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Voting power and decision making in environmental committees: The case of French water agencies

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ABSTRACT

I employ different concepts of voting power to analyze how the composition of environmental committees and voting rules relate to the voting power of different decision makers in different voting situations. I demonstrate the use of the concepts on data for French river basin committees over the period 1987–2007. In the second part of the paper I discuss how the existing tools and methods can be adapted to examine the problem of fair representation of different interests within environmental committees. The analysis brings relevant insights to the recent water policy debates in France.

1. Introduction

Environmental policies are often negotiated by special environmental committees that involve representatives from several stakeholder groups with divergent interests. This raises several important questions related to the relationship between the design of the decision making process and the effectiveness with which participating stakeholders can pursue their individual interests [18]. To what extent is a given policy maker able to influence the outcome? How is it possible to assess whether or not the interests of different stakeholder groups are fairly represented? How should a committee be designed to have a fair representation of different interests? In this paper I address these questions in the context of water policy in France.

Water Agencies (WAs) are important water policy institutions in many countries, including France. The overall purpose of WAs is to protect water against any action which can deteriorate its quality and quantity. The main focus of current policy is on reaching an adequate ecological and chemical state of river basin resources while maintaining a balance between available water resources and water needs. In practice, this translates into a set of practical objectives, such as the reduction of the impact of human activities on aquatic ecosystems, maintaining the natural processes of aquatic ecosystems, promoting the quantitative management of river streams – in particular during the summer – managing ground water resources in a sustainable manner, improving the quality of drinking water, etc.

Since the middle of 1960s, the French water policy has relied on the principle of decentralized management of the water resource by river basin. In each of the six French WAs, there is a River Basin Committee (RBC) acting as a "water parliament". Consisting of elected members of local and parliamentary chambers, water users' representatives and the public administration, the RBCs are responsible for specifying the environmental objectives of the river basin through voting on different issues.

The focus of this research is the decision making process within environmental committees. The main goals are to synthesize a number of tools and methods from different fields (such as political science, welfare economics and game theory), and to show how they can be adapted and applied to the particular case of the French RBCs. Specifically, I analyze how the composition of the committee and the voting rules relate to the voting power of different decision makers

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in different types of voting situations. I also discuss the problem of fair representation of different interests within the environmental committees. I believe this analysis may provide relevant insights to the recent policy debates related to water policy in France.

The traditional power measures, such as the Shapley–Shubik index [36] and the Banzhaf index [34,4], have been widely discussed and applied to analyze many voting institutions, such as the EU Council of Ministers [22,32,33,15,8], the United States Legislative system [37,14], and the Canadian Constitutional Amendment Scheme [37]. The Banzhaf index has been also used to study the design of voting bodies in the EU, US, or IMF [5,15,16,19,24,28]. To the best of my knowledge, to date no one has used the concepts of voting power to examine these issues in the context of environmental committees in general, and the French RBCs in particular.

In this paper I apply different power measures traditionally used in the literature, as well as some lesser known measures in this context, in order to analyze the power distribution in two types of voting situations. The first type is the binary setting, in which a decision maker can vote either “yes” or “no”, such as in a decision whether or not to construct a dam. However, not all voting situations can be classified as binary, as in, for example, the surplus distribution between stakeholders. I consider such “distributive issues” as a second type of voting situation. One of the examples of a distributive situation is the funding of local projects by the RBC through subsidies. The main difference with the binary setting is that in a distributive setting the set of alternatives is a simplex. Additionally, in the context of the RBCs, in the distributive situations three water users (domestic, industrial and agricultural) usually benefit from the surplus distribution, while other decision makers also vote on the decision. In contrast, there are may be more beneficiaries in the binary situations.

In the binary setting, I use the Banzhaf and the Shapley–Shubik indices that are well adapted for this situation. They measure the probability of a voter to cast a decisive vote. In the context of the distributive situations, the Shapley–Shubik index has also been shown to be an appropriate power measure [14]. It evaluates a voter's expected relative share in a fixed budget. Apart from the Shapley–Shubik index, I introduce two other measures of power suitable for analyzing distributive situations. The first is the nucleolus, which is not well known in this context but is becoming more popular, as it can be a good alternative to the Shapley–Shubik index [31,25,17]. Another power measure applied in the numerical analysis is derived as the vector of the unique expected equilibrium payoffs from a well known legislative bargaining game [7]. Interestingly, under some conditions it coincides with the nucleolus [29].

In the second part of the paper, I employ power measures to investigate how to design an RBC with a fair representation of different interests. A similar question has been already addressed in the literature in the context of international committees, but mostly under the binary setting.[2] One of the common approaches is the utilitarian one[3] that seeks to maximize the total utility of all citizens. Another is the egalitarian approach that seeks to equalize the power of all citizens as measured by the Banzhaf index. Felsenthal and Machover [14] adopt the egalitarian approach and show that the optimal weights should be chosen in such a way that each country's Banzhaf index is proportional to the square root of its population size (Penrose's rule [34]). By comparing the Banzhaf index and the square root of the population, they show that larger member states in the EU tend to have too little power, while the smaller ones have too much power. Algaba et al. [1] apply this theory to analyze the power of the European citizens for 25 and 27 countries. Le Breton et al. [25] also follow the egalitarian approach, however they use the distributive setting with the nucleolus as the power measure. In order to investigate this question for the French RBCs, I apply three different power measures suitable for the distributive setting and implement both aforementioned principles. This analysis may provide useful tools for checking the recent conclusion of the French audit office that the RBCs' composition is imbalanced in the sense that the agricultural users have a “quasi-monopoly” [12].

The paper is structured as follows. In Section 2, the organization and the functioning of WAs in France are briefly described. Section 3 provides a descriptive analysis of power for different groups participating in the decision making process related to the water policy. In the first part, I focus on the Banzhaf and the Shapley–Shubik indices to analyze the binary setting. As the analysis demonstrates, in general, the two indices give very close predictions. Then, following [37], I describe possible modifications of the classical indices which may be more applicable in the few cases where the Banzhaf and the Shapley–Shubik indices produce significantly different results. In the second part, I consider distributive situations and compare the performance of the three power measures adapted to the analysis. Additionally, I characterize the conditions under which all three produce the same predictions. In Section 4, I address the issue of the optimal RBC design under the distributive setting, and provide an illustration on the data for the Adour-Garonne Water Agency. Finally, Section 5 provides a summary of the main findings and some policy implications.

2. French river basin committees

The French WAs were created in 1966, following the first Water Act of 1964 which institutionalized a decentralized water management system at the hydro-geographical level of the river basin. This system has been reinforced by the subsequent Water Acts of 1992[4] and 2006.[5] The six WAs (Adour-Garonne, Artois-Picardie, Loire-Bretagne, Rhin-Meuse,

[2] Le Breton et al. [25] is an exception.

[3] See for example, [6,9,10].

[4] The Water Act of January 2, 1992 instituted the principles and tools of integrated water management by the RB. These new tools are the SDAGE (Schémas Directeurs d'Aménagement et de Gestion des Eaux) and the SAGE (Schémas d'Aménagement et de Gestion des Eaux).

[5] The reform of 2006 was devoted to making the system compliant with the Constitution, by reinforcing the role of the RBC, while maintaining control from the State. The goal of the reform was also to improve operational efficiency and to provide enough flexibility in the determination of taxes.