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Organizational Pathways in Drinking Water Governance: A Literature Review

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Abstract

Drinking water governance has emerged as a critical issue for policymakers. Climate change and the increase in human consumption exacerbate drought episodes, and the institutional arrangements for providing drinking water are increasingly diverse but vary in effectiveness. This paper explores the various contemporary organizational pathways in drinking water governance. Our aim is to provide a comprehensive understanding of the dynamics and implications of different organizational approaches in water management, shedding light on policy and strategic choices for sustainable and effective governance. Recommendations for future research are also considered.

JEL Classification: H11; L11; L95

Keywords: Drinking water governance, local government, public services, literature review

Résumé

La gouvernance de l'eau potable est devenue une question cruciale pour les décideurs politiques. Le changement climatique et l'augmentation de la consommation humaine aggravent les épisodes de sécheresse, tandis que les dispositifs institutionnels chargés de la fourniture d'eau potable se diversifient de plus en plus, avec une efficacité variable. Cet article explore les différentes formes organisationnelles contemporaines dans la gouvernance de l'eau potable. Notre objectif est de fournir une compréhension globale des dynamiques et des implications des diverses approches organisationnelles en matière de gestion de l'eau, en mettant en lumière les choix stratégiques et politiques pour une gouvernance durable et efficace. Des recommandations pour les recherches futures sont également proposées.

Codes JEL : H11 ; L11 ; L95

Mots-clés : Gouvernance de l'eau potable, gouvernance locale, services publics, revue de littérature

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1 Introduction

The 2024 United Nations World Water Development Report estimates that 2.2 billion people lack access to safely managed drinking water, while 3.5 billion lack access to safely managed sanitation services. The situation is worsening because of climate change, which exacerbates droughts and water scarcity. More specifically, a convergence of climate disturbances increases the difficulty of accessing drinking water. [Bates et al. \(2008\)](#) show that over the coming century, increased precipitation intensity is likely to lead to a greater number of drought episodes, water stored in glaciers is expected to decrease, and aquatic pollution is projected to grow.

In light of these growing challenges, effective governance becomes crucial. Current practices are diverse, and their effectiveness varies significantly depending on the institutional structures in place. As [Ostrom \(1990\)](#) and [North \(1990\)](#) argue, the institutional framework plays a pivotal role in shaping the economic performance of various sectors, including drinking water management. Over time, governance of drinking water has evolved significantly. While State intervention was prevalent in the XIXth century in Europe, policies of decentralization and later privatization gained momentum in the XXth century, transferring greater authority to local governments. The latter now have a wide range of organizational possibilities at their disposal. The literature has consistently demonstrated that the institutional framework directly influences the performance of the sector under consideration.

The objective of this article is to review the existing literature on drinking water governance and its consequences in terms of performance. Considering the New Institutional Economics as an analytical framework, organizational choices cannot be considered arbitrary but are “the limited set of alternatives accepted at a given time in a society” ([North, 1986](#)). Consequently, the choices made in drinking water provision are explained by determinants of different natures, which the literature has endeavored to identify. In this article, we attempt to answer the following question: do current modes of drinking water governance effectively address contemporary climate challenges?

Over time, policymakers’ considerations have evolved in their choice of governance modes with regard to drinking water provision. While they were solely economic for

a long time, environmental issues have gradually been integrated into decision-making (Destandau and Garcia, 2014). Maximizing general welfare is not the only motivation behind the choice of governance mode, and political or ideological considerations are sometimes an important factor in decision-making.

We offer a reflection on the effectiveness of three main governance modes. Firstly, intermunicipal cooperation appears as an institutional arrangement that allows municipalities to benefit from economies of scale and reduce public spending. Secondly, we focus on public-private partnerships. This contractual arrangement is used by local governments to outsource the management of a public service. Finally, we consider the intervention of central governments in the management of drinking water. Although State intervention was important in the XXth century, it became scarcer in the XXIth century.

In the context of drinking water governance, the choice of management models is crucial for ensuring economic efficiency, equitable access, and environmental sustainability. Focusing on public-private partnerships, inter-municipal cooperation, and state interventionism is particularly relevant for several reasons. These three models represent distinct yet complementary approaches to addressing the growing challenges in the drinking water resource management, each offering specific solutions in terms of financing, governance, and regulation. Yet, surprisingly, both theoretical and empirical literature in economics have not reached a consensus on the effectiveness of each governance mode.

France has a unique model for the governance of drinking water. Although it has evolved significantly throughout history, it is now based on five fundamental principles: (i) duality as both public and commercial services, (ii) management at the local level, (iii) public administration with private sector involvement, (iv) fragmented state regulation, and (v) user-based funding (Colon et al., 2020). While we extend our analysis to other countries, we have chosen to focus on the French case due to these distinctive characteristics.

The paper is organized as follows. Section 2 focuses on the determinants and consequences of cooperation at the local level in drinking water provision. Section 3 examines drinking water provision by private companies, through either privatization processes

or in the public sector. Section 4 provides an analysis of the evolution of the state's role in regulating drinking water provision. Then, we identify remaining gaps in the literature that would benefit from future research in section 5. Finally, we conclude in section 6.

2 Local level cooperation: motivations and results

The local scale is almost systematically favored in drinking water provision, and [Ostrom \(1990\)](#) shows that collective management of commons generally allows for optimal resource allocation. This aligns with the renowned decentralization theorem asserting that public goods and services should be delivered by the lowest level of government that encompasses the relevant benefits and costs ([Oates, 2004](#)). As a result, the number of collective organizational structures has multiplied at the local level, with the aim of achieving economies of scale and optimal management of drinking water resources.

Intermunicipal cooperation (IMC) is a complex economic and political phenomenon that developed in Northern Europe in the XIIIth century. Its most advanced form originated in France dates back to 1890 with the creation of municipal unions ([Teles, 2016](#)). However, the complexity of these collaborative structures is the cause of paradoxes, both in the determinants of cooperation and in the economic and environmental consequences.

2.1 Determinants of cooperation

Economists have long been interested in the close relationship between institutional changes, governance and economic performance. [Bovaird et al. \(2003\)](#) define governance as the set of interactions between local actors allowing the construction of an effective public policy. It is in this spirit that municipalities make the decision to actively cooperate in the provision of drinking water in most developed countries. Existing institutions can determine the behavior of economic actors ([March and Olsen, 1983](#)), the latter can decide to shape new institutions with the aim of improving their performance ([Morgan and Hirlinger, 1991](#); [North, 1991](#)). However, the determinants of institutional changes are still too little known according to [Dixit \(2009\)](#). The determination of the optimal

institutional form at the local level for the provision of public services has been the subject of much debate among economists.

In this regard, intermunicipal cooperation can be the result of a contractual relationship or an informal relationship between municipalities (Warner, 2006; Furmankiewicz and Campbell, 2019). These differences largely depend on the country where the cooperation takes place: in the United States and Europe, local governments are made up of small municipalities that ensure the provision of drinking water. This cooperation among small municipalities enables them to counter the significant market power of private firms, which often take advantage of their limited bargaining power to raise (Chong et al., 2015).

The determinants of cooperation, however, are diverse in nature. Economic factors are discussed in subsection 2.1.1. We then focus on the geographical (subsection 2.1.2) and ideological determinants (subsection 2.1.3).

2.1.1 Economic factors

Providing drinking water to the population is the responsibility of local governments in many countries. However, this management has a cost, and it is common for small municipalities to encounter problems financing this service. These issues stem from increasingly significant necessary investments: repairing leaks, upgrading infrastructure, and adapting to climate change (Zafra-Gómez et al., 2020). Good management of public finances is a serious issue for municipalities, and this problem represents an important determinant of intermunicipal cooperation. More precisely, Blaeschke (2014) shows that fiscal stress is positively correlated with the creation of cooperation between small municipalities in the provision of public services, including drinking water.

Fiscal capacity is often considered as a crucial element influencing the demand for intermunicipal cooperation. These results are consistent with Carr et al. (2007), who investigate the impact of local fiscal capacity on both horizontal and vertical collaboration across various public service categories in U.S. metropolitan areas. Their findings indicate that, unlike larger cities with robust fiscal capacity that prefer to provide public services independently, smaller towns are more likely to seek cooperation.

The fiscal situation of municipalities is widely considered as an important determi-

nant of cooperation. Using transaction cost theory, [Feiock \(2007\)](#) and [Kwon and Feiock \(2010\)](#) show that wealthy municipalities are less likely to cooperate in the provision of public services, including water and sanitation services. [Krueger and Bernick \(2010\)](#) confirm these conclusions and show in a study encompassing 3,664 cities across 49 states that intermunicipal cooperation is used mainly by municipalities encountering difficult budgetary situations.

The link between national government and local government is also important. When a restrictive budgetary policy is implemented at the national level, local governments tend to cooperate to protect themselves against budget cuts ([Bischoff and Wolfschütz, 2021](#)). [Warner et al. \(2021\)](#) extend and complete this analysis using robust econometric methods. They show that cooperation is preferred to privatization when municipalities are subject to fiscal stress.

The fiscal situation of municipalities is not the only economic determinant pushing local governments to cooperate in drinking water management. As mentioned previously, the reduction of production costs and the realization of economies of scale are the major elements driving their decision. A pioneering study conducted by [Morgan et al. \(1988\)](#) showed that the search for cost reduction was significant in the decision to cooperate in the provision of public services in the United States. This result has been confirmed and expanded upon by [Warner and Hefetz \(2002\)](#) and [LeRoux and Carr \(2007\)](#), whose findings align with the theoretical outcomes.

However, [Aldag and Warner \(2018\)](#) provide abundant evidences that the decision to cooperate with regard to drinking water provision cannot be explained solely by the desire to reduce production costs. Indeed, the collective management of public services - particularly a vital resource such as drinking water - requires significant coordination between municipalities. Indeed, it is crucial in order to optimize resources and ensure cohesive regional planning. It enables effective management of common issues, improves service delivery, and fosters social cohesion by pooling efforts and resources. intermunicipal cooperation involving multiple actors in a complex relationship necessitates minimizing risks of opportunism, resulting in substantial political transaction costs ([Rodrigues et al., 2012](#)).

These economic factors are often considered in conjunction with environmental fac-

tors. Using econometric methods developed by [Mundlak \(1978\)](#) and generalized by [Wooldridge \(2010\)](#) and [Lin and Wooldridge \(2019\)](#), [Guelmamen et al. \(2024\)](#) show that intermunicipal cooperation is primarily driven by the desire to increase economic performance, but municipalities are also seeking better environmental outcomes such as reduced water leakage.

2.1.2 Geographical factors

The excessive or inappropriate use of available water is one the primary causes of drought episodes. Furthermore, human behavior accelerates climate change. As a result, geographical conditions in which municipalities operate are significantly altered. Initially, some European countries are facing significant demographic challenges, compelling local governments to adapt their public service offerings and the manner in which they provide drinking water to the population.

In a meta-regression, [Bel and Warner \(2016\)](#) demonstrate that spatial factors such as municipal population are significant in the decision-making process. These conclusions confirm the results obtained by [LeRoux and Carr \(2007\)](#), who provide significant evidence that both population size and growth positively influence cooperation

Beyond the growing population, decisions made by neighboring municipalities are an important factor in the decision to cooperate. In recent years, spatial econometrics has been widely used to analyze the factors of cooperation at the local level. The majority of authors who have worked on this issue show that the cooperation decisions of neighboring municipalities are a highly significant factor strongly influencing an individual municipality's decision-making process with regard to cooperation ([Di Porto and Paty, 2018](#)). More specifically, [Di Porto et al. \(2011, 2013\)](#) use spatial models with an extensive panel dataset to examine decision-making in French intermunicipal cooperation. The authors perceive the decision to cooperate as a strategic, simultaneous process. [Blaeschke \(2014\)](#) confirms these results and shows that the main geographic forces are population growth, size heterogeneity, and neighborhood-related supply factors.

Although certain geographic factors may facilitate intermunicipal cooperation, others represent barriers preventing municipalities from joining forces. [Arntsen et al. \(2018\)](#) empirically show that geographical location and negative heterogeneity in size relative to

neighboring municipalities have the potential to limit intermunicipal cooperation. More precisely, intermunicipal cooperation is more often considered by local governments located in urban areas near large cities (Morgan and Hirlinger, 1991; Feiock et al., 2009; Blaeschke, 2014). Municipalities located in rural areas distant from large cities, are therefore less inclined to cooperate with regard to the provision of drinking water.

2.1.3 The importance of ideology

Another element that matters for local cooperation in the provision of drinking water is ideology. In fact, the importance of ideology in shaping and perceiving institutional arrangements was identified and theorized by North (1966, 1986). His major contribution was to understand how economic agents perceive the institutional framework under the assumption of bounded rationality.

As a result, ideology participates in shaping institutions (North, 1988). The management of natural resources is also subject to these considerations, with environmental public policy choices responding to ideological orientations (Söderbaum, 1999).

Local cooperation in France for drinking water provision depends in part on the opportunism of local elected officials. Mayol and Saussier (2023) showed that the decision to cooperate was often preceded by a reduction in the price paid by consumers. When these officials seek to enhance their popularity or gain political advantages, they might be tempted to favor short-term solutions or manipulate local partnerships to serve their own goals. Such behavior can impact how resources are allocated, the quality of infrastructure, and ultimately, the effectiveness of drinking water provision. In Germany, intermunicipal cooperation is also more likely in election years (Bischoff and Wolfschütz, 2021).

In this regard, Bischoff and Wolfschütz (2021) show that IMC is favoured in election years for municipalities that face high cost pressure. More precisely, IMC agreements emerge in order to not lose political control over the management of public services, including drinking water (Bergholz and Bischoff, 2018). However, not all voters hold the same views regarding this type of institutional arrangement. Inter-local cooperation is favored by voters of new progressive left parties but opposed by supporters of right-wing populist political currents among the electorate, who prefer local autonomy (Strebel

and Kübler, 2021). This indicates that the political interests capable of influencing local elections play a crucial role in determining the form of service delivery for drinking water and other public services (Bel and Fageda, 2008).

This summary highlights how ideological factors, including political opportunism, election cycles, and partisan preferences, can influence decisions about cooperation in drinking water governance. It argues that the choice of governance structure for services is not purely based on economic or considerations, but is also shaped by political and ideological factors.

2.2 Effects of IMC

The consequences of the cooperative management of public services - particularly drinking water - have been the subject of numerous studies. The literature is extensive and employs significant quantitative tools. Nevertheless, there is no consensus on the environmental and economic performance of intermunicipal cooperation.

The drinking water sector is generally a network industry, characterized by high to substantial infrastructure. In France, it was quickly agreed by national governments that municipalities should cooperate to achieve economies of scale (Bel and Warner, 2015). Significant economies of scale indicate that local communities may benefit from merging into water districts. By estimating translog cost functions on French panel data, Garcia and Thomas (2001) found significant economies of scale indicating that municipalities benefit from merging intermunicipal structures. Garcia (2003) extends this result and shows that economies of scale are limited, and diseconomies of scale can eventually be reached when intermunicipal structures contain more than six municipalities. However, these results are heterogeneous and depend on the level of involvement in cooperation. If cooperation is voluntary, economies of scale and improved local public spending are possible (Tricaud, 2021).

The reduction in production costs following intermunicipal cooperation for drinking water provision is not systematic. Previous authors have shown that cooperation may have no effect (Aldag et al., 2020), and even increase costs (Garrone et al., 2013; Schmidt, 2014; Zafra-Gómez et al., 2020) as well as (Guelmamen, 2024). These paradoxical results can be explained by a lack of coordination between members of intermunicipal

structures. As the relationship binding them is political, political transaction costs are created due to negotiations (Feiock, 2007) and impact performance, which is reduced (Rodrigues et al., 2012).

Beyond the effect of local cooperation on costs, this mode of governance is often advocated in order to reduce local public expenditure. Empirical studies are, once again, mixed in this regard. Using spatial models on a French panel dataset, Frère et al. (2014) shows that cooperation does not achieve its goal of reducing municipal spending by sharing local responsibilities. This result is not unique to France. In Italy, this mode of governance has not led to any increase in provision efficiency (Luca and Modrego, 2021). Worse still, cooperation in public service management (including drinking water) can increase local public expenditure Allers and De Greef (2018). It can also reduce the technical efficiency of municipalities if their vertical integration is insufficient (Blaeschke and Haug, 2018).

The effect of intermunicipal cooperation on the performance of drinking water provision is not consensual. The same is true for the political consequences of this organizational mode. While the joint provision of electricity would strengthen political ties between municipalities, this is not the case for drinking water (Muraoka and Avelaneda, 2021). Intermunicipal structures are also criticized for their lack of democratic legitimacy (Warner, 2006; Lidström, 2017; Silva et al., 2018), which reduces confidence towards local elected authorities.

3 Private sector participation: make or buy?

The theory of transaction costs initiated by Coase (1937), and later expanded and popularized by Williamson (1975), has enabled the understanding and justification of institutional arrangements within firms. Their approach can be generalized to the management choices made by local governments in the provision of public services (Williamson, 1999; Ménard and Saussier, 2003).

In most developed countries, although drinking water provision is the responsibility of municipalities, private management has gained popularity over time. They believed that the private sector would be more efficient than the public sector (Pezon, 2009).

This has given rise to public-private partnerships (PPPs). These are defined as “a type of strategic alliance characterized by long-term contracts between public and private partners, where the private partner usually designs, finances, builds and operates the infrastructure or the service” (Yescombe, 2007).

The French case features a distinct particularity. As stated by Huet and Saussier (2003), French municipalities have a wide range of delegation contracts at their disposal. This has led to numerous studies differing in their conclusions in terms of their assessment of the efficiency of public and private management in drinking water provision (Bel et al., 2010; Zhang et al., 2022).

The literature agrees that the choice of management mode for drinking water provision is not random (Reynaud and Thomas, 2005; Chong et al., 2006). It depends on economic factors (Lima et al., 2021), as well as political and ideological ones (Doerksen, 1977). Economic motivations stem from the perception that private management is often more efficient. In practice, French drinking water services choose to collaborate with private companies in the provision of drinking water when they encounter challenging operating conditions (Le Lannier and Porcher, 2014). Consequently, PPPs can help reduce operating costs compared to direct public management (Porcher and Saussier, 2018).

Examining the management mode of Spanish water services, Picazo-Tadeo et al. (2012) shows that ideological and political motives are important factors in understanding decisions about water service management. Surprisingly, they found that both the PSOE (center/left) and PP (center/right) are more likely to outsource drinking water services. This choice is explained by the desire of these two parties to occupy the center of the political spectrum. Their management mode choices are therefore convergent.

The integration of the environmental dimension by Garcia (2002) in the analysis led to the conclusion that economies of scale were made possible by private management. Carpentier et al. (2006) and Boyer and Garcia (2008) continued this analysis and showed that private management did not significantly impact performance. In contrast, private management is a means for local governments to deal with difficult operating conditions (Le Lannier and Porcher, 2014).

The effects of private management should, however, be nuanced. Indeed, they depend on heterogeneous factors which have been analyzed by [Chong et al. \(2015\)](#). Their contribution constitutes a major advancement in the literature with regard to the impact of management modes on the performance of the drinking water sector. Analyzing a sample of French drinking water service providers at three-year intervals (1998, 2001, 2004, 2008), they show that small local governments (less than 10,000 inhabitants) are victims of the market power of private operators. This results in higher prices for small municipalities under private management compared to those under public management and in large municipalities. Consequently, good economic performance in the drinking water sector depends on the presence of competition for the market. In other words, the opportunism of private partners must be considered in the effectiveness of contracts. These results are consistent with [Williamson \(1976\)](#), who identifies transaction cost problems in contracting for monopolies.

PPPs are contractual relationships between a local government and a private company. The inability of actors to foresee all possible scenarios leads to information asymmetry, pushing local governments to make these contracts more rigid ([Moszoro and Spiller, 2011](#)). These contracts are used by local governments to protect themselves from ex-ante ([Ho and Tsui, 2009](#)) and ex-post ([Saussier et al., 2009](#)) opportunism. At the end of the contract, the company may be tempted to use the information obtained while operating the network for opportunistic purposes. Nevertheless, opportunism can also come from the local government ([Valéro, 2015](#)), or from political third parties. Political ambitions lead local governments to rigidify partnership contracts to limit political hazards from political opponents ([Beuve et al., 2019](#)). The effectiveness of public-private partnership contracts largely relies on limiting opportunism in the contractual relationship between the different parties. As a result, contemporary dynamics indicate a return to public management by cities such as Paris, Hamburg, and Atlanta, in order to increase control over the resource.

In this section, we have shown that the decision of municipalities to adopt PPPs for the provision of drinking water is influenced by various factors. Firstly, economic determinants remain the primary drivers behind the choice of management model. Secondly, ideological considerations also play a role in shaping this decision. However, with regard

to performance, the findings should be interpreted with caution, as private management does not necessarily yield better outcomes than public management. Moreover, once engaged in a PPP, municipalities must navigate the risks of opportunistic behavior from their private partners.

4 National governments and drinking water governance: navigating between intervention and deregulation

The late XXth century was marked by a wave of deregulation across Europe in the management of drinking water and sanitation. France and the United Kingdom were the primary advocates for more flexible regulations ([Kallis and Butler, 2001](#)). In France, this was marked by a complete reorganization of the management mode. The absence of a stable regulatory framework accentuated geographical disparities. Large municipalities under public management decided to cooperate with private companies with the aim of reducing production costs. Alongside the evolution of management modes, price regulation was largely reduced. At the end of the XXth century, high inflation in France pushed the government to cap drinking water prices. However, this cap was much more severe for municipalities under public management than for private management. Consequently, the only way for municipalities under public management to increase prices was to privatize management ([Pezon, 2002](#)).

National-level deregulation in the drinking water industry has been driven by a range of diverse factors. Initially, the lack of national regulation is seen as an opportunity to avoid governance overlaps, conflicts, and gaps that often arise from the multiplication of jurisdictions ([McCullough and Farahbakhsh, 2015](#)).

In this regard, ideology stands as a key determinant. Specifically, the belief that adequate safeguards exist to protect consumers and the broader public interest without the need for state commission regulation is central to this motivation. This belief is rooted in a desire to reduce costs, both in terms of savings for regulators and for the regulated industry ([Beecher and Mann, 1990](#)).

English policymakers opted for a different strategy. In 1989, the UK government decided to fully privatize the management of drinking water. More precisely, adminis-

tration was removed from regional agencies and transferred to private companies. This decision was highly criticized and was the source of numerous academic and political debates as it constituted a significant reversal in UK water policy. Indeed, prior to privatization, non-state actors such as unions and environmental organizations were incorporated into the policy-making process. They worked jointly with local and national governments in the construction and application of water policy (House, 1996; Page and Bakker, 2005). This transformation of the drinking water market in the UK resulted in a significant increase in the price paid by consumers and no evidence of cost savings, consequences of the significant market power acquired by private companies (Bel et al., 2010).

After recognizing the failure of full deregulation in the drinking water market, policymakers began incorporating environmental considerations into their decision-making processes. This led to an increasing level of regulation concerning water quality at various levels. At the national level, different approaches to regulating this market have emerged, including standards and monitoring, risk-based management, or a combination of both (WHO, 2019).

In France, although European standards must be met, the government has implemented stricter national standards (Rouse, 2016). Consequently, environmental factors have become a significant driver of national regulatory decision-making. Beck et al. (2010) also show that political and economic factors significantly influence monitoring decisions: democratic governance, income levels, and peer pressure all contribute to greater monitoring intensity.

The XXIst century seems to be subject to a desire by public authorities to regain control drinking water as a resource. As drought phenomena multiply, there is a wave of returns to municipal management throughout Europe and the United States, with an increase in regulation concerning water quality (Warner, 2010). However, for environmental regulation to be effective, the threats of sanctions must be credible and effective. Consequently, each level concerned with drinking water governance (national, municipal and regional levels) must be properly monitored (Pacheco-Vega, 2020).

At the European level, legislation concerning agricultural pollution of drinking water has been strengthened. The Water Framework Directive adopted by the European

Union in 2000 outlines a comprehensive community policy on water pollution and establishes a long-term action plan. The initial objectives included planning and programming with specific working methods and deadlines, an economic analysis of water pricing mechanisms and the integration of environmental costs, as well as public consultation to enhance the transparency of water policy. Although these objectives are ambitious, limitations have been identified by [Zingraff-Hamed et al. \(2020\)](#): (i) problems related to horizontal intersectoral communication, (ii) insufficient land reserves, (iii) inadequate staff capacities, and (iv) insufficient funding.

Alongside these issues, the literature showed that the drinking water pollution comes specifically from fertilizers and pesticides used in agriculture. Although they have allowed for significant productivity gains in recent years, they are also responsible for the pollution of groundwaters and surface waters across Europe ([Platjouw et al., 2023](#)).

Whether at the European or national level, these new regulations must consider a paradoxical situation: in order to preserve water, farmers must use fewer pesticides, but global warming increases the use of fungicides and insecticides that pollute drinking water. [Bareille et al. \(2024\)](#) show that one percent temperature increase leads farmers to purchase additional +1.70% of fungicides, +1.72% of herbicides, and +0.37% of insecticides. This situation represents a very serious challenge for policymakers, as a simulation shows that by 2015, *ceteris paribus*, farmers could increase their pesticide use by +15%.

The current trend seems to show that a return to regulation is being carried out to preserve the resource. However, some criticisms regarding the speed of application of measures are regularly brought into public debate.

This section shows that national regulation in the provision of drinking water is shaped by multiple determinants. Socio-economic factors primarily drive the decision to regulate (or deregulate) the sector. However, current environmental concerns are leading to a general increase in the regulation of water quality. Now more than ever, the governance of drinking water has become a critical environmental challenge.

5 Further research and perspectives

The current body of literature on water governance reveals several critical gaps that require further exploration. While numerous studies have addressed the immediate benefits and costs associated with different water governance models, there remains a notable lack of research into their long-term impacts. It is essential for future research to systematically evaluate how these governance models affect service efficiency, resource sustainability, and user satisfaction over extended periods. Such longitudinal studies would provide a deeper understanding of the durability and adaptability of various governance frameworks, offering insights into their long-term viability and effectiveness.

There is also a pressing need for comprehensive comparative analyses between public and private water management frameworks. The existing literature often lacks robust meta-analyses that compare these two models in terms of efficiency, cost-effectiveness, and user satisfaction. Comparative studies scrutinizing these aspects across different contexts and scales would yield valuable insights, informing policy decisions and helping to identify best practices that could be applied universally or adapted to specific regional needs.

In addition, the interactions between different levels of governance (local, regional, national) and their implications for water management are insufficiently explored. Understanding how these levels interact, complement, or conflict with one another is crucial for developing cohesive and effective governance strategies. Research should investigate the mechanisms of coordination and the potential friction points between these governance layers, examining how they impact the implementation of water policies and the overall management of water resources.

The role of environmental regulations and their impact on water governance remains underexamined. Given the increasing importance of sustainability and environmental protection, it is crucial to understand how environmental policies influence water management decisions across all governance levels. This includes exploring the effects of regulatory frameworks on the adoption of sustainable practices, the management of water quality and quantity, and the resilience of water systems in the face of climate change and other environmental stresses.

Sociopolitical and cultural factors that influence water governance are often overlooked in the literature. There is a need for research that delves into how cultural differences, local political dynamics, and interpersonal relationships among decision-makers affect water management practices. By examining these sociopolitical dimensions, researchers can gain insights into the challenges and opportunities that arise in different cultural and political contexts, contributing to the development of governance models that are both effective and culturally sensitive.

Moreover, the integration of new methodologies, such as big data analytics and machine learning techniques, could provide unprecedented insights into the dynamics of water governance. Enhanced access to comprehensive and detailed datasets would enable more nuanced analyses, revealing patterns and trends that are not apparent through traditional analytical methods. These advanced methodologies could significantly improve the precision and depth of research findings, offering new perspectives with regard to the optimization of water governance.

Finally, the role of citizen participation in water governance decision-making processes remains quite somewhat understudied. Future research should explore mechanisms to enhance citizen engagement and assess its impact on governance transparency and service efficiency. By investigating the ways in which citizen involvement can be increased and its effects on governance outcomes, researchers can identify strategies to make governance frameworks more inclusive, democratic, and responsive to public needs.

Addressing these research gaps presents significant opportunities to advance our understanding of water governance and optimize existing models across various levels. Emphasizing long-term impacts, conducting comparative analyses, and considering sociopolitical dimensions will substantially enrich the current literature.

6 Conclusion

In analyzing the different governance structures for managing public services, particularly drinking water, this literature review has highlighted three primary approaches: intermunicipal cooperation, private management, and national-level management. Each

model has distinct implications for efficiency, cost, and political dynamics.

Intermunicipal cooperation, which involves collaborative agreements between municipalities, often aims to achieve economies of scale and improve resource management. However, the effectiveness of such cooperation varies. While it can lead to cost reductions and shared expertise, it may also introduce complexities and transaction costs that hinder performance. The degree of fiscal capacity and local political dynamics significantly influence the success of these cooperative efforts.

Privatization, characterized by transferring management to private entities, is frequently driven by the desire to enhance efficiency and leverage private sector expertise. This model's success depends on regulatory frameworks and the nature of contractual arrangements. While privatization can lead to improved service delivery and innovation, it also raises concerns about equity, affordability, and accountability. The literature reveals mixed outcomes, with some studies indicating cost savings and others highlighting issues such as price inflation and reduced public control.

National-level management of water services, prevalent in some countries, emphasizes centralized control and uniform standards. This approach can ensure consistent service quality and comprehensive regulatory oversight. However, it may also struggle with local responsiveness. Historical analyses indicate that national interventions have been crucial in establishing water infrastructure, yet contemporary challenges require balancing centralized policies with local autonomy.

Beyond the issue of drinking water resource governance, other contemporary subjects of investigation remain to be addressed. Municipalities are facing significant budgetary constraints: how can budgetary balance be maintained in a context of ecological transition, where investments are more critical than ever? Governance challenges intersect with contemporary environmental concerns. Therefore, the analysis of the links between markets, institutions, and the various actors involved in the management of commons and environmental externalities must remain central to the concerns of policymakers and economists ([Mayol and Omgba, 2024](#)).

In conclusion, the choice of governance model for drinking water services significantly impacts service quality, cost efficiency, and political relations. The findings emphasize the importance of context-specific strategies, recognizing that no single model univer-

sally outperforms the others. Future research should focus on models that integrate the strengths of different governance approaches and explore the long-term impacts of these arrangements on service sustainability and public trust.

Given the current environmental context, with increasing human consumption, water scarcity and climate change pressures, the governance of water services takes on even greater significance. Effective management must not only address economic and political factors but also ensure sustainable and resilient practices that can adapt to and mitigate environmental challenges. This necessitates a dynamic and integrative approach to water governance that prioritizes long-term environmental stewardship.

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