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Transforming peri-urban territories through payment for ecosystem services networks in Southern Brazil

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Abstract: The importance of institutional arrangements for nature conservation, like Payments for Ecosystem Services (PES) is recognized in the literature but needs more empirical exploration in peri-urban contexts where power imbalances play out more strongly due to urbanization drivers. We documented the actor configurations in the peri-urban environment of a watershed PES in Curitiba and conducted a Social Network Analysis (SNA) to enhance our analysis with a power layer. The analysis points to access advantages of powerful urban stakeholders to promote the commoditization of nature through PES, lacking stakeholder engagement which amplifies inequalities in peri-urban territories. In Brazil's current political scenario the neglect of environmental institutions shows increasing effects on conservation. We point out potential for participation of more diverse actors and the integration of institutions to benefit the PES arrangement in terms of ecosystem flows and social equity.

Keywords: Payment for Ecosystem Services; Institutional Arrangements; Social Network Analysis; Institutional Robustness.

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1 Introduction

In the second half of the 20th century, debates on the effect ecosystems have on human well-being – later discussed as Ecosystem Services (ES) - evolved considerably and their inclusion into the capitalist economy has given rise to discussions on the valuation of benefits from nature to people, and governance debates on how to achieve the promise of sustainable development, e. g. through Payments for Ecosystem Services (PES) frameworks (WUNDER, 2008). In Brazil, PES policies have emerged since the early 2000s and were inspired by other pioneer experiences from all over Latin America. The first Brazilian PES program "Conservador de Águas" was launched in Extrema (MG) in 2005 and since then local and national ES legislation has been created and in January 2021 a National Policy was approved (JODAS, 2015; ALARCON et al., 2016). Altmann and Silva Stanton (2018: p. 292) affirm that "the concept [...] has grown in normativity in Brazil, contributing to the improvement of environmental law", helping to advance the incorporation of human-nature relations into more areas of daily life (FERREIRA, 2004).

This research contributes to debates about the challenges in the institutional dimensions of PES in peri-urban contexts, where power imbalances play out more strongly due to urbanization drivers. Empirical research on land-use changes has been conducted on urbanization, industrialization, agricultural intensification, water, and land pollution and related overuse and degradation. We build on findings of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (BERBÉS-BLÁZQUEZ et al., 2016; TENGÖ et al., 2017) to discuss links between territory and participation in PES (SILVA et al., 2017; AZZULIN et al., 2019), as only few studies have analyzed participation in PES as a primary research object (CORBERA et al., 2007; ZANELLA et al., 2014; SCHRÖTER et al., 2018).

The great popularity of PES as a solution to socio-environmental issues has led to an immense diversity of methodologies and approaches in Latin America (MARTIN-ORTEGA, 2013; PRADO et al., 2015). Berbés-Blázquez et al.'s (2016) critique of the IPBES (2019) assessments, identified three "blind spots" that also motivated this research. The framework's focus on ES ignores the role of workers, institutions and governance structures in their production, which is a major challenge in complex peri-urban territories (WEINS et al., 2018). Underlying manifestations of power relations must be taken into account for assessing how to include complexities in socio-ecological systems and territorial development conflicts (BERBÉS-BLÁZQUEZ et al., 2016).

When diverse actors from civil society, industries and government meet in a PES arrangement, their objectives often diverge, generating conflict and affecting its implementation. In many cases, well-networked stakeholders from strong institutions hold knowledge advantages that consequently help them advance their objectives. Small local stakeholder groups that already possess less resources, on the other hand, often lag behind in information, making it even more difficult to catch up and introduce their needs into the process. Such inequalities can be amplified if only selected aspects of PES are considered as open to negotiation, as is the case in the present case study.

These disputes take place mainly in rural areas or at urban frontiers, where PES is

applied to help mitigate drastic land-use change and (re)establish healthy and biodiverse ecosystems. Peri-urban territories are fringe spaces of cities and are part of a process of movements of goods and services. They are physical spaces which make the transition from countryside to the city and mediate at an "interface between rural and urban activities, institutions and perspectives" (NARAIN; NISCHAL, 2007, p. 261). Agriculture around cities is one example of how peri-urban dwellers (in this case commercial food producers) are paradoxically "simultaneously dependent on and threatened by a dynamic urban economy" (FREIDBERG, 2001, p. 365).

Social network theory promises advances for the management of socio-ecological systems (CARLSSON; SANDSTRÖM, 2007), and empirical research on networks has already affirmed an acute knowledge gap associated with the relationships underpinning water decision-making (HORNING et al., 2016). Schröter et al. (2018) have shown how knowledge co-production and social learning in PES arrangements can be improved by a better understanding of their social network.

Social science approaches to PES can shed new perspectives on the role of the state (SCHOMERS; MATZDORF, 2013), limited policy choices (ROSA DA CONCEIÇÃO et al., 2015), and urban-rural dimensions (SILVA et al., 2017) impacting current management practices in the Global South. With the diversification of stakeholders, we want to discuss and critically assess power and knowledge imbalances between some of the actors engaged in the implementation of PES (MACDONALD, 2011). As the information on conservation is mobilized, translated, negotiated, synthesized and applied, early-stage stakeholder engagement is often overlooked (TENGÖ et al., 2017). Knowledge and information exchange are understood as cultural communication of instructions, data, and ideas which have been pointed out as decisive in the PES literature (VATN, 2005). Ferraro (2008), Agrawal et al. (2013) and Fidalgo et al. (2017) e.g. have dealt more specifically with the critical problems of imperfect information and the free-rider problem.

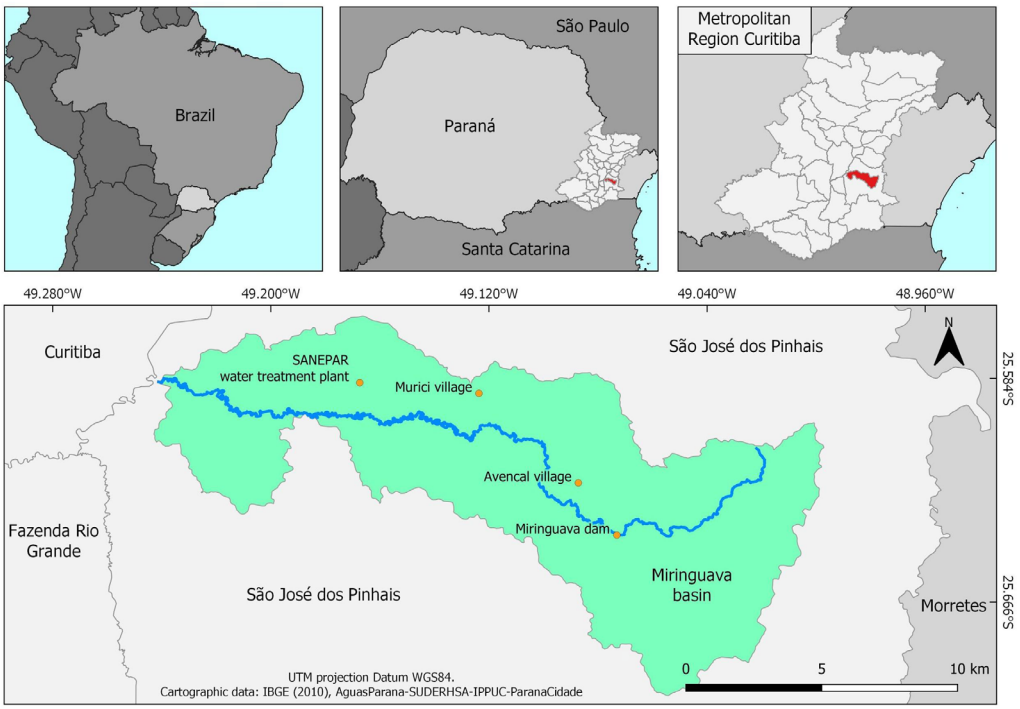
Our case study of the Miringuava watershed in the Brazilian Atlantic forest biome shows potential for enhancing ES flows downstream, with conflicts over drinking water and food production currently under public debate. According to Rezende et al., (2018), PES as a complementary strategy to existing environmental legislation could also help restore up to 35% of native vegetation cover in the Atlantic Forest. Our study shows an exemplary conflict over the configuration of peri-urban territory to connect and balance ES for urban, leisure and agricultural development, while adding empirical evidence about theoretical challenges to explaining landholder behavior (ZANELLA et al., 2014; BOUDET et al., 2020) and the rapid and undemocratic commoditization of nature through PES (KOSOY; CORBERA, 2010).

2 Description of the case study

Our case study is situated in the mountainous region of the Atlantic Forest biome in the urban fringes of Curitiba (figure 1), the eighth-most populous metropolitan region of Brazil (COMEC, 2018). The southern Brazilian state of Paraná is historically one of the country's agricultural poles and an important supplier to global markets through its

port in Paranguá (GARRETT; RAUSCH, 2016; SILVA et al., 2017). The capitalization of southern Brazil's agriculture was strongly coined by the colonial period and the coffee economy of São Paulo, and led to a concentration of agricultural land, the expansion of soy-related agroindustries and reoriented the supporting political-institutional apparatus to this new style of development (PARRÉ; GUILHOTO, 2009). In our case study, the dispute about agricultural practices (traditional, conventional, agroecological) breaks down the current conflict into domination of information and power over the production and distribution of (agricultural) goods and (ecosystem) services.

Figure 1 - Position of the Miringuava watershed, São José dos Pinhais, Paraná, Brazil



Source: data from IBGE (2020) and Aguasparaná-Suderhsa-IPPUC-Paranacidade (2000). Map credit: T.M. Anazawa & A. Schmidt.

São José dos Pinhais (SJP) where the Miringuava watershed is situated, has the highest expected growth rate in urban area (20%) of the 29 municipalities that comprise the Metropolitan Region of Curitiba (MRC) (COMEC, 2006). Considering these pressures, the ecological conditions of the watershed are under considerable stress (GARCIAS; SANCHES, 2009). The remaining forest patches in the MRC are in great proportion found in SJP (COMEC, 2006). Furthermore, the expected or planned urban and industrial expansion has been in conflict with several environmental protection areas for decades (LOPES et al., 2004).

PES was introduced in a public strategy of the state of Paraná to recognize the

economic importance of the ES produced in its territory (IAP, 2020). In 2012, Paraná's environmental legislation established the "Bioclima" program (decree 4.381/2012) which encompasses important rules for conservation initiatives. This includes environmental compensations like PES, which were regulated in state decree 1.591 (2015) and can be paid, among others, through the state's environmental or water resource funds and should be implemented first in the priority areas defined in the Bioclima program (IAT, 2020). The Miringuava watershed was integrated as a condition for the environmental licensing of the utility company SANEPAR's construction of a reservoir to meet the MRC's rising water demand. The involvement of local, national and international NGOs helped to create the necessary judicial framework.

Concerning water-related PES, the respective State Council, Environmental Secretariat, Water Institute as well as affected basin committees should be involved. However, even though the basin committee of the Upper Iguaçu (COALIAR) in which the Miringuava is located, was the first in the state, PES has not been discussed in it, as there have been few public meetings in the time of its implementation. The committee's decision-making processes have been plagued by imbalances and inequalities between its industry, state and NGO members (MEDEIROS; CANALI, 2012; CASSILHA et al., 2020).

Furthermore, the absence of early inclusion of local social actors like farmers associations has exacerbated conflicts over the agricultural use of the basin and has brought forth several political challenges that go far beyond the realm of conservation. To coordinate between the different interests, a socio-environmental management group was established by SANEPAR in 2017. Nevertheless, due to previous critiques of the company's public works and a general skepticism towards public environmental conservation institutions, local farmers do not trust the group for conflict resolution, hindering progress on a range of issues on the public agenda.

As peri-urban farmers are in a dilemma between demand for high productivity and environmentally sound practices (FREIDBERG, 2001), conservation and the transition to agroecological approaches are generally seen skeptically. They are perceived as economically uncertain modes of production by conventional farmers. According to data from the State Secretariat of Environment (SEMA, 2017), the landowners of the Miringuava basin generally know little about environmental legislation. More than 80% (n=467) do not know about Private Natural Heritage Reserves (RPPN). 33 respondents (6.5%) report having knowledge of it, but no land with suitable conditions for applying it, and only five participants of the survey report having a land management plan for registering a private conservation unit. Together with the opportunity costs, this is a major hindrance to compliance with legislation and the willingness to participate in voluntary conservation practices like PES in Brazil (ZANELLA et al., 2014).

Table 1 - Considered actors involved in the PES program in the Miringuava basin

Level	Public Administration	Civil Society & NGOs	Private sector
International		TNC	
National	ANA	FGB	
State	ÁguasPR, Emater, IAP, Min. Públ., SEMA	SANEPAR, SPVS, CPRA	FIEP, Painel Pesquisas
Municipal	SEMAG, SEMMA, SEMPL	APROMEL, CMMA, CMDR, FETAEP	Sociedade da Água Ltd.
Local		ASSOPAM, local church, EcoVida Network, Rural Workers' Union	

Illustration: Author's elaboration [1].

A administração pública local de SJP tem três secretarias envolvidas na implementação de PSA (agricultura, meio ambiente e turismo) e está em contato próximo com a SEMA para agilizar as políticas e programas estaduais e municipais. Há um envolvimento ativo das organizações da sociedade civil em todos os níveis. Além da bem estabelecida Sociedade de Pesquisa em Vida Selvagem e Educação Ambiental (SPVS) local e do Centro de Referência em Agroecologia do Paraná (CPRA), que vêm defendendo a conservação e a agricultura sustentável há décadas, a Fundação Grupo Boticário para a Proteção da Natureza (FGB) (nacional) e a ONG The Nature Conservancy (TNC) ativa globalmente, recentemente têm sido os principais impulsionadores da implementação discursiva e legal do PSA. Isto tem despertado o interesse do setor privado que vê potencial para investimentos "verdes". No entanto, no território, as associações agrícolas e os sindicatos de trabalhadores rurais têm visto esta agenda de sustentabilidade de forma bastante crítica, pois ela traz mudanças significativas em suas práticas diárias.

1 - Abbreviations (alphabetical order): ÁguasPR = Instituto das Águas do Paraná; ANA = Brazilian Nat. Water Agency; APROMEL = Assoc. of Organic & Meliponic Producers of SJP; ASSOPAM = River Basin Landholders, Residents, Breeders & Farmers Assoc. of Miringuava, SJP; CMMA = Mun. Environmental Council; CMDR = Mun. Council for Rural Development; CPRA = Paraná Reference Center in Agroecology; Emater = Paraná Institute of Technical Assistance & Rural Extension; FGB = Boticario Group Foundation; FETAEP = Rural Workers Union of SJP; FIEP = Paraná Federation of Industries; IAP = Environmental Institute of Paraná; Min. Públ. = Public Prosecutor; SANEPAR = Paraná State Sanitation Company; SEMAG = Mun. Secr. of Agriculture; SEMA = State Secr. of the Environment & Water Resources; SEMMA = Mun. Secr. of the Environment SJP; SEMPL = Secr. of Planning & Econ. Dev.; SPVS = Society for Wildlife Research & Env. Educ.; TNC = The Nature Conservancy.

3 Methods

Our approach to landowner participation in PES and the questionnaire were inspired by a study by Zanella et al. (2014) on actors and their characteristics, part of which we adopted for section 1 of our questionnaire on general knowledge of PES and section 2 on the specificities of the local arrangement. Expanding this with a third part, we inquired about the role of each actor and their relation to others (FREEMAN, 2004; BUIZER; VAN HERZELE, 2012). The fieldwork and interviews were conducted from March to November 2018.

Our qualitative and quantitative data was collected in interviews with key stakeholders of the PES process that come together in the management group. Prior to the interviews, the actors were categorized as public (state and municipal), private sector and civil society, based on public policy documents (table 1). We then contacted them through snowball sampling and confirmed the centrality of each organization's representative with the participants of the group.

The collected data was used for a Social Network Analysis (SNA) using the software Gephi (version 0.9.2, BASTIAN et al., 2009). The initial list of possible actors involved in the conceptualization and execution of the PES, was based on an internal list by SEMMA. Out of the universe of 40 contacted representatives mentioned in the public documents, 15 main stakeholders were open to participate in this survey and we obtained detailed responses in in-depth interviews (30-180 minutes) and an online form. After the researcher participated in the management group meetings for five months, interviews with the stakeholders were scheduled.

We identified 24 active stakeholder organizations that contribute to or are affected by the decisions of the PES arrangement. Among them are state and local government, technical agencies, environmental and social NGOs and more than 500 small landowners[2] (SEMMA, 2017). While only a small working group was directly involved in the making of the policy, the indirect involvement of many social organizations brought socio-environmental conflicts back on the agenda that had initially been put off as resolved by public authorities.

For the study of socio-ecological systems, SNA has been used by both natural and social scientists to analyze patterns of interactions and helped to understand complex lasting social arrangements (CARLSSON; SANDSTRÖM, 2008; BORGATTI et al. 2009). The varying degrees of connections between different nodes that are involved in the system provide a view on social organization that revolutionized the social sciences. Recuero (2017) provides an overview of the applications of SNA, which can reach from the analysis of the elements of a given phenomenon's structure, the structural mapping of a research object, or studies in which SNA helps to focus on a central set of data that is more viable and promising to analyze. A node between two actors represents their interaction, which serves other nodes in the system. Recuero (2017) also points out that there is a structural gap, in which two nodes could benefit from a direct link and visualization

2 - 85% of those are the direct landowners

can help identify missing links. The classification of nodes and connections used here is based on the models and classification of this author.

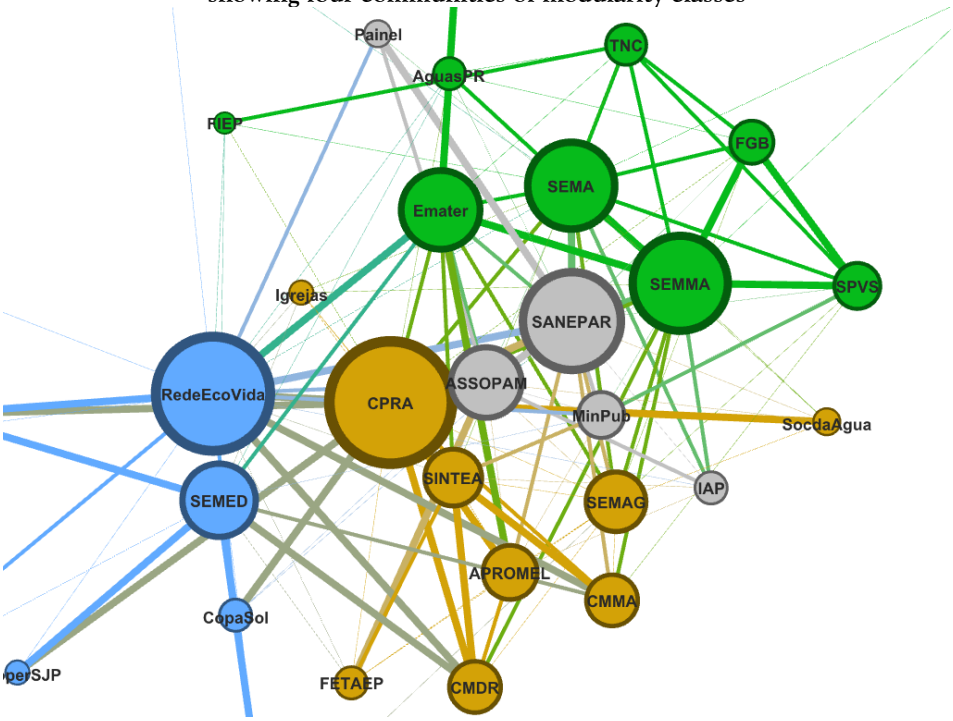
4 Results and Discussion

A growing body of literature deals with interdependent socio-ecological systems and considers sociological factors in PES (NICOLAUS, 2018). Due to the recognition of the importance of socio-political factors as a possible hindrance to PES implementation, Hausknost et al. (2017) argue for a more political approach to PES to consider the multiple interests of actors, and how these influence decision-making. In our case study, late stakeholder engagement by policy-makers could be found to be a hindering factor. Participants from diverse associations, government agencies, and NGOs managed to enter the discussion at different points in time and thus bring their interests forward. We took the interactions of members of the socio-environmental management group about PES in the Miringuava basin as an expression of their access to the policy debate.

To measure the power layer of this policy network, we used interview data on interactions in a SNA using Gephi version 0.9.2 (BASTIAN et al., 2009). In the Yifan Hu configuration, four modularity classes can be distinguished with a division of clusters of each 29,4% in the green and blue, 26,5% in the yellow and 14,7% in the grey cluster.

This reflects a clustering of public institutions with high closeness of nodes, especially among the environmental secretariats with the water utility company SANEPAR at the center of the network (figure 2). As expected, the environmental secretariats' ties with the three involved NGOs (SPVS, FGB, TNC) become visible in their clustering (green) and confirm a strong influence over PES-specific policy-making. On the other end of the network's center (blue cluster), actors who were only active in the management group, like CPRA and RedeEcoVida hold the highest degree centrality. The size of the nodes hints at the high connectivity of the network RedeEcoVida (blue cluster) and the association CPRA (yellow cluster) which are both connected to central stakeholders that represent farmers, but are also strongly connected to the agricultural planning and extension service Emater and the green cluster involved in environmental policy reforms.

Figure 2 - Social network for PES in the Miringuava basin, showing four communities of modularity classes



Source: Author's illustration / software Gephi (BASTIAN et al., 2009).

The interactions reported by RedeEcoVida are surprisingly high, with at least intensity "1" (on a scale from 0 to 4) for 32 of the 34 actors. Similarly high numbers were only reached by two other actors, SEMAG (26/34) and CPRA (23/34), who were actively involved in most meetings during the field research. This might be explained by a confirmation bias or as a case of an extremely actively networked individual of that organization (SCHAEFFER; PRESSER, 2003). Considering their role in networking farmers with organic farming initiatives, it is likely that the interviewed individual is in fact well connected. However, this position does not (yet) reflect their observed practice in the PES process in the field research period.

The unequal interactions reported between small associations and higher-level government entities could be justified in the differing perception by e.g. SANEPAR or secretariats of peripheral actors, while inversely, SEMA and SANEPAR represent the most important high-level entities to the individuals of those associations. Thus, by reporting an interaction with them, they show their own relevance. Horning et al. (2016) appropriately states:

> "Being well-connected within a network is important, but whom one is connected to and to which community is equally significant to the

> effectiveness of an actor to exchange pertinent knowledge within a network." (HORNING et al., 2016: p. 63).

An issue that initially motivated this research was how PES could help cause structural changes in metropolitan governance of water resources (CASSILHA et al., 2020), with emphasis on democratic governance structures and basin committees. In this respect, the role of ÁguasPR, a protagonist of the basin committees, was expected to be central prior to the fieldwork (GADDA et al., 2018; WEINS et al., 2018). However, as the SNA data and fieldwork have shown, there is no involvement of this actor, despite its legal possibilities and responsibilities.

Technological change, like the one from traditional to pesticide-based to agroecological practices, plays an important role in the transformation of territories (REDMAN et al., 2004). Pesticide use is currently challenged by urban consumer markets who demand healthier and environmentally-sound food (ALTIERI; NICHOLLS, 2008). In the ongoing dispute within the community and between the urban center and its periphery, power dimensions become evident, considering the imposition of practices by powerful institutions onto the farmers (KOSOY; CORBERA, 2010; HAUSKNOST et al., 2017; SCHRÖTER et al., 2018).

While multi-stakeholder participation in public policies is essential to the legitimacy of environmental policies (PASCUAL et al., 2010) and democratic process is still consolidating in the young three decade-old democracy of Brazil, barriers can often be found in legislation that is designed without inclusion of affected communities (TRIMBLE et al., 2014). In line with a growing body of literature, we argue for PES as an inherently political endeavor because its ties with civil society are crucial to achieving fair and effective conservation (MURADIAN; RIVAL, 2012; HAUSKNOST et al., 2017; VAN HECKEN et al., 2015). Engaged individuals promoting PES in our case study might play a positive role. However, being neither fully supported by the local community nor its beneficiaries, depending on a few individuals, makes the institutional arrangement weak (WEINS et al., 2021).

If water-related PES programs should contribute to "changing historical inequities between the upper and lower areas of a catchment", an increase in "bargaining power and status of poor providers of environmental services in the upland areas" is necessary (PASCUAL et al., 2010: p. 1238). Formalized PES is "effective but not enough" (RUGGIERO et al., 2019) in this complex challenge. Clement et al. (2017, p. 881) warn about institutional panaceas that "operate a discursive closure in a way that supports apolitical visions of water management, exclude certain actors and views, and supports existing power distribution."

While there have been initiatives to make PES more widely known by the general public (see e.g. SPVS, 2016), many programs in Brazil still lack "publicity" (VEIGA NETO, 2008; JODAS, 2015; SILVEIRA, 2015; FIDALGO et al., 2017) and continue to be scattered and unaligned (PRADO et al., 2015). If the recent national policy (Nº 14.119/2021) is not monitored democratically and better communication strategies by public entities are presented to integrate PES, democratic standards are at risk and exist-

ing inequalities are maintained or even amplified. PES, particularly in peri-urban areas and areas under pressure of urbanization, favors marketization to the detriment of less articulated stakeholders.

Basin committees should be such democratic spaces in which the use and conservation of water resources are negotiated. However, the governance structure in Paraná hinders effective tackling of important issues, neglected in agenda-setting e. g. by underfunding ÁguasPR (CASSILHA et al., 2020). In the Brazilian scenario, where the political internalization of environmental issues is recent (FERREIRA; TAVOLARO, 2008), the global sustainability agenda is currently being openly rejected, investment cuts are causing setbacks, and making biodiversity targets unreachable (ZAIA, 2019).

Our SNA illustrates how the non-functioning of public entities (ÁguasPR) opens the space for three NGO actors to take a bridging function. They are aligned close to the nucleus of the PES arrangement. Differences in number and intensity of their connections are evidence of their strategic interests. MacDonald (2011) points out that such developments should be observed critically, as private coalitions are formed that may not serve public interest for conservation of publicly relevant areas, but may cater to rather specific interests.

Bridging organizations like CPRA and RedeEcoVida are situated between municipal entities and NGOs involved in the creation of the arrangement. For better information flow, involving rural unions and farmers' associations plays a critical role in adjusting to local realities and demands to the policy, which would raise the legitimacy of established rules. Water governance is the ES governance type with the highest necessary diversity of stakeholders. Studies applying SNA methodologies show that the lack of diversity plays a role in causing conflict in the long run (DRUMMOND; BARROS-PLATIAU, 2006; ODOM GREEN et al., 2015; VALLET et al., 2019).

Recent news reports, environmental council hearings, and informal conversations with stakeholders during the field research have revealed that ÁguasPR is being "drained" in administrative and human resources (MATHIAS, 2015; WEINS, 2019). As a "bridging organization", this institution would have the potential to integrate stakeholders from the camps of water-demand vs. conservation vs. agricultural production (ODOM GREEN et al., 2015, HORNING et al., 2016). We identified it as a possible key stakeholder in the integration of watershed committees which should be the first places for wide discussion of policies like PES (RAUBER; CRUZ, 2013; WEINS et al., 2019). The reclusiveness and blockade of the work of the Upper Iguaçu basin committee, caused by greatly diverging interests (MEDEIROS; CANALI, 2012)[3], paired with a gradual reduction in personnel and budgets, are a threat to sufficient environmental monitoring.

3 - The committee of the Upper Iguaçu River has seen little progress on the issue of distribution of water quotas, foreseen in the Brazilian Water Law (9.433/97). The conflicts over those quotas in the RMC have led to irreconcilable gridlock in the parties' positions. See Medeiros (2012) for more details.

5 Conclusions

The increasing incorporation of ES into local and national public policies shows growing awareness of the dependence on healthy ecosystems for diverse human activities. This becomes especially evident in peri-urban contexts, where consumers and producers meet, enter in conflict and negotiate terms and conditions of ES production and use. This article pointed to institutional dimensions of resource management and discussed the social organization for conservation in an urbanizing watershed. Gutman (2007) affirms that the implementation of PES demands extensive negotiations between actors to serve its discursive purposes of mediating rural-urban integration. The proposal of PES can be an excellent opportunity for (re)integrating the urban and the rural in terms of consumer perception, economic benefits, and on a political level (AZZULIN et al., 2019). Through this integration, more robust social institutions and resilient ecosystems can be obtained.

Recent literature has consistently shown: the great majority of PES applications around the world does not actually follow free market ideas in practice. As PES is mediated by the state, actors' roles must be clearly defined to make sure conservation policies serve societal interests and are not manipulated by vested interests. The strong disregard of power imbalances and control over land, as well as gender dimensions in the territory are issues to be further explored (SCHRÖTER et al., 2018).

In the case studied here, the process is on track to include factors disregarded by the central actors in the planning phase. The inclusion of the local farmers in 2018 has made clear how much issues on the agenda greatly differ from those on the ground. The issue of pesticides use has shown how worries about food production and anti-environmentalist sentiments are contrary to the views of strategic decision-making. This situation has been exacerbated in the Brazilian political scenario since 2018, where a political climate prevails in which economic development is prioritized over any environmental and social concerns. With the expressed preference for authoritarian approaches, it remains to be seen how democratic and inclusive governance of watersheds in Brazil will develop in the years to come.

The use of network theory and sociological approaches that highlight power as a variable in why and how a certain policy is chosen, helps to clear up the complex configuration of interests that converge in such a choice. The organization of environmental education by private and NGO actors could offer an arrangement that is independent from changing political administrations. Nonetheless, the interdependence of these actors involved in the conservation policies with some political administrations, might slow down progress and continue the exclusion of actors. Lastly, we could see that the transition to agroecology is not only a technical challenge, but also a politico-economic issue that spurs general skepticism and hinders farmers' participation in progressive conservation policies like PES.

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SciELO

Transformando territórios periurbanos por redes de pagamento por serviços ambientais no Sul do Brasil

Niklas Werner Weins
Christian Luiz da Silva
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Leila da Costa Ferreira

Resumo: A importância dos arranjos institucionais para a conservação da natureza, como os Pagamentos por Serviços Ecossistêmicos (PSA) é reconhecida na literatura, mas precisa de exploração mais empírica nos contextos peri-urbanos onde desequilíbrios de poder se manifestam mais fortemente devido aos vetores de urbanização. Documentamos as configurações de atores no ambiente periurbano de um PSA hídrico de Curitiba e realizamos uma Análise de Rede Social (SNA) para melhorar nossa análise com uma camada de poder. A análise aponta para vantagens de acesso de poderosos atores urbanos para promover a comoditização da natureza através do PSA, sem participação de atores, ampliando as desigualdades nos territórios periurbanos. No cenário político atual do Brasil, a negligência das instituições ambientais mostra efeitos crescentes sobre a conservação. Apontamos o potencial de participação de atores mais diversos e a integração de instituições para beneficiar o arranjo de PSA em termos de fluxos de ecossistemas e equidade social.

Palavras-chave: Pagamento por serviços ambientais; Arranjos institucionais; Análise de redes sociais; Robustez institucional.

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SciELO

Transformando territorios periurbanos a través de redes de pago por servicios ambientales en el sur de Brasil

Niklas Werner Weins
Christian Luiz da Silva
Tatiana Maria Cecy Gadda
Leila da Costa Ferreira

Resumen: La importancia de arreglos institucionales para la conservación, como los Pagos por Servicios Ambientales (PSA), es reconocida en la literatura, pero necesita mayor análisis empírico en contextos periurbanos donde desequilibrios de poder actúan más fuertemente debido a vectores de urbanización. Documentamos las configuraciones de actores en el entorno periurbano de un PSA hídrico en Curitiba y realizamos un Análisis de Redes Sociales (ARS) para mejorar nuestro análisis con una capa de poder. El análisis señala ventajas de acceso de poderosos actores urbanos para promover la mercantilización de la naturaleza por PSA, careciendo de participación de actores, lo que amplifica desigualdades en territorios periurbanos. En el escenario político actual brasileño, el descuido de instituciones ambientales muestra efectos crecientes en la conservación. Señalamos el potencial de la participación de actores más diversos y la integración de instituciones para beneficiar el arreglo de PSA en términos de flujos de ecosistemas y equidad social.

Palabras-clave: Pago por servicios ambientales; Arreglos institucionales; Análisis de redes sociales; Robustez institucional.

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