negative communication network, if the actor who makes a negative statement toward a stakeholder attends a greater number of meetings, the stakeholder is expected to attend fewer meetings. While more research is needed, this statistically significant estimate suggests a very specific dynamic in the venue. Particularly, there is a quality to who is making negative statements. If core members who are attending many meetings in a year make a negative comment to a stakeholder, this is more impactful to a stakeholder's attendance than a negative statement from a peripheral member attending less often. This suggests not only how many negative interactions but from whom the interactions are coming is important to future attendance.

Conclusion

This article contributes to research on collaborative governance through an examination of individual dynamics associated with sustained engagement in collaborative venues. While other past work has examined the evolution of collaborations (Imperial et al. 2016; Siddiki and Ambrose 2022; Ulibarri et al. 2020; Weible et al. 2011), it has done so at the group-level. Thus, this research contributes insights regarding the relationship between individual experiences and sustained engagement, with the understanding that a collaborative group's actions are directly related to those that are included/present in the process (Cohen, March, and Olsen 1972; Howlett 2018; Kingdon 1995). Further, by drawing on computational text analysis of meeting minute data, this article offers a generalizable methodological approach for assessing these dynamics and phenomena in collaborative governance but also in collaborative policy making more broadly. The methodology used supports recent interest in developing a clearer understanding and measurement of conflict in collaborative arrangements engaged in policy formulation and implementation (Weible and Heikkila 2017; Yi et al. 2022).

While this article contributes to research and practice, the authors acknowledge limitations to the study. First, the article presents analysis from a single collaborative venue case. For this reason, the generalizability of these results, while broadly

supporting the hypothesis posited from literature, needs to be further tested. Furthermore, the relationships and interests leveraged in this work only reflect the communication captured in the meeting minutes of the collaboration. While we acknowledge the likelihood of conversations and relationship building outside of the meeting, the methods presented here are seen as a robust representation given the available data. Additionally, the authors acknowledge meeting minute data is limited by its interpretation. Nuance associated with sarcasm, perception, and the salience of specific topics for individual actors can be minimized in such methods. As such, more work, including qualitative work, is needed to understand the perceptions of actions and how different topics are more or less salient to individual actors. Yet, substantial and significant findings are observed.

When exploring interest advancement's influence on continued attendance in collaborative venues, the results show the advancement of one's own interests is inversely associated with attendance by actors compared to expectations. In other words, in our study, as an actor moves from supporting one topic to five topics reflected in collaborative annual objectives, there is an expected decrease in that stakeholder's likelihood of attendance. In contrast, the results show the inclusion of topics in the collaboration's annual objective for which the individual stated opposition is salient to attendance, as increased oppositional annual topics is associated with a greater likelihood of attendance. A similar trend is observed for neutral statements. As actors have more annual objectives for which they make neutral, informing statements, there is a greater likelihood of attendance. While collaborative governance literature often highlights the importance of interest advancement in collaborative governance venues (Berardo and Lubell 2019; Emerson and Nabatchi 2015; Lubell 2013), less work evaluates these links. Our results highlight the importance of interest advancement but show that it is a nuanced dynamic. More work is needed to evaluate if similar associations across topic support and opposition are observed in other venues as well as other domains implementing collaborative governance.

The second group of factors explored in this article corresponds to interpersonal relationships observed in the collaborative venue. Here, the results suggest the importance of repeated-positive-interaction relationships in increasing the likelihood of attendance, whereas single-positive-interaction relationships were associated with decreases in attendance likelihood. While the results show single-negative-interaction relationships were associated with increases in attendance likelihood, repeated-negative-interaction relationships were associated with decreases in attendance likelihood, suggesting the important difference between minimal and chronic conflict in collaborative venues. While there is a growing amount of literature focusing on conflict in collaborative governance (Karjalainen and Rapeli 2015; Koebele and Crow 2023; Ulibarri 2023; Weible and Heikkila 2017), this study focuses on the interpersonal relationships that emerge between actors, thus focusing on conflict and concord as it emerges at the actor-level rather than measuring conflict at the group-level of the council. Thus, we argue, understanding the behavior of actors within the collaboration governance arrangement is needed to better understand collaborative governance itself.

These results can help inform practitioners in two ways. First, when interest advancement is seen as strategic decisions

associated with future attendance, it can be used by collaborative governance conveners to think critically about the identification of annual objectives. More specifically, not only is a broad representation of topics important, but also a broad representation of the interests across actors. When a broad set of actors support and oppose multiple annual objectives, greater stability in the group might be expected; whereas, if the annual objectives reflect the support of a narrow group of actors, attendance might be more volatile in the following year. Second, not all conflict is bad, but chronic conflict is. This supports literature that suggests conflict and disagreement in collaborative governance may be constructive (Emerson and Nabatchi 2015; Heikkila and Gerlak 2013). Yet, our study shows that chronic conflict is associated with the greatest decline in attendance. These results, in conjunction with the dyadic measurement of interpersonal relationships in this study, offer an important highlight for practitioners—the emergence of chronic conflict specifically between two individuals can be detrimental. While conflict is often measured at the group-level in studies, we show that the relationships between individuals matter. Thus, practitioners should give particular interest to specific chronic relationships of conflict.

Supplementary material

Supplementary material is available at *Journal of Public Administration Research and Theory* online.

Data Availability

The datasets were derived from sources in the public domain: https://mde.maryland.gov/programs/crossmedia/environmentaljustice/pages/cejsc.aspx

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References

Agranoff, R. 2006. "Inside Collaborative Networks: Ten lessons for Public Managers." *Public Administration Review* 66: 56–65.

Ambrose, G., S. Siddiki, and U Brady. 2022. "Collaborative Governance Design in Local Food Systems in the United States." *Policy Design and Practice* 5 (3): 362–83.

Ansell, C., and A Gash. 2008. "Collaborative Governance in Theory and Practice." *Journal of Public Administration Research and Theory* 18 (4): 543–71.

Ansell, C., and J. Torfing, eds. 2022. *Handbook on Theories of Governance*. United Kingdom: Edward Elgar Publishing.

Berardo, R., and M Lubell. 2019. "The Ecology of Games as a Theory of Polycentricity: Recent Advances and Future Challenges." *Policy Studies Journal* 47 (1): 6–26.

Berardo, R., and J. T. Scholz. 2010. Self-organizing policy networks: Risk, partner selection, and cooperation in estuaries. *American Journal of Political Science* 54 (3): 632–49.

Bodin, Ö. 2017. "Collaborative Environmental Governance: Achieving Collective Action In Social-Ecological Systems." *Science* 357 (6352): eaan1114.

Bryson, J. M., B. C. Crosby, and M. M Stone. 2006. "The Design and Implementation of Cross-Sector Collaborations: Propositions from the Literature." *Public Administration Review* 66: 44–55.

Carboni, J. L., Siddiki, S., Koski, C., and Sadiq, A. A. 2017. "Using Network Analysis to Identify Key Actors in Collaborative Governance Processes." *Nonprofit Policy Forum* 8 (2): 133–45. De Gruyter.

Civil Rights Act, Title VI, 42 U.S.C. § 2000d et seq. 1964. https://www.govinfo.gov/app/details/COMPS-342

Cohen, M. D., J. G. March, and J. P Olsen. 1972. "A Garbage can Model of Organizational Choice." *Administrative Science Quarterly* 17: 1–25.

Crosby, B. C, and J. M Bryson. 2005. "A Leadership Framework for Cross-Sector Collaboration." *Public Management Review* 7 (2): 177–201.

Emerson, K., and T. Nabatchi. 2015. *Collaborative Governance Regimes*. Washington D.C., USA: Georgetown University Press.

Grafton, B., A. C. Perez, K. Hintzen, P. Mohai, S. Orvis, and R Hardin. 2015. "From the Michigan Coalition to Transnational Collaboration: Interactive Research Methods for the Future of Environmental Justice Research." *Politics, Groups, and Identities* 3 (4): 684–91.

Heikkila, T., and A. K Gerlak. 2013. "Building a conceptual approach to collective learning: Lessons for public policy scholars." *Policy Studies Journal* 41 (3): 484–512.

Howlett, M. 2018. "Matching Policy Tools and Their Targets: Beyond Nudges and Utility Maximisation in Policy Design." *Policy & Politics* 46 (1): 101–24.

Imperial, M. T., E. Johnston, M. Pruett-Jones, K. Leong, and J Thomsen. 2016. "Sustaining the Useful Life of Network Governance: Life Cycles and Developmental Challenges." *Frontiers in Ecology and the Environment* 14 (3): 135–44.

Innes, J. E., and D. E Booher. 2003. "Collaborative Policymaking: Governance Through Dialogue." In *Deliberative Policy Analysis: Understanding Governance in the Network Society*, edited by Hajer, M. A., and H. Wagenaar 33–59. Cambridge, England: Cambridge University Press.

Innes, J. E., and J. Gruber. 2005. "Planning styles in conflict: the metropolitan transportation commission." *Journal of the American Planning Association* 71 (2): 177–88.

Jones. 2001. *Politics and the Architecture of Choice: Bounded Rationality and Governance*. University of Chicago Press.

Karjalainen, M., and L Rapeli. 2015. "Who will not deliberate? Attrition in a multi-stage citizen deliberation experiment." *Quality & Quantity* 49: 407–22.

Kim, J., and S Siddiki. 2018. "Linking diversity of collaborative policymaking venues with procedural justice perceptions: A study of US marine aquaculture partnerships." *The American Review of Public Administration* 48 (2): 159–74.

Kingdon, J. W. 1995. *Agendas, Alternatives, and Public Policies*. 2nd. NY: Haper Collins College Publisher.

Koebele, E. A., and D. A Crow. 2023. "Mitigating Conflict with Collaboration: Reaching Negotiated Agreement Amidst Belief Divergence in Environmental Governance." *Policy Studies Journal* 51 (2): 439–58.

Koski, C., S. Siddiki, A. A. Sadiq, and J Carboni. 2018. "Representation in Collaborative Governance: A Case Study of a Food Policy Council." *The American Review of Public Administration* 48 (4): 359–73.

Lospinoso, J., and T. A Snijders. 2019. "Goodness of Fit for Stochastic actor-oriented models." *Methodological Innovations* 12 (3): 2059799119884282.

Lubell, M. 2013. "Governing Institutional Complexity: The ecology of games framework." *Policy studies journal* 41 (3): 537–59.

Lubell, Henry, and McCoy. 2010. "Collaborative institutions in an ecology of games." *American Journal of Political Science* 54 (2): 287–300.

Nabatchi, T. 2012. "Putting the 'public' back in public values research: Designing Participation to Identify and Respond to Values." *Public Administration Review* 72 (5): 699–708.

Naldi, M. 2019. "A Review of Sentiment Computation Methods with R packages." *arXiv preprint arXiv* 1901.08319.

Neblo, M. A., K. M. Esterling, R. P. Kennedy, D. M. Lazer, and A. E. Sokhey. 2010. "Who wants to deliberate—and why?". *American Political Science Review* 104 (3): 566–83.

Ostrom, E. 2009. *Understanding Institutional Diversity*. Princeton, USA: Princeton University Press.

Petersen, D., M. Minkler, V. B. Vasquez, and A. C Baden. 2006. "Community-Based Participatory Research as a Tool for Policy Change: A Case Study of the Southern California Environmental Justice Collaborative." *Review of Policy Research* 23 (2): 339–54.

Pondy, L. R. 1967. "Organizational Conflict: Concepts and Models." *Administrative Science Quarterly* 12: 296–320.

Resh, W., S. Siddiki, and W. R McConnell. 2014. "Does the network centrality of government actors matter? Examining the Role of Government Organizations in Aquaculture Partnerships." *Review of Policy Research* 31 (6): 584–609.

Rinker, T. 2017. "Package 'Sentimentr.'" *Retrieved* 8: 31.

Ripley, R. M., Snijders, T. A., Boda, Z., Vörös, A., and Preciado, P. (2022). *Manual for RSiena*. University of Oxford, Department of Statistics, Nuffield College.

Ross, A., J. Van Alstine, M. Cotton, and L Middlemiss. 2021. "Deliberative Democracy And Environmental Justice: Evaluating the Role of Citizens' Juries in Urban Climate Governance." *Local Environment* 26 (12): 1512–31.

Sabatier, Focht, Lubell, Trachtenberg, and Vedlitz. eds. 2005. *Swimming Upstream: Collaborative Approaches to Watershed Management*. Cambridge, USA: MIT Press.

Sabatier, P., S. Hunter, and S McLaughlin. 1987. "The devil shift: Perceptions and misperceptions of opponents." *Western Political Quarterly* 40 (3): 449–76.

Sabatier, P. A., and Weible, C. M. 2019. "The Advocacy Coalition Framework: Innovations and Clarifications." In *Theories of the Policy Process* (2nd edition), 189–220. United Kingdom: Routledge.

Schattschneider, E. E. 1960. *The Semi-Sovereign People*. New York, USA: Rinehart and Holt.

Siddiki, S., and G Ambrose. 2023. "Evaluating Change in Representation and Coordination in Collaborative Governance Over Time: A Study of Environmental Justice Councils." *Environmental Management* 71 (3): 620–40.

Siddiki, S. N., J. L. Carboni, C. Koski, and A. A Sadiq. 2015. "How Policy Rules Shape the Structure and Performance of Collaborative Governance Arrangements." *Public Administration Review* 75 (4): 536–47.

Simon, H. A. 2013. *Administrative Behavior*. New York, USA: Simon and Schuster.

Ulbig, S. G., and C. L Funk. 1999. "Conflict Avoidance and Political Participation." *Political Behavior* 21: 265–82.

Ulibarri, N. 2023. "An Analysis of Micro-Scale Conflict in Collaborative Governance." *Journal of Public Administration Research and Theory* 34 (2): 316–30.

Ulibarri, N., K. Emerson, M. T. Imperial, N. W. Jager, J. Newig, and E. Weber. 2020. "How does collaborative governance evolve? Insights from a medium-n case comparison." *Policy and Society* 39 (4): 617–37.

United States Environmental Protection Agency. 2021. *"Environmental Justice."* https://www.epa.gov/environmentaljustice. Accessed October 27, 2021.

Weible, C. M. 2008. "Expert-Based Information and Policy Subsystems: A Review and Synthesis." *Policy Studies Journal* 36 (4): 615–35.

Weible, C. M., and T Heikkila. 2017. "Policy Conflict Framework." *Policy Sciences* 50: 23–40.

Weible, C. M., P. A. Sabatier, H. C. Jenkins-Smith, D. Nohrstedt, A. D. Henry, and P DeLeon. 2011. "A Quarter Century of the Advocacy Coalition Framework: An Introduction to the Special Issue." *Policy Studies Journal* 39 (3): 349–60.

Weible, C. M., S. N. Siddiki, and J. J Pierce. 2011. "Foes to Friends: Changing Contexts and Changing Intergroup Perceptions." *Journal of Comparative Policy Analysis: Research and Practice* 13 (5): 499–525.

Yi, H., C. M. Weible, C. Chen, J. Kagan, J. Yordy, R. Berardo, and F. Holm, 2022. "Measuring Policy Conflict and Concord." *Society & Natural Resources* 35 (6): 684–91.

Zafonte, M., and P. Sabatier. 2004. "Short-Term Versus Long-Term Coalitions in the Policy Process: Automotive Pollution Control, 1963–1989." *Policy Studies Journal* 32 (1): 75–107.