

The Role of Forum Membership Diversity on Institutional Externalities in Resource Governance Systems

Abstract

In many resource governance systems, representatives of resource-related organizations gather in forums to discuss and develop solutions to policy problems. Forums often deal with interdependent policy problems, giving rise to institutional externalities: instances where decisions made in one forum either decrease (negative institutional externality) or increase (positive institutional externality) the rate by which current policy outputs in *other forums* resolve their prescribed policy problems. In this article we argue that forum-specific factors can impact the direction of such externalities. We theorize that forums with more diverse memberships in terms of both the issues that participants care about and types of organizations represented are better equipped to incorporate more holistic, ecosystem-based perspectives, which promote the generation of positive institutional externalities. Our study utilizes survey data collected from forum participants in the California Delta. Results from a series of cross-nested regressions demonstrate a positive association between forum diversity and positive externalities.

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In many resource governance systems, numerous public and private organizations make decisions that affect a common resource (Lubell et al. 2017). In the California Delta for example, federal, state, and local government agencies, environmental special districts, science-based organizations, and interest groups all make choices that impact the watershed (Berardo and Lubell 2016). When problems arise that impact the interests of multiple organizations, representatives of those organizations (“actors”) are incentivized to meet, discuss the policy problem(s), and devise policy solutions (or “outputs”). These interactions can occur in “forums”, which are issue based intermediary arenas that facilitate actor interactions (Fischer and Leifeld 2015; Herzog and Ingold 2019; Hileman and Bodin 2018; Mancilla Garcia and Bodin 2019). When forums deal with interdependent policy problems (e.g., ecosystem restoration and biodiversity), policy choices made in one forum may generate “institutional externalities” for other forums. Institutional externalities refer to instances where decisions made in one forum either decrease (negative institutional externality) or increase (positive institutional externality) the rate by which current policy outputs in *other forums* resolve their policy problems (Jasny and Lubell 2015; Zhao and Mu 2019). In this context, forums are conceptualized as individual components of a resource governance system, whereby the collective choices made across forums impact the aggregate health of the resource (Mewhirter and Berardo 2019). Forums maximize their contribution to a resource governance system when they produce outputs that simultaneously resolve their prescribed policy problem *and* generate positive externalities for other forums in the system (Mewhirter, Lubell and Berardo 2019). Forums inflict the greatest harm when outputs fail to resolve their forum-specific policy problem and reduce the rate by which outputs in linked forums resolve policy problems (i.e. produce negative externalities). In this paper, we focus on the interactive nature of forums, asking: how do forum-specific features

impact the direction of institutional externalities generated by a forum?

While prior research on forums often implies (or explicitly assumes) that institutional externalities impact within-forum processes, outputs, and outcomes (e.g., Lubell, Henry and McCoy 2010; Lubell et al. 2017), to date, only one study has empirically verified their existence (Mewhirter, Lubell and Berardo 2019), and none have examined the conditions that impact externality direction. We attempt to fill this gap, theorizing how one forum specific feature—forum diversity—impacts the direction of institutional externalities. Forum diversity encapsulates both the breadth of issues (“issue diversity”) that forum participants care about as well as the range of organizational types (“organizational diversity”) represented in a forum. We argue that intentionally producing policy outputs that generate positive externalities is a complicated task, requiring forum actors to identify i) how issues dealt with in a given forum interact with linked issues throughout the system, ii) how policy alternatives being considered in that forum might affect those linked issues, iii) the forum(s) that address linked issues and the policies that are currently in place, and iv) how policy alternatives might interact with current policies in linked forums (Mewhirter, Lubell and Berardo 2018). We argue that greater forum diversity increases the likelihood that actors identify how forum-specific issues are linked to other issues in the system and the forums that address those issues. Diversity provides actors with the knowledge base to understand and take into account how outputs might affect other forums in the system, leading to more positive institutional externalities.

Using survey data collected from actors involved in water management forums in the California Delta governance system, we run a series of cross-nested regressions to test our hypotheses. We find that increases in forum diversity are positively associated with the generation of positive externalities. Such findings provide support for recent claims made by

researchers utilizing the Ecology of Games Framework, who emphasize the importance of analyzing entire systems of actors, forums, and their interconnections in order to understand forum dynamics and outputs (Angst 2018; Berardo and Lubell 2019; Hamilton and Lubell 2018; Fischer et al. 2017; Herzog and Ingold 2019; Hileman and Bodin 2018; Mancilla Garcia and Bodin 2019). Moreover, these findings provide insight into actor participation and institutional change in resource governance systems. Actors tend to select into and continue participating in forums that they believe more effectively solve policy problems (Lubell 2003; Lubell, Henry and McCoy 2010). Without sufficient commitment from relevant actors, forums lose their legitimacy, leading to disbandment (Berardo, Olivier and Lavers 2015 Smaldino and Lubell 2011). While others have analyzed how institutional changes to forums can improve the rate by which forum outputs resolve policy problems, in some cases, forum success or failure may be largely driven by decisions made in linked forums. A better understanding of these between-forum dynamics can provide pragmatic examples of features that forums would benefit from adopting to foster the creation of positive institutional externalities.

Forum Outputs & Institutional Externalities

A multitude of forums simultaneously operate within individual resource governance systems, each providing opportunities for actors to discuss and develop solutions to policy problems that impact their mutual interests. For example, a previous study identified over 300 forums operating within the California Delta, each of which addresses a subset of interdependent policy problems such as water quality, water supply, biodiversity, land use, flooding, and climate change (Lubell et al. 2017). While actors participate in forums for (often) numerous reasons, participants generally share a desire to draft forum outputs that resolve specific policy problems (Fischer and Maag 2019; Crona and Parker 2012; Chen 2008, Chen 2010; Scharpf 1988; Thomas

and Perry 2006). Research has identified a wide array of forum-specific factors (e.g., rules, trust, resources, etc.) that impact the capacity of actors to resolve policy problems in forums, and, more generally, to create effective forum outputs (e.g., Fischer and Leifeld 2015; Bryson et al. 2006; Lubell 2003; Innes and Booher 1999; Kallis Kiparsky and Norgaard 2009). Building on the work of Mewhirter, Lubell and Berardo (2018), we argue that when forums deal with interdependent policy problems, policy outputs meant to resolve a specific policy problem in one forum might impact processes and outputs in linked forums. Here, a positive institutional externality increases the capacity of linked forums to resolve their specific policy problems, whereas a negative institutional externality reduces that capacity.

A comparison of two forums in the California Delta—the Bay Area Stormwater Management Association of Agencies (BASMAA) and the Delta Stewardship Council Meetings (DSCM) — elucidates the relationship between forums and institutional externalities. BASMAA consists of nine San Francisco Bay Area municipal stormwater programs that meet to craft integrated stormwater management plans (<http://basmaa.org>). DSCM hosts hundreds of actors representing a multitude of organizational interests who meet to discuss and shape the Delta Plan (a management plan for the entire Delta: deltacouncil.ca.gov). Despite different agendas and memberships, the two forums are linked as policy decisions within one forum may impact how well policy solutions work in the other. For instance, if DSCM actions result in reduced agricultural runoff, BASMAA will face a lower runoff burden, thus increasing the rate by which BASMAA's current solutions lead to desired outcomes (i.e., better water quality: a positive institutional externality). If DSCM choices instead result in *increased* agricultural runoff, it would decrease the rate by which current BASMAA solutions achieve their desired outcome (i.e., a negative institutional externality).

Forum Diversity

A rich literature details how diversity impacts collective decision-making efforts (Leach et al. 2014; Innes and Booher 1999; Margerum 2011; Wondolleck and Yaffee 2000). While diversity among actors can, at times, increase the costs associated with collective decision-making (Ananda and Proctor 2013; Provan and Kenis 2008), it can also be advantageous as it allows actors to tap into a wide array of knowledge and perspectives (Burby, 2003; Innes and Booher, 1999; Margerum, 2011) that can facilitate learning and policy innovation (Siddiki et al. 2017; Moore and Koontz 2003; Koontz and Moore Johnson 2004). Although this literature highlights the influence of forum composition on targeted environmental outcomes, little is known about how diversity within forums impacts the direction of forum externalities, and thus the capacity of linked forums to resolve their policy problems. In this section, we define and discuss the two types of diversity addressed in this article: the diversity of issues that actors in a forum care about (“issue diversity”) and the diversity of organizational “types” present in a forum (“organizational diversity”).¹ In the proceeding section, we develop a theory regarding the relationship between forum diversity and the direction of institutional externalities.

Defining Issue Diversity

Issue diversity refers to the scope of substantive issues that actors in a given forum identify as related to their organization’s interests (Innes and Booher 2003; Booher 2004). While individual forums are often charged with managing a specific policy problem (e.g., wetland

¹ It should be noted that diversity has been operationalized in numerous ways in the resource governance, collaborative governance, and participation literatures, several of which develop typologies based on actor composition (e.g., agency-based, citizen-based, or mixed, government-oriented, interest-group oriented, etc.: Moore and Koontz 2003; Koontz and Moore Johnson 2004; Koontz et al. 2004; Bidwell and Ryan 2006; Hardy 2010; Andrews and Entwistle 2010; Maag and Fischer 2018). We chose organizational and issue diversity as they have been commonly studied across fields. That said, others certainly exist and should be explored.

restoration), each policy problem is often underlain by and/or is interdependent with other issues (e.g., water quality and erosion control: Angst 2018, 2019). The assortment of resource related issues that define individual policy problems may draw actors with issue-specific experience and distinctive expertise who contribute a broad range of resources, skills, and competencies (Sidiki et al. 2017; Innes and Booher 2004). Actors in these forums can exchange knowledge and learn about diverse issues and policy alternatives related to the broader policy problem, which maintain diffusion and spillover effects across different issue areas (e.g., Jones and Jenkins-Smith 2009; Gilardi 2010; Crona and Parker 2012). Forums exhibit high issue diversity when the interests and expertise of actors cover a wide range of resource related issues (Boydston, Bevan, and Thomas III 2014; Fischer and Schläpfer 2017). Forums exhibit low issue diversity when actors are solely concerned with a narrow set of overlapping issues.

Defining Organizational Diversity

Organizational diversity refers to the extent to which a forum is composed of actors representing distinct “types” of organizations (Andrews and Entwistle 2010; Selsky and Parker 2005; Hardy and Koontz 2009). For example, actors may represent federal, state, regional, and local governments, various types of interest groups, and/or science-based organizations. The type of organization an actor represents impacts i) the issues they are concerned with and/or are knowledgeable about, which in turn, impacts ii) their knowledge about forums in the system (Termeer, Dewulf and Lieshout 2010; Huxham et al. 2000).

While past research shows that most government actors participate in a wide range of forums (Lubell, Robins, and Wang 2014), the types of forums these actors prioritize is largely driven by the level of government they represent. For instance, state and federal actors are predominantly concerned with “big picture” policy problems and prioritize their participation

efforts in forums that address them (e.g., the DSCM—mentioned above—that creates the Delta Plan). This proclivity is evidenced by actors' forum selection patterns, which show state and federal actors overwhelmingly select into the most central forums in a system (McAllister, McCrea, and Lubell 2013). Alternatively, local governments tend to be concerned with issues occurring within their jurisdiction, limiting their participation to forums clustered within and/or near their locale (Lubell, Robins and Wang 2014).

Forum participation can also involve non-state actors, including representatives of science and interest-based organizations. Science-based actors tend to possess knowledge about/are concerned with niche interests related to their expertise, whereas interest groups have knowledge about/are concerned with issues directly concerning their members (Fischer and Schläpfer 2017; Maag and Fischer 2018). Both non-state actor types tend to limit their attention and participation to a narrow subset of forums that directly impact their organization's niche interests/areas of expertise (Dür and De Bièvre 2007; Newig and Fritsch 2009).

When participants represent a wide range of organizational types, the forum is considered organizationally diverse. When fewer organizational types are represented, diversity is lower.

The Impact of Forum Diversity on Institutional Externalities

When making decisions in forums, actors consider the range of policy options available, evaluate the potential effectiveness of each alternative, estimate and bargain over how the costs and benefits of outputs will be divided, and consider how/whether policy decisions might impact other forums in the region (Mewhirter, Lubell, and Berardo 2018; Mewhirter and Berardo 2019). Calculating the latter is a complicated process as actors must understand how forum issues are linked to other issues in the system, how policy alternatives might impact linked issues, the forum(s) that deal with linked issues, and how policy alternatives might interact with policies in

linked forums. Past research demonstrates that while individual actors likely lack the capacity to weave their way through the complexity of such systems (Lubell 2013), compilations of actors might collectively possess the know-how to more fully map out the multiplicity of issues, forums, and linkages in a system. In this section, we argue that forums with more diverse memberships maintain a greater capacity to craft policy solutions that promote positive institutional externalities.

How Issue Diversity Impacts Institutional Externalities

Forums with low levels of issue diversity may act as echo chambers by enabling repetition in knowledge and policy ideas (Putnam 2000; Coleman 1988). When developing policy solutions, homogeneous forums may produce a limited range of policy alternatives that simply assuage the collective interests of forum actors (Anderies, Janssen, and Ostrom 2004). While this homogeneity can facilitate coordinated action *within* a forum (Berardo and Scholz 2010), it increases the likelihood that participants overlook how policy outputs might impact related policy problems in linked forums. When participants are unaware of how outputs might impact linked issues, they cannot design solutions with these linkages in mind.

Conversely, diverse forums link actors with different issue interests and knowledge bases who are less likely to view policy problems or potential solutions similarly (Fischer and Schläpfer 2017). Connecting diverse actors can dissolve ‘closed group thinking’ while cultivating pathways for learning, resource exchange, and policy innovation (Burt 2005; Scheffer and Westley 2007; Ernston et al. 2010; Weible 2008; Selsky and Parker 2005). Diversity exposes actors to new perspectives and varied expertise that may enhance or alter their understanding of policy issues and/or introduce them to related issues of which they were previously unaware (Bodin and Crona 2009; Sidiki et al. 2017; Innes and Booher 2004; Leach et al. 2014). This

potential for joint learning increases the likelihood that actors more fully map a system's issue interdependence (Beierle and Cayford 2002; Sirianni 2009; Weible and Sabatier 2009).

Combined, this suggests that increases in issue diversity increase the likelihood that actors in a forum can map out issue linkages between their forum-specific problem and other issues in the system, which in turn, allows participants to design outputs that take issue linkages into account. The following example helps elucidate this relationship.

Consider a forum charged with removing invasive plants in a given region. If the forum is composed solely of actors whose knowledge base involves removing invasive plants, then participants will only consider how to remove the greatest amount of plants. Such a stance may be problematic if the plants serve a role in the ecosystem, for instance, if birds utilize them for nesting. Failing to account for how eradication techniques may impact biodiversity could lead to negative institutional externalities for other, biodiversity-based forums in the region. The negative institutional externalities received by biodiversity-based forums reduce the ability of their forum-specific policy outputs to preserve the bird. While such a scenario may seem outlandish, it parallels recent events in the San Francisco Bay, where efforts to remove *Spartina* (an invasive sea plant) decimated the Ridgeway Rail population (an endangered shorebird) by 50% (Lampert et al. 2014). If, however, actors with expertise in biodiversity and/or habitat protection were involved in the forum, they would have likely understood the ramifications of removing plants without considering ecosystem impacts. Their presence may have changed the framing of the problem from "how do we remove plants" to "how do we remove plants without harming birds." Here, we expect that outputs generated in the more diverse forum will promote more positive externalities, relative to outputs generated from the less diverse forum.

This preceding logic leads us to the following hypothesis:

H1: Higher issue diversity is positively associated with the generation of positive externalities

How Organizational Diversity Impacts the Direction of Institutional Externalities

Forums with high levels of organizational diversity unite actors with different knowledge bases regarding other forums in the system and the current outputs enacted by those forums (Ernstson et al. 2010; Lubell, Robins, and Wang 2014). When a forum is composed of organizationally homogenous actors, collectively, forum participants may have a limited understanding of the range of forums in the system to which their current forum is linked. When considering how outputs might impact other forums in the system, these participants can only design outputs that promote positive externalities for the narrow subset of forums they are aware of, overlooking forums they are less familiar with. Increases in diversity expands the breadth of forums that participants are aware of, allowing them to better map a forum's place in the system. This allows participants to develop outputs that account for all of these forum linkages.

Consider, for instance, a forum composed solely of federal and state actors. Given these actors tend to focus on "big picture" issues and limit their participation to more central forums, collectively, forum participants may have a good understanding of how proposed forum outputs might affect the viability of currently enacted policies in the region's central forums. However, such actors will likely be unaware of less central forums that their forum is linked to. Relatedly, a forum composed of only local government actors may be able to map out connections to forums within their locale, missing out on how outputs might impact more central forums. Similarly, forums composed exclusively of non-state actors may only be able to identify connections to other forums that address their niche interests, missing all others. In all cases, actors possess a "partial" map of forums in the system, allowing interactions between a given forum and unmapped forums to be overlooked. If all types of organizations are present, however,

actors can combine knowledge bases, and map linkages from their forum to more central forums, local forums, and the forums of concern to non-state actors.

When actors are aware of forum linkages, they have an opportunity to create policies that promote positive externalities. Such knowledge about linkages should be associated with the generation of more positive externalities. This leads us to the following hypothesis:

H2: Higher organizational diversity is positively associated with the generation of positive externalities

Research Design

We test these hypotheses with survey data collected from forum participants in the California Delta (hereafter CA Delta) water governance system. The CA Delta is the state's main water hub spanning nearly 1,100 square miles and supplying water to 25 million residents. The CA Delta plays host to more than 750 species of flora and fauna while supporting diverse human activities like agriculture, recreation, and residential economy (State of California 2007). The CA Delta is governed under a highly decentralized and fragmented system that has developed over several decades (Berardo and Lubell 2016).

Data Collection

Survey data was collected from individuals that participated in water-related forums in the CA Delta. A web-based survey was administered by the Indiana Center for Survey Research in 2014 (funded by SBE-XXX-XXXX). The names and email addresses for participants were collected from a previous survey administered in 2010 as part of an NSF-funded project (SBE-XXX-XXXX). Additional participants were gathered from media and web searches for forums related to water management in the CA Delta. Only actors that participated in forums during the previous year were considered. The survey design incorporated a web-based survey with mail surveys to non-respondents. In total, 1,481 names and email addresses of forum participants were

collected: 322 actors partially or completely took the survey, 141 refused, 222 indicated that they had not participated in a water forum in the previous year and were excluded, and 796 did not respond. The American Association for Public Opinion Research estimated response rate ranges from 26% to 34% depending on estimation method.

Survey Overview

The theory developed in this article stipulates that the level of diversity among forum participants impacts the direction of externality generated by a forum. A unique survey design allows us to empirically test our hypotheses. The survey begins by asking respondents to identify the forum in the region that has the largest impact on their organization's interests, which we refer to as the actor's "primary forum". We then ask several questions regarding the respondent's participation in that forum. We then collect information about the actor and organization that they represent (if any). Next, we ask each respondent to select, from a pre-specified list, the other forums in which they participate. This list contains 15 other forums known to play an important role in the region (based on findings from the 2010 survey). See Authors (2017) for a discussion and defense of the forum selection procedure. After establishing the subset of forums in which the actor participates, we ask questions regarding their participation in each forum. Finally, we ask actors about the impact that forum outputs had on the activities that took place in their primary forum. Combined, this design allows us to examine how forum diversity in one's non-primary forum(s) impacts the direction of the externality that was received in their primary forum (if any). Summary statistics for all variables are provided in Table A1 in the Appendix.

Dependent Variable

Our dependent variable, *Institutional Externality*, captures the extent to which an actor believes that the policy outputs generated in each non-primary forum in which they participate

impacts their primary forum. This measure is generated from the following question: “In some cases, other forums may positively or negatively influence what occurs in {primary forum name}, the primary forum you described in previous questions. In your opinion, would you say that the following forums have a positive, negative, or no influence on {primary forum name}?” Values range from 0-10: 0= “major negative influence”; 5= “no influence”; and 10= “major positive influence”. As such, a score of 0 indicates a strong negative externality; 10 indicates a strong positive externality; and 5 indicates no externality.

A network graph showing the extent to which actors perceive there to be institutional externalities between forums in the CA Delta is presented and described in Figure A1 in the Appendix. This figure was originally published in Authors (2018, p. 301). As detailed by Authors, each forum in the CA Delta tends to be connected to multiple others, indicating that “forum structure is highly interdependent and that the decisions made in one forum tend to be strongly influenced by the decisions made in multiple, related forums.”

Independent Variables

We utilize two independent variables to test our hypotheses. The variable, *Organizational Diversity*, measures the diversity of organizational types that participants in a given forum represent. To construct the measure, each actor was asked to select (from a list) the “type” of organization that they represent. Actors had 16 choices²: the final measure counts the number of unique organizations that participated in each forum (thus it is measured at the forum level).

² The types of organizations include: federal government; state government; local government; regional government; water infrastructure special district; environmental special district; environmental group; trade/business/industry group; homeowners association; education/consulting/research; multi-stakeholder coalition; political party; recreational group; agriculture; media; other.

While we prefer this measure due to its simplicity, the measure may not accurately capture the concept of “diversity” given its inability to account for the evenness by which different types of organizations are distributed within each forum. To adjust for this, we calculate the generalized variance (also known as the Hirschman-Herfindahl Index) for each forum as well as the entropy statistic. These measures account for both the number of unique organization types present in a given forum as well as the relative abundance of each organization type. As shown in Table A2 in the Appendix, our results hold across measures. See Budescu and Budescu (2012) for a discussion of these measures.

Our second independent variable, *Issue Diversity*, also measured at the forum level, captures the range of issues actors report as impacting the policy interests of their organization. To capture this measure, each actor was asked to select as many of the following issues that impact their organizational interests: water supply reliability; water quality; biodiversity/species protection; land use; flood control; climate change; other issues. The final measure is the mean number of issues that participants in a given forum selected.

Control Variables

Several control variables are included in the model. Measurements are at the actor, non-primary forum, primary-forum, or non-primary forum primary forum dyad levels.

Relative to local government actors and non-state actors, state and federal government actors tend to select into central forums that often deal with bigger issues that draw larger, more diverse members. Forums designed to tackle larger issues have a greater chance of generating externalities for other forums in the system (Mewhirter and Berardo 2019). We adjust for this by including *Organizational Type*: a series of dummy variables that detail the type of organization an actor represents (see footnote 4 on page 16 for a list of choices).

We account for the experience and political sophistication of each actor. Actors who are less experienced and less knowledgeable about the political environment in which they operate may be more likely to select into large, more diverse forums where more connections can be built (Fischer and Leifeld 2015). They may also be less attuned to the interactions between forums leading to more neutral evaluations of *Institutional Externality*. *Political Knowledge*, and *Experience* are used to capture these concepts. *Political Knowledge* is generated from the following question: “For water issues most important to {you | the organization you represent}, would you say that {you know | your organization knows} the policy interests of the most active water management stakeholders in the CA Delta?” Values range from 0-10: 0= “do not know their interests” and 10= “definitely know their interests.” *Experience* captures whether participating in forums is a major aspect of an actor’s (organization’s) primary work (=1) or incidental to their primary work (=0).

The variable *Cooperation* indicates the extent to which one’s interactions with other actors (in forums or elsewhere) have been amicable or conflict-oriented. Cooperative interactions foster high levels of trust in others and beliefs that collaborative activities are a good investment of resources (Bednar and Page 2007; Mewhirter, Coleman and Berardo 2017). As such, actors that have experienced cooperative interactions should have fewer reservations about joining diverse forums with unfamiliar actors and may be more likely to view all forum processes positively (inflating *Institutional Externality* ratings). To adjust for this, we use the following question: “In your opinion, how would you describe the overall cooperation between water management actors in the CA Delta?” Values range from 0-10: 0= “no cooperation among members” and 10= “a great deal of cooperation among members.”

Forum Size is a count variable specifying how many respondents indicate that they participated in a given forum. Past research demonstrates that *Forum Size* might increase the negotiation/bargaining costs associated with participating in a forum and lead to a crowding out of individual concerns (Booher and Innes 2002; Koontz and Moore Johnson 2004; Olson 1965). As actors struggle to get their voices heard, they may focus more on accomplishing forum specific tasks and eschew their concerns regarding externalities. Moreover, as forums become larger, more organizational types and issues will likely be represented.

We account for the type of policy problems dealt with in each non-primary forum. Within a system, some issues are more contentious than others. Conflict prone issues are generally dealt with in more centralized forums which draw larger and more diverse crowds (Authors 2018; Baumgartner and Jones 1991). Given that conflict drives up forum participation costs (Lubell et al. 2017) and that actors seek to minimize these costs, we expect that actors attempting to solve conflict-prone problems will do so as quickly and cheaply as possible. This may lead participants to disregard between forum interactions, resulting in more negative externalities. To adjust for this, we control for the extent to which each forum dealt with a series of issues. Respondents were asked to select, from the following list, which issues were dealt with in forum activities: water supply and distribution; water quality; biodiversity/species protection; land use; flood control; climate change; other issues. We then create seven variables, each of which indicates the proportion of actors that selected each of the listed issues as being addressed in each forum. The values range from 0-1: 0 indicates no actor said it was addressed; 1 indicates all actors said it was addressed; 0.5 indicates half of the actors said it was addressed. The resulting variables are: *Forum Issue-Supply*; *Forum Issue-Quality*; *Forum Issue-Biodiversity*; *Forum Issue-Land Use*; *Forum Issue-Flood Control*; *Forum Issue-Climate Change*; *Forum Issue-Other*.

Issue Overlap between Forums allows us to control for the propensity that decisions made in one's non-primary forum will impact what occurs in that actor's primary forum (holding organizational diversity constant). Here, some forums will be less likely (or even unable) to generate externalities for another forum, whereas other forums will be more likely to generate externalities. We argue that forums that deal with more similar issues will have a greater probability of generating externalities for one another, relative to those that deal with dissimilar issues. To calculate this measure, we first take the absolute value of the difference between each of the *Forum Issues* measures (discussed above), and then take the mean value of those differences, which indicates the extent to which those forums overlap.

Actors whose organizational interests were reflected in non-primary forum outputs may have more favorable views of the forum as a whole, leading them to have higher *Institutional Externality* scores. We adjust for this tendency through the variable *Organizational Gains*. Respondents were asked the following question for each non-primary forum in which they participated: "In each forum, how effective {has your | has your organization's} participation been in shaping water management decisions in the CA Delta region to reflect {your | your organization's} needs?" Values range from 0-10: 0= "very ineffective" and 10= "very effective."

Similarly, it is possible that actors whose organizational interests were reflected in primary forum outputs might ex-post misattribute their success in that forum, when prompted, to decisions made in non-primary forums. To adjust for this, we include the variable *Primary-Forum Organizational Gains*, which uses the same question and measurement scale as *Organizational Gains*, but in reference to one's primary forum.

Finally, it may be possible that participating in externality generating forums facilitates the accumulation of political capital that can be used to increase one's leverage in externality

receiving forums, increasing their influence within them (Mewhirter, Coleman and Berardo 2017). Moreover, actors in externality generating forums *might* have the capacity to shape externalities in a manner that disproportionately favors them in the externality receiving forum (Mewhirter, Lubell and Berardo 2018). In this case, an actor’s rating of *Institutional Externality* may be both a function of the effect on policy outputs (what we want to capture) as well as the political benefits they received through their participation in the externality generating forum (which we do not want to capture). To control for this, we use the variable *Strategic Effect*. The variable comes from the following question: To what extent would you say that participating in each of the following forums improved your organization's capacity to participate in [primary forum name]. Values range from 0-10, where 0= “Didn’t improve capacity at all” and 10= “Helped improve capacity a great deal”.

Analysis and Results

Our hypotheses concern the impact of forum diversity on a forum’s generation of institutional externalities. The unit of analysis is the actor non-primary forum dyad. As such, individual actors have multiple observations in the dataset (contingent on how many non-primary forums they participate in). Given that multiple actors participate in each non-primary forum, multiple observations occur at the non-primary forum level as well (contingent on how many actors participate in each). To correct for autocorrelation that arises at the actor and forum levels, we utilize a cross-nested multi-level regression with random intercepts at the actor and non-primary forum levels. See Rabe-Hesketh and Skrondal (2012, pp. 433–70) for a discussion of cross-nested models.

[INSERT TABLE 1 AROUND HERE]

The results, presented in Table 1, provide strong support for our hypotheses. Here, both diversity variables are positive and statistically significant, demonstrating that increases in diversity tend to produce more positive externalities, relative to more homogeneous forums. For every additional organizational type represented in a given forum, we expect to see a 0.27 point increase in *Institutional Externality*, holding all other variables at their means. Similarly, as we increase the average number of issues that actors in a given forum are concerned with by 1, we expect to see a 0.94 point increase in *Institutional Externality*. As noted earlier, we considered several different measures of *Organizational Diversity*. As shown in Table A2 in the Appendix, our results are consistent across different specifications of this variable.

With regard to control variables, we observe that, relative to federal government respondents, those from state governments tend to view externalities more positively, whereas trade groups and environmental special districts tend to view externalities more negatively. Forum size has a negative impact on institutional externalities, pointing towards a potential trade-off between forum diversity and size (see Fischer and Schläpfer 2017). Finally, the positive and statistically significant coefficient estimates for *Organizational Gains* and *Strategic Effect* demonstrate that actors that were successful in non-primary forums have more favorable views regarding the direction of the externality as do actors who believed that participating in the non-primary forum increased their influence in their primary forum.

Discussion

Our findings that forum diversity positively impacts institutional externalities provide insight into several different strands of literature. The literature on (policy) forums and related organizations (boundary organizations, collaborative institutions, stakeholder partnerships, etc., see, e.g., Crona and Parker 2011; Lubell 2003; Leach et al. 2002) mainly focuses on the

relationships between a plethora of forum characteristics and forum-specific outputs (Fischer and Leifeld 2015; Fischer and Schläpfer 2017). Building on that literature, our contribution underlines the practical importance of diversity as a forum characteristic. Concurrently, it also emphasizes the complexity of this characteristic, given that i) diversity among forum participants impacts both transaction costs as well as different *types* of potential benefits, and ii) diversity can be expressed in myriad ways, such as organizational or issue diversity, or many others.

By focusing on forum externalities as a specific (and essential) type of output, we provide support for the tenants of the Ecology of Games Framework, notably that understanding within-forum dynamics requires a more nuanced awareness of that forum's place within the larger system (Lubell 2013; Mewhirter and Berardo 2019; Mewhirter, Lubell, and Berardo 2018; Fischer and Maag 2019; Berardo, Olivier, and Lavers 2015; Lubell, Robins, and Wang 2014; Bodin and Nohrstedt 2016; Smaldino and Lubell 2011). The interactive processes that take place within forums, and ultimately, the outputs produced, can ripple throughout a system, impacting decision making in linked forums (Mewhirter and Berardo 2019; Mewhirter, Lubell, and Berardo 2018; Bodin and Nohrstedt 2016; Zhao and Mu 2019). Given that i) institutional externalities impact the extent to which other forum policies achieve their intended goals, and ii) collectively, the choices made in forums can dramatically impact the health of a resource, we believe it is exceedingly important to identify factors associated with positive institutional externalities. First, forums that generate negative institutional externalities run the risk of actors withdrawing (Smaldino and Lubell 2011), which may ultimately cause the collapse of that policy forum. While an actor's decision to participate in a given forum may predominately depend on the capacity of the forum to address their prescribed policy problems, the forum's ability to generate positive institutional externalities might be equally important to some actors. Second, forums that

produce negative externalities undermine the functioning of other forums (Mewhirter, Lubell, and Berardo 2018; Mewhirter and Berardo 2019; Lubell 2013; Berardo and Lubell 2019) and may detract from constructive governance of resources while diminishing the vitality of an ecosystem. Lastly, if central forums (i.e., forums that deal with “big picture” problems and are interdependent with many others in the system) generate negative institutional externalities, the repercussions are especially problematic and magnified. Amelioration of such issues requires uncovering factors affecting forums’ capacity to produce positive institutional externalities. In this article, we provide evidence that forum diversity, in terms of the type of actors present and those actors’ issue specialization, promotes positive institutional externalities. Understanding the impact of additional forum features (e.g., membership guidelines, forum rules, etc.: see Fischer and Leifeld 2015) on institutional externalities can improve our understanding of the functioning of forums, the dynamics within an Ecology of Games, and, ultimately, factors that influence successful ecosystem governance.

In addition to literatures on forums and the Ecology of Games, findings in this article contribute to literatures on collaborative governance (Ansell and Gash 2008; Emerson and Nabatchi 2015) and learning (Reed et al. 2010; Heikkila and Gerlak 2013; Sidikki et al. 2017; Koontz and Moore Johnson 2004). Our results build on prior collaborative governance scholarship that extols the significance of diversity in forums and similar organizations (Leach et al. 2014; Innes and Booher 1999; Margerum 2011; Wondolleck and Yaffee 2000). We expand this literature by demonstrating that forum diversity also impacts decision-making and policy outputs in *other* forums across a system. Established models of collaborative governance (Ansell and Gash 2008; Emerson and Nabatchi 2015) tend to neglect the effects of forums’ internal processes on other forums in a governance system. However, these collaborative frameworks can

inform on additional variables³ that may supplement or interact with diversity's influence on institutional externalities.

Finally, arguments from this article could cross-fertilize with literature on learning (Reed et al. 2010; Heikkila and Gerlak 2013). The (positive) relation between diversity and learning has been widely addressed in the literature (Innes and Booher 1999; Siddiki et al. 2017; Koontz and Moore Johnson 2004). Although we do not explicitly measure learning processes, it is likely an intermediate variable between diversity and positive institutional externalities. In fact, we argue that actors' capacity to learn about other forums and issues stimulates outputs that generate positive externalities. When studying the role of learning as an intermediate variable between diversity and institutional externalities, different forms of learning (e.g., individual learning, collective learning, policy learning, organizational learning, etc., see Gerlak et al. 2017) might be relevant. By contrast, this article (and the Ecology of Games framework more generally) emphasizes the importance of actors learning about issues and forums beyond those they participate in. Similar to existing differentiations between forms of learning, learning about within-forum issues and learning about potential externalities might be two different processes worth further examination.

Limitations & Future Research

While we believe that our results provide compelling evidence regarding some of the benefits of forum diversity in resource governance settings, several limitations remain. First, while our theory details that diverse forums lead to positive forum externalities, we cannot be sure about the exact mechanisms behind the observed effects. More specifically, we cannot say

³ For example, trust, ground rules, transparency, power asymmetries, (Ansell and Gash 2008) principled engagement and/or shared motivation (Emerson, Nabatchi and Balogh 2012) may play a role.

whether actors with a diverse knowledge base (due to their diversity) explicitly care more about what happens in other forums and consciously prefer to produce positive externalities, or whether they subconsciously produce positive externalities only because of their diversity. Second, it remains unclear what types of linkages across forums can produce positive institutional externalities. Are actors able to produce benefits for all affected forums in the system or only the ones in which they also participate? Our current analyses (which rely on actor perceptions of externalities between forums in which they participate) provide evidence that externalities matter when participants are members of linked forums. We cannot speak to whether actors are concerned with and/or actively shape institutional externalities when forums do not share common participants.

Third, our research design only allows us to evaluate the impact that forum diversity has on institutional externalities within the most central forums in the region that have been shown to produce externalities for other forums across the system (Mewhirter, Lubell and Berardo 2018). Future scholarship should seek to understand whether and to what extent increases in forum diversity impact externalities in less central and peripheral forums.

Fourth, our measure of institutional externality direction relies on perceptions of individual actors. This reliance is somewhat problematic given the potential for “halo effects” (see Koontz and Thomas 2006), whereby participants artificially inflate their evaluations of forum outputs and outcomes (in this case, positive views towards institutional externalities) when they encounter forum-features they view as desirable. In this case, participating in diverse forums may be seen as favorable (given the potential to learn new information, build new contacts, etc.), leading actors to look more favorably on the direction of externalities. Future research should disentangle how forum diversity impacts the objective state of policy problems

and viability of enacted solutions in linked forums, as well as analyze the extent to which actor perceptions correlate with objective measures.

Fifth, while almost all resource governance systems feature fragmented decision-making authority and the presence of forums (Berardo and Lubell 2019; Heikkila, Villamayor-Tomas, Garrick 2018), the particularly high density of forums in the CA Delta leads to concerns about generalizability. Future scholarship should seek to compare resource governance systems, disentangling whether and to what extent forum density moderates the impact of forum diversity on the direction and/or magnitude of institutional externalities.

Finally, while we conceive of diversity in two different ways, various other measures could be utilized. For instance, alternative measures could consider how actors vary in terms of organizational size, missions, and/or expertise. Breaking down which types of diversity truly matter – and how – is an important next step. Uncovering the relationship between forum characteristics and institutional externalities thus remains important for complex governance scholars (and beyond) if we want to properly understand the functioning of complex natural resource governance systems, and social-ecological systems.

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