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Focusing Events and Changes in Ecologies of Policy Games: Evidence from the Paraná River Delta

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Abstract

Solving environmental problems on a regional scale demands joint efforts by multiple stakeholders, but coordinating such efforts can be difficult in complex governance systems. In this paper we combine the literature in Adaptive Governance with the Ecology of Policy Games (EPGs) framework to enhance our understanding of how complex governance systems react to environmental focusing events. We study the EPGs in the Paraná River delta in Argentina following widespread fires caused by slash-and-burn practices in 2008, and analyze how new forums created to address the consequences of this event differ from the forums created prior to the event in terms of their capacity to attract stakeholders and to provide higher interconnectivity to the whole governance system.

Furthermore, we offer an initial evaluation of the Comprehensive Strategic Plan for the Conservation and Sustainability of the Paraná River delta (PIECAS), the main forum in the EPGs created to address the negative consequences of the focusing event. Finally, we discuss the implications of our findings for the study of complex governance systems where stakeholders are able address the management of natural resources at a regional scale.

Introduction

Solving environmental problems in social-ecological systems (SESs) requires joint efforts by multiple stakeholders, but coordinating such efforts can be difficult for a variety of reasons. Stakeholders are likely to have different views on how common-pool resources in a SES must be accessed and used, how the quality and quantity of available resources must be monitored, and which regulations should be in place to punish harmful behavior (Ostrom 2009).

But coordination can be difficult even in the absence of widespread disagreement over the previous topics. For example, stakeholders may have relatively homogeneous views about how resources should be managed, but lack the knowledge or information needed to discern how others behave or feel. This, in turn, hinders their ability to find coordinated responses to common problems (Berardo and Scholz 2010, Janssen 2013). This problem is particularly acute in large SESs, where resources are often distributed across extensive geographic areas that fall within multiple political jurisdictions. In such cases, the complex nature of the governance subsystem becomes explicit, and reaching decisions that affect the management of resources reveals itself as a demanding task that requires the investment of considerable organizational resources (Ostrom 2005, 2009).

This complexity results from the participation of myriad actors in decision-making processes (both governmental and non-governmental) and from the existence of multiple policy forums. We define these policy forums as venues where actors participate to further their policy agendas, defend their positions, or simply gather information about what other actors are likely to do in regards to a topic of interest (Lubell 2013, Baumgartner and Jones 1993). Additionally, complex governance systems are not static, but dynamic and subject to exogenous forces operating on them. It is thought that focusing events, for example, can have an important impact on the capacity of certain forums to create the conditions that lead to the solution of environmental problems (Albright 2011; Kapucu and Van Wart 2006).

In this paper we examine how focusing events can reshape the complex governance systems of large SES. Specifically, we study how out-of-control slash-and-burn practices that spread through the Paraná River delta in Argentina back in 2008 led to the emergence of forums that aimed to tackle the consequences of that particular event. We see these forums, and the patterns of interactions that take place among stakeholders when they participate in them, as the realization of an “ecology of policy games” (henceforth, EPG), an able metaphor to illustrate the architecture of complex governance systems (Lubell 2013). Lubell rescued this metaphor from earlier work in urban politics (Long 1958) to describe governance systems where policy decisions are not adopted centrally, but are rather shaped through the aggregated interactions of multiple stakeholders taking place in myriad interdependent decision-making forums.

Much attention has been recently devoted to the EPG approach and researchers have been able to explore how relationships form between stakeholders that participate in the EPG (Lubell et al. 2010), and how these relationships evolve in time (Berardo and Scholz 2010). While valuable, this research has focused mostly on the endogenous forces that shapes the EPG. Much less is known about how unforeseeable and dramatic events that operate exogenously may affect the structure of an EPG. By studying the emergence of new policy forums in the Paraná River delta after the occurrence of the focusing event referenced above, and observing how stakeholders participate in them, we contribute to improving our understanding of how focusing events shape complex governance systems (i.e. EPG), a central preoccupation of scholars interested in the study of collective action in response to environmental problems (Nohrstedt, 2005, 2008; Nohrstedt and Weible 2010).

Additionally, we rely on the literature on adaptive governance to extend our analysis and evaluate the performance of the main forum created to address the consequences of the focusing event, the so-called “Comprehensive Strategic Plan for the Conservation and Sustainability of the Paraná River Delta”

(PIECAS, in Spanish). Scholz and Stiftel (2005:5) suggest that adaptive governance involves the evolution of new governance institutions –of which forums are an example (Lubell 2013)– capable of generating long-term, sustainable solutions to joint problems through the coordinated efforts of previously independent systems of users. Furthermore, these institutions face a series of challenges that need to be addressed to give stakeholders a chance to solve the problems resulting from the poor management of shared resources (Scholz and Stiftel 2005). Evaluating how the most important forum created to address the focusing event deals with challenges to adaptive governance allows us to paint a more accurate picture of the real capacity that the whole governance system has to overcome the environmental problems posed by the focusing event.

Complex Governance Systems and the Shock of Focusing Events.

The management of common-pool resources in complex governance systems is a topic that has attracted a great deal of attention in recent decades, particularly since the publication of Elinor Ostrom's *Governing the Commons* and the further development of the Institutional Analysis and Development (IAD) Framework. One of the cornerstones of Ostrom's theoretical work is the explicit acknowledgment of the complexity of decision-making processes in social-ecological systems, where decisions are adopted through multiple iterations among stakeholders participating in different forums and at different levels (Anderies and Janssen 2013).

Recently, Lubell and colleagues have utilized the ecology of games metaphor (Long 1958) to describe and model this complexity (Lubell et al. 2010, Smaldino and Lubell 2011). This approach to the study of complex governance systems assumes that decisions reached in an individual forum are not only driven by the interactions taking place inside the forum, but are also the result of stakeholders' participation in other forums where they may update their policy beliefs or behaviours.- While research efforts to date have focused on modeling these endogenous interdependencies, Lubell (2013) acknowledges that

changes to the EPG can be driven by exogenous factors as well such as focusing events and other unpredictable external shocks. The idea that a governance system can radically change when a sudden external shock takes place is almost axiomatic in political science. For instance, Multiple Streams theory (Kingdon 1995), Punctuated Equilibrium theory (Baumgartner and Jones 1991; Jones, Sulkin and Larsen 2003), and the Advocacy Coalition Framework (Sabatier and Weible 2007), all pay explicit attention to how focusing events modify the ways in which policy is designed and implemented. Yet, our understanding of how focusing events may affect the EPG in complex governance systems remains inadequate. In the next section we advance hypotheses to begin to elucidate the nature of this relationship.

Focusing events and their effects on the Ecology of Games.

Birkland (1998) borrows from Kingdon (1995) and defines a focusing event as a sudden and somewhat uncommon, harmful or potentially harmful event, concentrated in a particular geographical area, and revealed simultaneously or almost simultaneously to policy makers and the public.⁴ The study of focusing events has received great attention from scholars in Multiple Streams (MS) theory, who claim that these events can help open policy windows that policy entrepreneurs can use to their advantage, pushing for their own policy choices and thus modifying policy agendas (Johnson et al. 2005).

Scholars in the Advocacy Coalition Framework (ACF) have also examined the role of focusing events in reshaping the core policy beliefs of advocacy coalitions and triggering group mobilization, which in turn create the conditions to facilitate policy change. For example, Albright (2011) shows the effect that

⁴ Notice that given this definition, a focusing event is different than a crisis, even though these terms are sometimes used interchangeably. A crisis, according to Boin and Hart (2003), are extended periods of high threat and uncertainty that disrupt social and political processes and cannot be treated as discrete events neatly placed on a linear time scale.

recurring flood events have historically had on the regulations and institutions that manage flooding in Hungary. Her research shows in detail how the Hungarian government developed a flood protection plan after a series of extreme flooding events in the late 1990s and early 2000s, and how these focusing events mobilized both governmental and non-governmental actors to an extent not previously seen.

Most importantly, this research also suggests that increased mobilization following a focusing event is rarely constrained by or channeled through existing specialized forums or venues, simply because some of the pre-existing forums are ill-equipped to deal with the new problems that may become apparent when the focusing event takes place. Thus, when previously existing forums prove inadequate to deal with the consequences of an unforeseen focusing event, either because the problem at hand falls outside of their purview, or because they lack the capacity to channel responses to the events in question, one should expect to observe the emergence of new, more specialized forums that can address the consequences of the focusing event more decisively (Birkmann et al. 2010; Lubell 2013; Mitchell 2006).⁵ Given that a focusing event is harmful or potentially harmful, and that it affects a more or less well defined geographic area, the new forums that emerge in the EPG to tackle the consequences of the event should attract the attention of many stakeholders in the area because those new forums should be better-equipped to deal with the negative effects of the event. This leads us to our first hypothesis:

H1. Forums created to cope with the consequences of a focusing event should be more active (i.e. attract more participants) than forums that existed previous to the occurrence of the event.

⁵ It is important to keep in mind that we are not implying that the whole governance system gets refurbished after a focusing event. Even though some of the old forums may not be well-fitted to deal with the consequences of the focusing event, some others may in fact channel mobilization successfully. As an example of successful coordinated responses to a large-scale focusing event through pre-existing forums, see Derthick's (2007) analysis of search and rescue missions in the wake of Hurricane Katrina.

Focusing on the level of activity allows us to identify the best-attended forums within the EPG, but it does not help us understand the role that they may play in bringing actors together at a system-wide scale. For instance, it may be the case that new forums are popular among many stakeholders, but also that the latter are a rather small subset of the whole population of stakeholders who happen to exhibit an overlapping pattern of participation in the new forums. If that were the case, the EPG would be obviously fragmented, composed of separate clusters of stakeholders and forums that are not linked to each other. Such a fragmented landscape could not contribute to an increase in coordinated behavior needed to solve systemic problems, an expectation that lies at the core of both the EPG framework and the literature on natural resources management in the presence of critical focusing events (Boin 2009; Boin and Hart 2003; Kapucu 2006; Kapucu and Garayev 2013). Indeed, a fragmented landscape would hinder collective action and the resolution of systemic (environmental) problems because information needed to solve those problems would remain “locked” in separate clusters with no communication ties to each other (Berardo and Scholz 2010).

However, in large SES that experience important focusing events one should not expect excessive fragmentation in the patterns of participation as new forums emerge for a couple of reasons. In the first place, some active stakeholders should be resourceful enough to maintain a presence in both new *and* old forums. For instance, in complex governance systems governmental agencies usually maintain a presence in multiple forums and in some of them their participation may be legally mandated (Lubell et al. 2010). In addition, there might be some stakeholders that do not participate in old forums whatsoever, but may get involved in new forums after the focusing event takes place, which should decrease the fragmentation in the systems as isolate stakeholders get integrated into the EPG. This leads to our second hypothesis.

H2. Forums created to cope with the consequences of a focusing event increase the interconnectivity of the overall Ecology of Policy Games.

The expectations contained in the two hypotheses are illustrated in Figure 1, where white squares represent old forums, the dark square represents a newly formed forum created to deal with the focusing event, and white circles represent stakeholders that participate in the forums.

[Figure 1 here]

In this figure, solid lines represent participation in forums that takes place before the focusing event, while dotted lines represent participation in the new forums that was established to tackle the problems brought up by the focusing event. The dotted lines make the new forum very active, in the sense that it attracts the attention of four different nodes making it more “popular” than the old forums (hypothesis 1), but the establishment of the new forum also lowers the fragmentation of the network, since stakeholders converge on it that would otherwise not meet each other in the old forums (hypothesis 2).

It is important to keep in mind that the value of the forums created to respond to a focusing event cannot be assessed exclusively as a function of their popularity, or how much connectivity they bring to an EPGs. A newly created forum may be quite successful at bringing stakeholders together, but its actual impact on improving environmental conditions might be minimal or even non-existent if it does not give stakeholders a real opportunity to engage in meaningful discussions or to influence management decisions. Thus, in addition to testing our two hypotheses, we rely on the Adaptive Governance literature (Scholz and Stiftel 2005) to analyze whether the main forum created to address the focusing event we study has real potential to contribute to sustainable and adaptable solutions to the mismanagement of water and land resources in the Paraná River delta.

The following section describes in detail the focusing event we study in this paper. Later sections explain how we mapped the EPG after the focusing event took place and how we measure activity of forums and interconnectivity in the EPG, which we need to test our two hypotheses. We then present our results and evaluate one critical new forum by analyzing how it meets the challenges to adaptive governance (Scholz and Stiftel 2005). The forum in question aims to provide a management framework for the entire delta, and in that respect is the most important forum to have emerged in response to the focusing event (the fires) in 2008. We finish the paper with a discussion of the implications of our findings.

A Focusing Event in the Paraná River Delta

The Paraná River is one of the most important rivers in the Americas. It covers parts of Argentina, Brazil, and Paraguay, and its watershed is the third largest in the continent after the Amazon's and the Mississippi's. The river's headwaters are located in Brazil, from where they run south for over 2500 kilometers before joining the Uruguay River to form the Río de la Plata, which drains into the Atlantic Ocean in eastern Argentina.

The Paraná delta, where we focus our study, covers approximately 17,500 square kilometers (Malvárez 1999), and is shared by three Argentine provinces: Buenos Aires, Santa Fe, and Entre Ríos. It extends northwest to southeast for over 300 kilometers, and cuts across some of the country's most productive agricultural land.

The Argentine capital (and the country's largest city), Buenos Aires, is located on the southern shore of the delta's lower section. In recent decades, significant urban sprawl has taken hold in this part of the delta, very often without careful planning (Zagare 2012). While the lower section of the delta is seeing rapid urban development, the middle and upper sections are affected mostly by intensive agricultural production, particularly in the portion of the delta located in the province of Entre Rios. Construction of illegal embankments to allow farming in naturally flooded areas are common, as are slash-and-burn

practices (see Baigún et al. 2008), which clear native vegetation to make room for grazing cattle in the delta's islands. Other environmental problems in the delta include the overharvesting of certain fish species, and the negative effects associated with dredging practices required to keep the river navigable for commercial traffic (Taller Ecologista 2009). These environmental problems are not new, but they have been exacerbated in recent decades because human pressure continues to mount in the area, and the provinces have not been able to develop a coherent and consistent set of rules to regulate the access to (and use of) natural resources in the delta.⁶

These issues make the delta particularly vulnerable to environmental emergencies, something that became patently clear in the first half of 2008. In April that year, slash-and-burn fires set by cattle farmers in the Entre Ríos portion of the delta swept out of control as strong winds blew over the area following several months of dry weather. The end result was one of the greatest environmental catastrophes in the recent history of the delta, with hundreds of thousands of hectares burnt and considerable loss of biodiversity. The visibility of this environmental tragedy (and the public outcry it created) was heightened by lingering clouds of smoke over Buenos Aires and Rosario (a port city on the banks of the Paraná River). The problem attracted considerable attention from the main media outlets in the country, particularly as air quality deteriorated rapidly around Buenos Aires. This critical event and the attention it generated forced policy-makers to discuss openly the issue of natural resources management in the delta, opening a policy window that was utilized both by governmental and non-governmental actors to advance their individual agendas.

⁶ This can be attributed –among other things- to the fact that the National Constitution grants provinces the ownership of natural resources (Article 124). In practice, this article has operated as a powerful disincentive against joint management efforts of natural resources involving two or more provinces.

The National Secretariat of Environment, Argentina's top environmental bureaucratic agency, responded to the crisis by advocating an interprovincial agreement that would lead to the creation of a legal instrument improving the management of natural resources in the delta. The result of this effort was the signing, in September 2008, of a Letter of Intent by the federal and the provincial governments of Santa Fe, Buenos Aires, and Entre Ríos committing them to the elaboration of the "Comprehensive Strategic Plan for the Conservation and Sustainability of the Paraná River Delta" (PIECAS, in Spanish). According to the Letter of Intent, PIECAS' main goal would be to contribute to improving the environmental management of the territory by harmonizing legislation, ensuring public participation at all levels (local, provincial, and national), wedding sustainability goals with social justice, and finding effective and viable solutions to the problems caused by the unchecked slash-and-burn practices in the area.⁷

In the months that followed the signature of the letter, provincial and federal governmental actors started discussing the design of PIECAS in open, informal meetings where other actors (municipalities, NGOs, and research institutions) were also invited to participate.⁸ In 2010, the "High Level Interjurisdictional Committee for Sustainable Development in the Paraná Delta" (hereafter, the High Level Committee) was created. The committee is composed of one delegate from each of the three provinces and one delegate from the federal government, and was tasked with designing PIECAS' "Lineas de Base" (or general guidelines), which would serve as the plan's building blocks. In August 2013, the

⁷ Letter of Intent, Plan Integral Estratégico para la Conservación y Aprovechamiento sostenible del Delta del Paraná. Available (in Spanish) at:

<http://www.ambiente.gov.ar/archivos/web/DOAT/file/PIECAS-3.pdf> [last accessed: December, 2014]

⁸ Although PIECAS is in itself a comprehensive management plan, its design through a series of participatory meetings qualifies it as a forum, since in those meetings stakeholders were free to discuss what they considered to be the main problems in the management of natural resources in the delta, what main guidelines the plan should include, who should be involved in monitoring of natural resources in the delta, etc.

High Level Committee announced that a bill containing a set of minimum standards for the conservation and sustainable use of the delta would be sent to the Argentine Congress for discussion⁹.

In the following section we describe our data collection process, map the EPG using Social Network Analysis techniques, and analyze how PIECAS and other forums formed as a response to the fires in 2008 have affected the structure of the EPG in the Paraná River delta.

Data Collection and Mapping of the EPG

The process leading to the mapping of the EPG in the Paraná River delta began with the collection of data in the delta in 2010 and 2012 as part of a research project financed by the National Science Foundation¹⁰. In early 2010, Berardo developed a search protocol to identify stakeholders involved in the management of natural resources in the delta. The identification was done by searching through news stories available online from some of the main newspapers in the delta, incorporating a series of key terms such as “land use”, “water quality”, “water quantity”, “habitat protection”, that were coupled with the term “Paraná Delta”. This exercise produced the names of 261 individuals who were considered to be active in the topic of natural resource management in the delta. A survey company was then hired to conduct phone surveys with these individuals; 177 of them answered, for a response rate of 67.2 %. These respondents represented 135 organizations from a variety of backgrounds, including NGOs, government officials at the local, provincial and federal level, social movements, and research institutions. In 2012, the process was repeated and a second survey was released, this time targeting 322 individuals, of whom 183

⁹ The bill can be seen at:

<http://www.ambiente.gov.ar/archivos/web/DOAT/file/Anteproyecto%20PMPA%20PIECAS%20V%2013%2008%2013%20-%20final.pdf> [last accessed: December, 2014]

¹⁰ National Science Foundation project: SES-0921461. More information on project here:

<http://www.watergovernance.net/>

answered positively, for a response rate of 56.8%. Respondents represented 134 organizations, again from a wide array of organizational types.

To map the EPGs in the delta, a necessary first step to test our hypotheses, respondents were asked to identify the forums where they participated to discuss the management of natural resources. The following question was posed: *“The issues of water and land use in the delta can be discussed in different forums, such as regional planning councils, advisory boards, workshops, etc. Could you mention the names of the forums in the delta in which you/your organization have/has participated in the last year?”*

In 2010, of the 177 individuals who responded to the survey, 127 (72% of the total) mentioned that they participated in at least one forum – some respondents mentioned as many as nine. Altogether, respondents identified 107 different forums in the Paraná River delta in 2010. In 2012, of the 183 individuals who answered the survey, only 94 (51%) mentioned that they participated in at least one forum (the maximum number of forums identified by a respondent this year was 6). A total of 75 forums were identified in 2012, of which only 29 were in existence in 2010, indicating that the EPG in the Paraná River delta was quite unstable.¹¹

The following table shows the number of forums identified by respondents to the surveys. In both years, the mode is no participation in forums, with the percentage of respondents not participating in any forums increasing sizably from 2010 (28%) to 2012 (49%).

[table 1 about here]

With the information provided by respondents about participation in forums, we built one two-mode matrix for 2010 and one for 2012, in each case containing stakeholders (organizations/individuals) in the rows and forums in the columns. A cell x_{ij} in these columns has a value of 1 if the stakeholder i participated

¹¹ Appendix I includes a list of these 29 forums and their main characteristics.

in the forum j , and 0 otherwise. Figure 1 contains a graphical representation of the EPGs in 2010, with circles representing stakeholders and squares representing forums where the former participated.¹²

[Figure 2 about here]

The size of the nodes reflects their level of activity, which we measure with the “degree centrality” of the node (more details about this measure are provided in the following section). Forums that are more active (that is, have more participants), and stakeholders that participate in more forums, are depicted bigger in the image. Finally, darker squares are the forums that were created after the 2008 focusing event to address explicitly the environmental problems that slash-and-burn practices caused in the delta. One of them (PIECAS) is the governmental collaborative process we described in the previous section. The other six forums are one-day workshops put together by the NGO Wetlands International. According to its Director, this international NGO organized the workshops to jumpstart a “delta-wide conversation on the limits that management efforts (both governmental and non-governmental) had had up to that point, and to think about what needed to be done in the following years to preserve the delta for the future generations.” (Daniel Blanco, personal communication, July 28, 2010). These workshops were very well attended in general, and attracted participants from different backgrounds: from individuals working for federal and provincial governmental agencies, to agricultural producers, NGOs, and researchers from different universities. The labels in the figure have mostly been removed, but we kept the labels for the forums of interest.

Figure 2 graphs the same relationships of participation in forums for the respondents in 2012. One of the main differences between this network and the previous one is that the most active (i.e. most heavily attended) forums are in general different from those that were most active in 2010. This is mainly

¹² The image does not include isolates (the respondents who claimed to not have participated in any forums) to improve clarity.

because a majority of the important forums in 2010 were single-meeting workshops, with three of the most popular ones having been organized by the INGO Wetlands International, as explained above.

[Figure 3 about here]

Another major difference is that the EPG in 2012 is noticeably less dense than in 2010; that is, there is less participation in forums as time passes. This suggests that the EPG was highly responsive to the focusing event at an earlier stage, but that the intensity of participation decays as the actors slowly start to refocus their attention on other topics, and media coverage and political interest declines.

Measurement of Forum Activity and their Contribution to the Interconnectivity of the EPG

Our hypotheses stated that forums created to deal with the focusing event in the delta would be more active (H1) and contribute to increase the interconnectivity in the EPG (H2). We use forum degree centrality as an indicator of activity, and contribution to the network cohesion as an indicator of contribution to the interconnectivity in the EPG. Both measures are calculated using UCINET (Borgatti et al. 2002).

Degree centrality is the simplest way of capturing activity in a network (Wasserman and Faust 1994). In the case of the two-mode networks (EPG) formed by stakeholders and forums that we analyze here, degree centrality for forums is calculated based on the number of ties that the forums have to stakeholders.¹³ UCINET produces a normalized score for each forum¹⁴, which ranges from 0 to 1. A score of 0 means the forum is not connected to any of the stakeholders (clearly only a theoretical value, since

¹³ In social network analysis, a two-mode network is a network formed by two types of nodes (stakeholders and forums in our case).

¹⁴ And a normalized score for each stakeholder as well, though we are not interested in those scores in this paper.

all forums in the EPG were identified by at least one respondent). A value of 1 means that the forum is connected to every stakeholder in the EPG. In other words, every stakeholder participates in the forum (another purely ideal value since no forum is attended by all stakeholders). To test hypothesis 1, we calculate the mean degree centrality for forums explicitly created to address the consequences of the focusing event, and compare it to the mean degree centrality of the forums that were in functioning before the focusing event took place. We perform this comparison for both 2010 and 2012, and expect to see a positive difference, as suggested in the hypothesis.

To capture the contribution of forums to the interconnectivity of the EPG (hypothesis 2) we use UCINET's "cohesion" routine for two-mode networks. The routine calculates both the *average distance* in the network and its *fragmentation*. The *average distance* is the average shortest path between stakeholders and forum. The theoretical lowest value for this score is 1, which would indicate that every stakeholder participates in all forums. The *fragmentation* coefficient, on the other hand, measures the proportion of nodes in the network that cannot reach each other. A fragmented network is one where there is more than one component.¹⁵ The theoretical range of this measure goes from 0 (all nodes in the network are in the same component and can reach each other) to 1 (perfect fragmentation—all nodes are disconnected from each other). In our case, the fragmentation coefficient would indicate how scattered is the participation of stakeholders in forums. To test our second hypothesis, we compare the values of the average distance and the fragmentation in the EPG (again, both in 2010 and 2012), with and without the forums explicitly created to address the consequences of the focusing event. Support for the

¹⁵ A graph (i.e. network) is disconnected if there is not a path between every pair of nodes in the graph. In a disconnected graph, nodes can be partitioned into two or more subsets that are in turn isolated from each other. This is, a node in a subset cannot reach a node in a different subset. In such cases, we refer to these subsets as "components" (for more details, see Wasserman and Faust 1994, 109).

hypothesis would exist if the average distance and fragmentation values grow when the new forums are removed from the network.

Results

Table 2 contains mean scores for degree centrality for the forums in the EPG of the Paraná River delta. The first row contains the mean score for all forums in the EPG. The second and third rows disaggregate those results, separating the mean centrality of new forums that were created *after the focusing event* to address its consequences and the mean centrality of all other forums in the EPG that were not created as an explicit response to the focusing event.

[Table 2 about here]

The results provide strong support for our first hypothesis. The mean score of degree centrality for forums that were not explicitly created to address the problems associated with the out-of-control slash-and-burn practices is a meager 0.014 in 2010. This means that in that year, on average, each forum included only about 1.4% of the active stakeholders in the whole EPG of the Paraná River delta. On the other hand, the forums that were explicitly created after the focusing event are clearly more central, with a mean centrality score of .090. On average, almost 10% of all stakeholders in the system participated in them. (See Table A2 in the Appendix for a difference of means test that shows this difference to be statistically significant at the .01 level.)

It is important to keep in mind that six of the seven new forums explicitly created to cope with the focusing event are the result of a non-governmental effort (the six workshops organized by the INGO Wetlands International) and were not meant to extend their operation in time. Thus, in 2012, the only forum created to address the consequences of the focusing event that was present in 2010 and remains active is PIECAS. As shown in the table, the mean degree centrality score for other forums in 2012 is

0.013. This means that, on average each forum attracts the participation of slightly over 1% of the stakeholders in the delta. For PIECAS, however, the score is 0.190, meaning that almost 20% of the stakeholders claimed to have participated in the forum in 2012.

Our second hypothesis stated that forums created to cope with the negative consequences of a focusing event increase the overall interconnectivity of the EPG. Table 3 contains the information to test this hypothesis. The first row includes the scores for average distance and fragmentation when the whole EPG is considered. The second row includes the same measures calculated without the forums designed to cope with the focusing event. In other words, the second row in the table tells us what happens with the average distance and the fragmentation in the system in the absence of these new forums.

[Table 3 about here]

The results provide support for our second hypothesis. The average distance in the whole EPGs is 4.40 in 2010, and 4.14 in 2012. Removing the forums that were explicitly created to deal with the focusing event of 2008 increases these values to 5.55 and 4.79, respectively (a 26% increase in 2010 and a 16% increase in 2012). This suggests that new forums occupy a connecting role in the network, and that stakeholders who participated in them could expect to learn more quickly about what other stakeholders in the area want, what kind of information they seek, and the types of problems that they feel need urgent attention, amongst others. Notice that the difference is larger in 2010 than in 2012, but this is because in 2010 the popular workshops organized by Wetlands International took place, while in 2012 they were not active. This introduces a heavier burden on the remaining forum, PIECAS, that alone accounts for the whole 16% reduction of the average distance in the system in 2012.

The fragmentation of the network also grows as expected when we remove the new forums from the matrices. In 2010, fragmentation grows from 0.56 to 0.75 (34% increase) when the new forums are removed, while in 2012 the fragmentation grows from 0.79 to 0.87 (10% increase) when the remaining

new forum (PIECAS) is removed. One must be careful not to interpret these percentage increases as evidence that fragmentation is becoming less of a problem as time progresses. The only reason why the percentage increase in fragmentation is lower in 2012 than in 2010 is that the system is already highly fragmented in 2012. A way of demonstrating this is that the fragmentation value *including PIECAS* in 2012 is higher than the value *excluding all new forums designed to cope with the focusing event* in 2010.

Summing up, these results provide an interesting extension to our second hypothesis. While it is true that new forums integrate the system to a greater extent by reducing the average distance among nodes and reducing the fragmentation *in any given year*, the whole EPG is becoming more fragmented *as it distances itself in time from the focusing event that took place in 2008*.

PIECAS and the Challenges to Adaptive Governance.

Our analysis has shown that new forums created to address the problems made explicit by the focusing event in 2008 are more active than other forums. In addition, they integrate the EPG by reducing the average distance among participants and the fragmentation of the whole system. While this is in general positive, we also have shown that the system is highly unstable, particularly due to the high turnover of forums that we observed between 2010 and 2012. This finding underscores the prominence of PIECAS in this evolving EPG and provides us with a point of departure for exploring our second research question. Unlike the majority of other forums, PIECAS is stable – it was present in both 2010 and 2012 - and has increased its relative importance for the whole EPGs, since it tends to capture the attention of a larger share of stakeholders over time. This comprehensive planning effort has received considerable support from the federal and provincial governments in its earlier stages. It is seen by many in the delta as a critical component to devise a successful strategy for improving the management of natural resources in the area.

But can PIECAS live up to these expectations? It is hard to evaluate a forum tasked with developing public policies that have not yet been fully implemented, but one can at least speculate on the chance that the plan will be successful based on how it has performed in the design stage. One way of doing this is to evaluate the plan according to how well it faces the challenges to adaptive governance identified by Scholz and Stiffler (2005). For these authors, adaptive governance is represented by the emergence of new governance institutions that generate long-term solutions to complex problems through their ability to coordinate the efforts of multiple stakeholders who have dissimilar policy interests, technical expertise, and even authoritative capacity (in the case of governmental stakeholders). In this sense, PIECAS can be seen as a key centerpiece for adaptive governance in the complex EPG of the Paraná River delta because it was explicitly created to function as a new institution that could facilitate coordination of previously disconnected actors (the provincial governments, agricultural producers, science-producing institutions, etc.). The extent to which PIECAS satisfies the challenges to adaptive governance is therefore good measure of its value as a catalyst for adaptive governance in the delta.

Scholz and Stiffler (2005) recognize different challenges that emergent institutions must address if they are to coordinate stakeholder behavior successfully. We are particularly interested in three of those challenges, because they are most likely to appear in the early stages of institutional emergence: representation, process design, and problem responsiveness.

The challenge of representation refers to determining who should be involved in the new institutions and how much should they participate. Securing representation of diverse interests in new forums has obvious benefits, not the least of which is that stakeholders involved in a forum are less likely to undermine the collaborative efforts that may take place within it (Berardo and Gerlak 2012). But mere inclusion is not sufficient to achieve coordinated behavior in the absence of real involvement in the discussions that take place in the new institution. , Thus, the challenge of representation requires both

including myriad stakeholders with a wide range of policy interests and a real engagement of those stakeholders in the deliberation process inside the forum. When we collected our data in 2010 and 2012, respondents were asked not only to identify the forums where they participated, but also to provide their evaluation about each of those forums. This was done using several questions, three of which are particularly useful to assess how well PIECAS faces the three challenges to AG. The question we use as an indicator of how well a forum faces the challenge of representation asked: *How effective [have you / has your organization] been at influencing the discussions taking place in the forum? We'll use a 0 to 10 scale where 0 means "not at all successful" and 10 "very successful"*. Forums that score higher in this variable are likely to be better equipped to address the challenge of representation, because influence in discussions indicates that actors are capable of having real input into the forum's deliberative process.

The second challenge for emergent institutions is the challenge of process design, which requires developing deliberation mechanisms that stakeholders find satisfactory. It is only when actors feel that deliberation is procedurally fair to all involved (everybody has a chance to voice their opinions) that the likelihood of conflict is substantially reduced and coordination enhanced (Berardo 2013, Lubell 2013).

We use responses to the following question from our survey as an indicator of how well a forum faces the challenge of process design: *In general would you say the discussions that take place in the forum are fair in the sense that all voices are equally represented? We'll use a 0 to 10 scale where 0 means "very unfair" and 10 "very fair"*. Like before, forums that score higher values in this variable are assumed to face the challenge of Process Design more effectively.

Finally, the challenge of problem responsiveness lies in producing institutional outputs that successfully solve an underlying source of conflict (Scholz and Stiffler 2005, 9), which in our case is the conflicting patterns of land use in the delta that produced the focusing event in the first place. We use the following question as an indicator for problem responsiveness: *"I'll ask you to tell me whether the actions taken in*

the forum contributed significantly to the solution of water management problems and land use in the delta. Please place your answer in a 0 to 10 scale where 0 means that the forum's activities did not contribute significantly to solving problems and 10 that they contributed significantly to the solution of problems.”

To assess how PIECAS is dealing with these three challenges, and to provide a benchmark for comparison, we perform two-sample Student's t-tests (assuming equal variances) to compare the means of responses of participants in PIECAS for the three questions with the means of responses of participants in other forums. Results are presented in Table 4.

[Table 4 about here]

Before discussing which differences in means are statistically significant, it is worth noting that PIECAS performed reasonably well in 2010, according to the participants' opinions. The mean scores for the three variables of interest are reasonably high. Furthermore, these scores are slightly higher than the mean scores of other forums in the delta's EPG (even though the differences are statistically indistinguishable from 0 at the .05 level).

However, the opinions about PIECAS' performance in these three variables consistently deteriorate from 2010 to 2012. This indicates that respondents believe that PIECAS is not getting better at addressing the challenges of representation, process design, and problem responsiveness – indeed, the opposite is happening. It is worth noticing that participants in other forums evaluate those forums more positively than PIECAS' participants in 2012, scoring higher values in the three variables.

In regards to the challenge of representation in particular, we should point out that, in addition to the deteriorating opinions of participants in PIECAS, the inclusion of stakeholders has been limited from the beginning. For example, agricultural producers have remained conspicuously absent during the early

stages of designing the plan. In addition, as time has passed, the responsibility for the design of PIECAS has fallen more heavily on the High Level Committee, which is composed solely of governmental actors. As this happens, the involvement of other stakeholders (NGOs, municipalities, researchers) seems to have diminished.

We believe that the failure to include agricultural producers in PIECAS's High Level Committee or to engage producers in a meaningful way is somewhat puzzling. Producers are an economically and politically powerful group in the delta, and their buy-in into the process would seem to be a critical variable in securing the success of any comprehensive planning effort in the area.

Informal conversations with stakeholders in the delta lead us to believe that the absence of this influential set of actors could be plausibly attributed to two different factors. On one hand, it is possible that bureaucrats and decision-makers from the federal and provincial governments see PIECAS as an opportunity to reassert their formal authority over the management of natural resources in the delta, which has never been strongly exercised. If this is their goal, then assuming a clear command-and-control stance in the design of PIECAS should be expected. The more important role recently played by the High Level Committee in the design of the plan hints that this may be the case. On the other hand, it is also possible that agricultural interests were never strongly represented in the forum because they simply chose to remove themselves from the process. Birkland (1998) notices that powerful groups must carefully plan how they respond to focusing events, particularly if that event threatens to reduce their power. It is not unreasonable to expect agricultural producers and cattle farmers to withdraw support for PIECAS, particularly if the directive contained in the plan are likely to curtail the leniency with which they access and utilize land in the delta.

In summary, PIECAS faces two problems with regard to the challenge of representation. First, it has not incorporated all relevant stakeholders in the process of designing the plan. Second, those that have been

participating feel that their opinions are less relevant (as shown in Table 4), since it seems that it is becoming more difficult for active stakeholders to influence the internal deliberative process through which decisions can be reached.

Regarding the challenge of process design, the opinions of participants about procedural fairness inside PIECAS also seem to be deteriorating. When compared with participants in other forums, the negative difference reaches almost one full point in the scale of the variable, and becomes statistically significant at the .05 level. This suggests that other forums seem to be doing better than PIECAS at instrumenting decision-making in a procedurally fair manner, allowing all voices to be equally heard. It is revealing that this difference takes place only in 2012, as the process of designing PIECAS moves forward. We believe this finding should be taken as an early warning sign about the potential obstacles that PIECAS might encounter on the road to become a successful policy effort to manage the delta comprehensively. After all, procedural fairness has been identified as one of the most important drivers to facilitate collective action and find coordinated solutions to the management of natural resources (Lubell 2003, Leach and Sabatier 2005, Berardo 2013).

Finally, regarding the challenge of problem responsiveness, differences in opinions among PIECAS' participants and stakeholders in other forums are not statistically significant. But looking at the opinions of the former alone reveals the same troubling pattern: opinions about the capacity of PIECAS to contribute to the solution of environmental problems in the delta seem to be deteriorating. We think this particular result goes in line with previous research that shows that stakeholders have trouble learning how to face the negative consequences of focusing events, even when they understand the real opportunity for policy change that they bring (Birkland 2006, Boin and Schulman 2008, Boin 2009). In their study of floods in England and Wales, for example, Johnson et al. (2005) showed that the policy changes that resulted from important flooding events were not real reflections of new ideas, nor did they

represent fundamental changes in policy direction. This type of finding has been reproduced elsewhere (Kapucu and Garayev 2012) and forces researchers and practitioners alike to be realistic in regards to the potential for innovative policy change brought about by large-scale focusing events.

Overall, the results we have presented show an EPG in the Paraná River delta that has been responsive to the focusing event we examined, but that also seems to be losing some of its structural strength over time, as forums disappear and the density in the network of forums and stakeholders that participate in them decreases. While PIECAS remains active and “holds the system together” (by reducing the fragmentation of the EPGs), the challenges it faces are considerable, and force us to adopt a less than optimistic view of its chances of achieving coordinated responses to the mismanagement of natural resources in the Paraná River delta.

Conclusion

The governance arrangements of large social-ecological systems are complex in nature, with multiple forums where decisions are made and where policy views are advanced and contested by myriad actors with unique preferences and priorities. Using the metaphor of the Ecology of Games (Long 1958, Lubell et al. 2010, Lubell 2013) this paper analyzed how the shocks caused by focusing events reshape the complex governance of social-ecological systems by aiding the emergence of new forums where stakeholders can gather to discuss how to tackle the environmental consequences of such events.

Our work provides interesting insights. We showed that new forums are important to increasing stakeholder participation in the EPG, even if this effect tapers off as most of those forums are short-lived. We also showed that the most important new forum, PIECAS, which is government-driven and was created specifically to tackle the consequences of the focusing event, maintains a central position in the EPG and contributes to increasing the interconnectivity in the whole system over time. This goes in line with the traditional expectation that critical events demand a heightened coordinated response, which

can be facilitated when a central authority or institution centralizes decision-making (Berardo and Scholz 2010; Moynihan 2008, 2009; Waugh and Streib 2006).

However, external shocks are not only important because their impact on the structural characteristics of a EPGs, but also because they force adaptive responses on the part of the new institutions that emerge (Scholz and Stifftel 2005; Folke et al. 2005). In our case, a careful analysis of the inner functioning of PIECAS suggests we should be cautious about the capacity of the forum to create policy responses that can address the negative consequences of natural resources mismanagement in the delta. While central in the EPGs, PIECAS has not been able to include some stakeholders whose participation may be of importance in creating management tools that improve the ecological health of the delta. Furthermore, participants see PIECAS' decision-making process as less fair over time, and believe that the ability of PIECAS to contribute to the solution of management problems in the delta is deteriorating. PIECAS' failure to address these adaptive governance challenges indicates that achieving a coordinated response in crisis-management operations is a daunting task for public bureaucracies. This is especially true in contexts governed by short-lived institutional arrangements that are poorly prepared to deal with problems that require flexibility and rapid decision-making (Boin 2009).

Johnson et al. (2005, 572) claim that an important contextual variable to explain change in the presence of critical environmental events is the "governance structures in place". In this work, we have unpacked and analyzed these structures in the Paraná River delta, arguing that both the cohesion in the system and the performance of central forums matter in assessing the capacity of the system to provide effective responses to large scale environmental problems. More stakeholder involvement across the EPG is always a good thing. It is through participation in different forums that the likelihood of obtaining innovative responses to relevant problems (for individual stakeholders anyway) grows. But in addition to

mobile policy actors, more stable and inclusive forums are needed, to facilitate the gathering of actors that may not necessarily share policy beliefs or positions.

Future research needs to dissect these arguments in more detail, and to provide a detailed road map of how complex governance systems can contribute to improving the sustainability of common-pool resources. One possible way of doing this would be to carefully analyze how the specific relational structures in the EPG that form when stakeholders participate in forums affect certain key environmental outcomes of interest. In addition, collecting information both before and after a focusing event takes place would help understanding exactly how the EPGs changes, and whether old forums disappear to give room to the new ones that emerge, something we are unable to assess with our data. Of course, collecting data before-and-after focusing events is inherently challenging given the unpredictable nature of the events, but researchers can deal with this limitation by focusing their efforts in high-risk areas where focusing events are more likely to happen (such as river basins that experiment recurring floods, hurricane-prone areas, etc.). Finally, combining structural analyses of the EPG with the examination of forums' individual performances would give scholars a chance to get a better grasp of the contextual institutional conditions that can facilitate environmental and social resilience in the wake of sudden focusing events, an outcome that will appeal to both researchers and policy practitioners alike.

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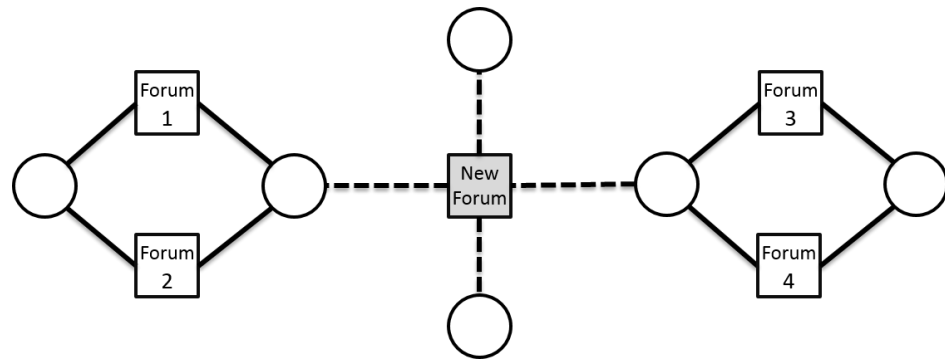


Figure 1. Effect of a new forum in an EPG

Table 1. Forums identified by each respondent.

Number of forums mentioned	Frequency	
	2010	2012
0	50	89
1	42	51
2	39	23
3	23	15
4	16	3
5	4	2
6	-	-
8	1	-
9	2	-
TOTAL	177	183

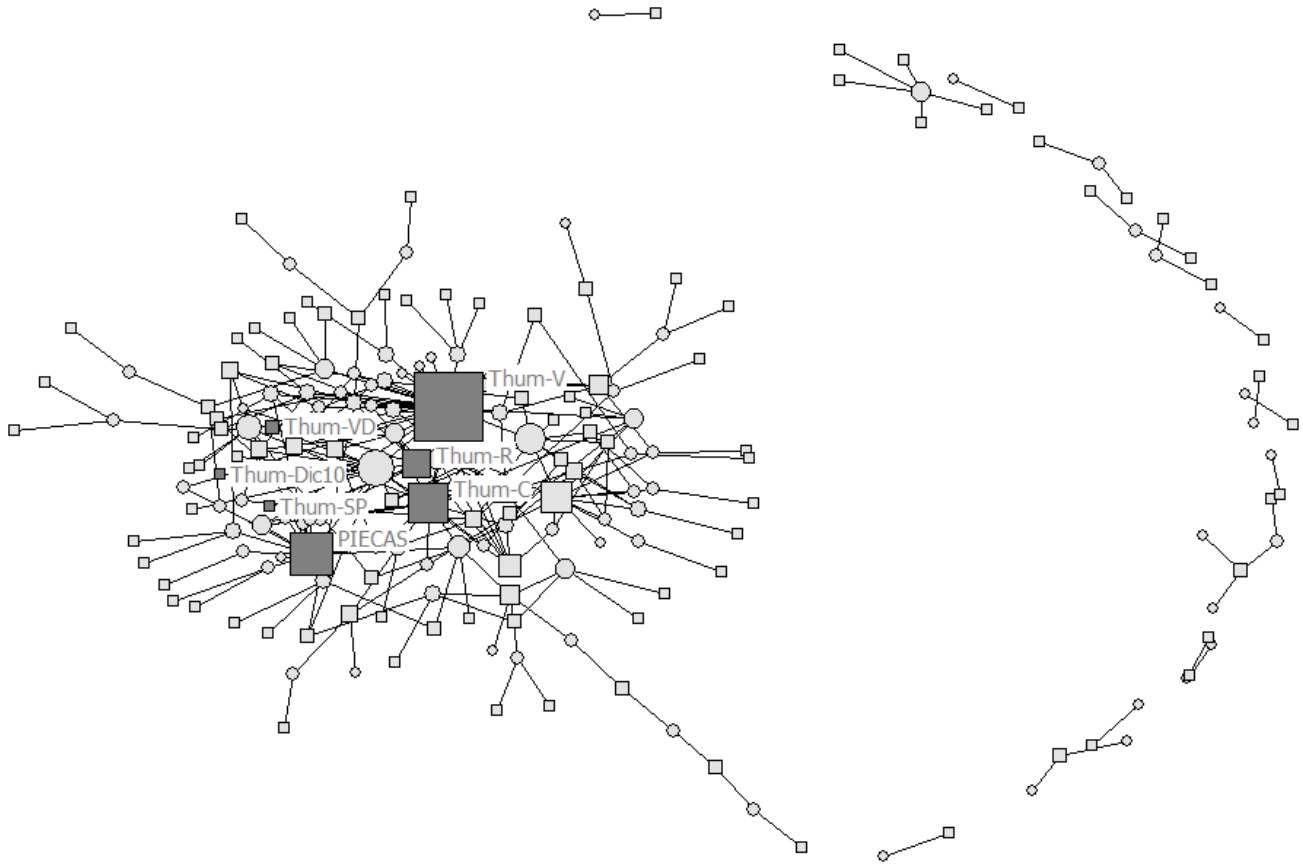


Figure 2. EPG in the Paraná River delta in 2010

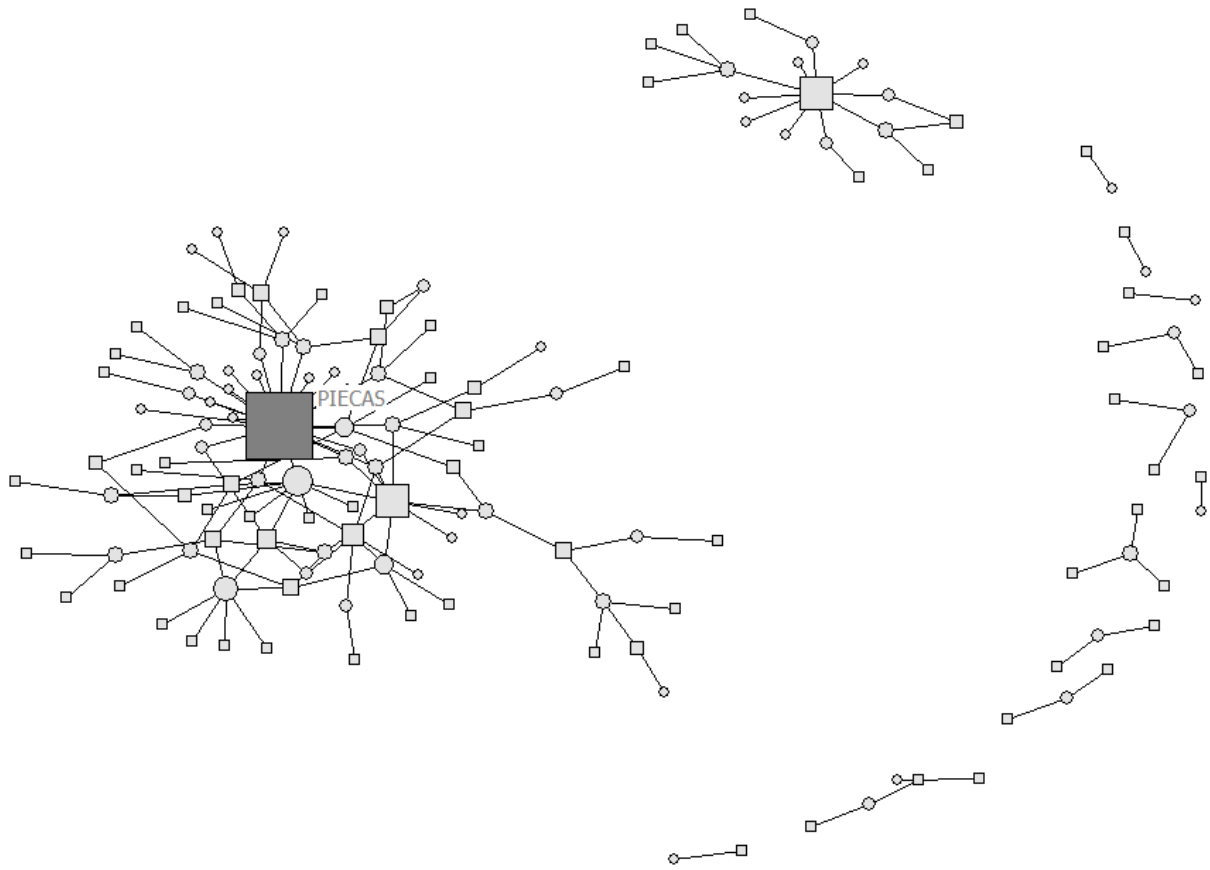


Figure 3. EPG in the Paraná River delta in 2012

**Table 2. Means Scores of Degree Centrality for Forums in the Ecology of Policy Games of the
Paraná River Delta**

	Mean Degree Centrality	
	2010	2012
All Forums in the EPGs	0.018	0.015
New Forums	0.090	0.190*
Other Forums	0.014	0.013

*Of the seven new forums established in 2010, only PIECAS remains active in 2012. Thus, the value in this cell only represents the degree centrality score for this forum.

Table 3. Cohesion measures for the EPGs with and without new forums

	Average Distance		Fragmentation	
	2010	2012	2010	2012
Whole EPGs	4.40	4.14	0.56	0.79
EPGs without new Forums	5.55	4.79*	0.75	0.87*

* Of the seven new forums established in 2010, only PIECAS remains active in 2012. Thus, the only new forum that is removed from the 2012 matrix to calculate these values is PIECAS.

Table 4. Comparison between PIECAS and other forums in facing the challenges to Adaptive Governance

Challenges	2010		2012			
	Mean	Mean	Difference	Mean	Mean	Difference
	PIECAS	Other forums	(PIECAS – Other forums)	PIECAS	Other forums	(PIECAS – Other forums)
Representation						
(Permeability of forum)	7.23	6.80	0.43	6.48	6.66	-0.18
Process Design						
(Procedural Fairness in forum)	7.52	7.47	0.05	6.76	7.65	-0.89*
Problem Responsiveness						
(Contribution of forum solving manag. Problems)	6.30	6.25	0.04	5.55	6.39	-0.84

* $p < 0.05$

APPENDIX.

Table A1: List of Forums Active in 2010 and 2012.

Full Name	Year of Origin	Type of Forum	Participation Rules	Decision Authority
Delta and Río de la Plata Assembly	2006	Citizens' Assembly	Open	Binding on members only
Argentine Forestry Association	1946	Interest Group Association	Closed	Binding on members only
Luján River Basin Committee	2001	Regulatory Rulemaking	Mandated	Binding on all
Delta Consortium	2008	Interest Group Association	Closed	Nonbinding
Federal Agricultural Council-Continental Fishing Commission	2004	Regulatory Rulemaking	Mandated	Binding on all
Management Committee. Delta Biosphere Reserve.	2000	Multi-stakeholder Partnership	Mandated	Binding on members only
Intermunicipal Council of the Delta	1972	Advisory Committee	Mandated	Nonbinding
Regulatory Council of Water Sources and Use	1998	Local Planning	Mandated	Binding on all
Council of Producers of the Delta	1936	Multi-stakeholder Partnership	Open	Nonbinding
Santa Fe Provincial Fishing Council	2004	Advisory Committee	Mandated	Nonbinding
Interbasin Coalition	2007	Interest Group Association	Open	Nonbinding
Island Forum of Tigre	2008	Local Planning	Open	Nonbinding
Preparatory Meetings. Global Environment Facility Project.	2010	Project Construction/Preparation	Closed	Binding on members only
Carabelas River Mutual Consultation Group on Forestry	1981	Project Construction/Preparation	Open	Binding on members only
Meetings organized by the National Institute of Agricultural Technology (INTA)	2010	Multi-stakeholder Partnership	Closed	Binding on members only

Seminars organized by INTA and National Parks Administration	2010	Workshops	Closed	Nonbinding
Local Advising Council. INTA, Delta Experimental Station.	1959*	Advisory Committee	Closed	Nonbinding
Ecological Forum of Paraná	2010	Workshops	Open	Nonbinding
Forestry Roundtable of the Province of Buenos Aires	2010	Multi-stakeholder Partnership	Closed	Binding on all
Comprehensive Strategic Plan for the Conservation and Sustainability of the Paraná River Delta (PIECAS)	2008	Joint Powers Authority / Workshops	Mandated/Open	Binding on all
Master Plan for the Urbanization of the Delta's Islands	2009	Advisory Committee	Open	Nonbinding
National Plan of Fire Management	1996	Joint Powers Authority	Mandated	Binding on all
Preparatory meetings. PNUD Argentina Project, ARG/10/003	2010	Project Construction-Preparation	Mandated	Nonbinding
INTA ProDelta Workshops	2010	Workshops	Open	Nonbinding
Workshop on Climate Change. Governmental Committee on Climate Change, Federal Secretariat of the Environment and Sustainable Development,	2010	Workshops	Mandated	Binding on all
Rural Society of Ibicuy	No Date	Interest Group Association	Open	Nonbinding
Workshops on Native Forests (Buenos Aires Province)	2010	Workshops	Open	Nonbinding
Workshops on Marsh Deer	2010	Project Construction-Preparation / Workshops	Closed	Nonbinding

Table A2. Comparison between pre and post-focusing event forums.

	Old Forums		New Forums		Group Difference	
	Mean (Std. Error)	95% Confidence Interval	Mean (Std. Error)	95% Confidence Interval	Mean (Std. Error)	95% Confidence Interval
Mean Degree Centrality	0.014 (0.001)	[0.011; 0.02]	0.090 (0.03)	[0.007; 0.16]	-0.076* (0.009)	[-0.09; -0.054]

* $p < 0.01$