

REFLECTIONS ON WATER SHORTAGE IN SOME BRAZILIAN REGIONS AND CO-PRODUCTION IN PUBLIC MANAGEMENT: TOWARDS A MORE EFFECTIVE WATER MANAGEMENT

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The lack of water in some regions of Brazil, as in the northeastern semi-arid and in Jequitinhonha and Mucuri Valleys, located in the northeastern part of Minas Gerais State, has caused economic and societal problems. This article aims to fill a literature gap, once studies on this topic are scarce. This work sought to reflect on whether the relationship between water management stakeholders, through co-production in public administration, could improve water management. Through the intersection between the theories of Stakeholders, Co-production, and Common Good, it is hypothesized that the intersection between stakeholders could, through democratic decision-making, minimize the negative effects of water scarcity. The main conclusions point to new possibilities for public management, which constitute a promising field for the effective participation of stakeholders, enabling more effective water management.

Keywords: water management, co-production, stakeholders.

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REFLEXÕES SOBRE A FALTA DE ÁGUA EM ALGUMAS REGIÕES BRASILEIRAS E A COPRODUÇÃO NA GESTÃO PÚBLICA: RUMO A UMA GESTÃO HÍDRICA MAIS EFETIVA

A falta de água em algumas regiões do Brasil, como no semiárido nordestino e nos Vales do Jequitinhonha e do Mucuri, localizados no nordeste de Minas Gerais, tem causado problemas econômicos e sociais. Este artigo visa preencher uma lacuna na literatura, uma vez que estudos sobre o tema são escassos. Este trabalho buscou refletir se a relação entre os atores da gestão hídrica, por meio da coprodução na administração pública, poderia melhorar a gestão da água. Por meio da intersecção entre as Teorias dos *Stakeholders*, da Coprodução e do Bem Comum, levanta-se a hipótese de que a intersecção entre os *stakeholders* poderia, por meio da tomada de decisão democrática, minimizar os efeitos negativos da escassez de água. As principais conclusões apontam para novas possibilidades de gestão pública, que constituem um campo promissor para a participação efetiva dos atores, possibilitando uma gestão mais efetiva da água.

Palavras-chave: gestão hídrica, coprodução, *stakeholders*.

REFLEXIONES SOBRE LA ESCASEZ DE AGUA EN ALGUNAS REGIONES BRASILEÑAS Y LA COPRODUCCIÓN EN LA GESTIÓN PÚBLICA: HACIA UNA GESTIÓN HÍDRICA MÁS EFICAZ

La escasez de agua en algunas regiones de Brasil, como la región semiárida del noreste y los valles del Jequitinhonha y del Mucuri, ubicados en el noreste de Minas Gerais, ha causado problemas económicos y sociales. Este artículo pretende llenar un vacío en la literatura, ya que hay pocos estudios sobre el tema. Este trabajo buscó reflexionar sobre si la relación entre los actores de la gestión del agua, a través de la coproducción en la administración pública, podría mejorar la gestión del agua. A través del cruce entre las Teorías de las Partes Interesadas, la Coproducción y el Bien Común, se plantea la hipótesis de que el cruce entre los actores podría, a través de la toma de decisiones democráticas, minimizar los efectos negativos de la escasez de agua. Las principales conclusiones apuntan a nuevas posibilidades de gestión pública, que constituyen un campo promisorio para la participación efectiva de los actores, posibilitando una gestión más eficaz del agua.

Palabras clave: gestión del agua, coproducción, *stakeholders*.

INTRODUCTION

The rapid and disordered development of cities and other varied problems related to social and economic issues has caused water scarcity in some Brazilian regions. Water is a public good and must be managed based on the Constituição da República Federativa do Brasil (Constitution of the Federative Republic of Brazil) (CF/88 as called in Portuguese in Brazil) and under the coordination of public departments at the national, regional and local levels (CONFORTO, 2000).

As claimed the Agência Nacional de Águas – ANA (National Water Agency) (BRAZIL, 2010), the control of water resources must take place with the participation of public authorities, users and community. Edelenbos and Klijn (2005) say that the interactions between the subjects of public administration should take place based on democratic legitimacy, in which employees, citizens, social groups, and private companies can influence decision-making.

When a group of users have the power to decide on the delivery of public services, these services tend to become more efficient, but, to achieve this, the government must offer participation conditions so that citizens have the ability to co-produce with it (LINDERS, 2012; MCGINNIS & OSTROM, 2012). In this sense, it is important to consider the Stakeholder Theory, conceptualized as the theory of interested parties, which concerns any group of individuals that can affect or be affected by an organization's actions (FREEMAN; REED, 1983). García-Sánchez, Oliveira and Martínez-Ferrero (2020) deliberate that public organizations' stakeholders are actors concerned with in public affairs and aware of their rights and duties and who demonstrate citizenship, ethics, and defense of the environment, regardless of whether they are citizens, public agents, social groups, communities, associations, cooperatives, or other civil organizations.

Considering that water is a public good and that the entire population benefits from the good conservation of this resource, there are, thus, citizen-users, supplier-users, public employee-users, all characterized by a role defined predominantly by the public sector. Therefore, all these subjects can be considered as stakeholders in water management. Accordingly, Cabral, Fernandes and Ribeiro (2016) categorize public sector stakeholders as those who have: the right to vote; economic power; political power; right to use public services; employment relationship with the public service; and the ability to influence or change the way services are delivered.

Stensrud (2019) stated that in the early civilizations, water management was driven by the political powers and bureaucratic elites of the time and, despite social and cultural developments, water distribution required high levels of organization regulated by manuals and bureaucratic details. The author also pointed out that the use of water was under the control of the “modern bureaucracy”, especially in the field of agricultural irrigation.

The relationship between the State and hydro-social territories incorporates participatory practices of people, hydraulic technologies, socio-economic structures, and political-cultural institutions as elements that (co)constitute and (re)produce (MENGA & SWYNGEDOUW, 2018). In this sense, water management actors’ perception is considered important for preference: to cooperate with water resources conservation through the participatory management of all possible actors, work together, co-produce with the State and regulatory bodies.

Hence, in this theoretical essay, the following question is primarily considered: could the participation of stakeholders in the public sector incur better water resources management? In this sense, it was established as the main objective to reflect on whether the participation of public sector stakeholders could improve water management. To achieve this purpose, water will first be presented as a public good, addressing mainly its management. Previous studies have discussed the problem of scarcity of water resources, economic interests in the exploration and exploitation of water in Brazil, cultural aspects that involve water distribution, conflicts caused by poor water management, among other topics, nonetheless, there is a lack of studies that reflect on better water management through the intersection of its involved stakeholders. Thus, the present essay aims to help fill this theoretical gap, by adopting an approach that discusses the theories of Stakeholders, Coproduction, and Common Good.

In this perspective, many authors seek to understand and explain the cultural aspects that involve water distribution, such as Damania (2020) and Mollinga (2020). There are also many studies related to lack of water or related to conflicts caused by poor water management or water scarcity, namely: Brito and Aguiar (2019); Demajorovic, Caruso and Jacobi (2015); Fernandes *et al.* (2020); Sehring (2020); and Silva *et al.* (2019). Or even those who describe aspects related to equal distribution and good use of water, or even study democratic and participatory management, such as Belotti (2015); Conejo (1993); Krüger and Siedenberg (2017); Rodrigues, Tomás and Saiani (2019); Rosa *et al.*

(2020); Santin and Goellner (2013). And yet, those who version about water management's bureaucratic principles, such as Stensrud (2019).

It was also necessary to present the concepts and characteristics of the stakeholders of the public authorities in this scenario in the light of Donaldson and Preston (1995); Edelenbos and Klijn (2005); Freeman and Reed (1983); and Freudenreich, Lüdeke-Freund, and Schaltegger (2020). Subsequently, it was discussed about the intersection between public service stakeholders and the co-production of the public good, reflecting, in this perspective, the best water management, supported by the authors: Alford (2014); Bovaird and Loeffler (2012); Brito, Lopes and Dos Anjos Neta (2020); Dias and Gomes (2017); Linders (2012); Magalhães and Souza (2015); Mattia and Zappellini (2014); Nabatchi, Sancino and Sicilia (2017); Osborne and Strokosch (2013); Osborne, Radnor and Nasi (2013). The final considerations are made, and a research agenda for future studies on the theme will be proposed.

Water as a public good

As specified by Rodrigues, Tomás, and Saiani (2019), water is a finite and vital human survival resource. But Santin and Goellner (2013) drew attention to the fact that approximately 97.5% of the planet's water resources are saltwater, and only 2.5% of this total is freshwater. However, of all water on the planet, only 0.5% is available for human use.

As specified by Brito and Aguiar (2019, p. 62-63), “approximately 828 million people live in slum conditions, lacking basic services, such as drinking water and sanitation”, with over one and a half billion people living in regions with total water scarcity. Another relevant point is the prediction that, by the year of 2025, two thirds of the world population may be affected by restrictions or inadequate water sanitation.

Accelerated urban development, disorderly land use, and the raising number of industries have made this resource increasingly scarce (DEMAJOROVIC; CARUSO; & JACOBI, 2015). It is known that, in contemporary times, lack of water in some Brazilian regions has become a serious problem. Thus, planning to control its use as well as its conservation is essential to guarantee the quantity and quality of water.

At the national level, the Diretoria de Águas (Water Directorate) (1933), the Serviço de Águas do Ministério da Agricultura (Water Service of the Ministry of Agriculture) (1933), and the Departamento Nacional de Pesquisa Mineral (National

Department of Mineral Research) (1934) were among the first public institutions that manage water resources. The Departamento Nacional de Pesquisa Mineral (National Department of Mineral Research) is still in charge. Pizaia, Machado and Jungles (2002), at that time, say that the bureaucratic model (“comply and make comply”) prevailed in public administration, and, only in 1948, with the creation of the Companhia de Desenvolvimento dos Vales do São Francisco – Codevasf (São Francisco Valley Development Company), Brazilian water resources management model started to be considered financially feasible.

The systemic model of participatory integration, which aims at policies for economic growth, social equity, and environmental balance, emerged with the consolidation of the CF/88 (PIZAIA; MACHADO; & JUNGLES, 2002). Nowadays, some of the departments that participate in this management are the Secretaria de Recursos Hídricos e Qualidade Ambiental (Secretary of Water Resources and Environmental Quality) and the ANA, both linked to the Ministério do Meio Ambiente (Ministry of Environment). The former is responsible for the national policy on water resources, and the second for its implementation.

After the CF/88, on October 5th 1988, some laws and guidelines were enacted, seeking a better management of this resource, such as “registering, monitoring, and inspecting concessions of research and exploration rights of water and mineral resources in their territories” (BRASIL, 1988). Conforto (2000) points out that state departments of water resources, constructions, and infrastructure are responsible for organizing the sanitation policy. This author also emphasizes that, in some states, management is carried out by regulatory agencies for public services. However, there is no effective and efficient regulation of the sector, which has led to a dissociation between companies and users, creating a lack of regulation in consumption fees.

In conformity with Brito and Aguiar (2019), the water crisis that the world has been tackling is caused by governance problems and not necessarily by resource availability. In turn, Conejo (1993) states for the water resource to be managed properly, there must be: (1) technology - to measure hydrological phenomena in a manageable way; (2) instruments – which define rules, technical, economic, and legal norms, through policies and plans; (3) human resources - which involve decision makers, water users, technicians, and other people interested in the management of this resource. In the municipal sphere, the lack of qualified human resources causes problems in managing water resources.

For Rosa *et al.* (2020), the poorest and the most vulnerable people tend to suffer more from the consequences of serious water scarcity. In this sense, these authors state that better water resources management would minimize the problems caused by water scarcity since political and economic factors determine the efficiency of resources distribution.

Water as a common good

The resources or set of resources shared by the community are considered as “common goods” and are not considered as private property rights (BRANDSHAUG, 2019). Krüger and Siedenberg (2017) assert common goods are not open for everyone to use freely as they wish, the water is an example.

In the opinion of Rotta (2019), common goods are shared resources, having specific values, protocols, and rules to be managed for collective benefit. As per Belotti (2015), water is a natural and immaterial resource intended for the community use, must be free and without exclusions. In this context, Galizoni and Ribeiro (2011 p. 85) claim that the “domain over water is not limited to the individual, but transits as a gift to the community”.

The management of common goods requires a democratic style of relationship between individuals and communities (BELOTTI, 2015). In the water context, it is necessary for communities to participate in its management, once they transit through different geographical spaces. Irigaray and Gorczewski (2019) state that water is not a resource intended for heritage and must be maintained and distributed conveniently, according to collective interests and needs.

When it comes to common goods, it is necessary to establish community relations as an institutional arrangement, in which citizens, government officials, and organizations will have their responsibilities for use, monitoring, and evaluation (BRANDSHAUG, 2019). Therefore, it is necessary to establish an adequate water resource management process, in order to guarantee efficiency and sustainability (BELOTTI, 2015).

One way to manage water in the community would be to treat it as a collective matter, organizing community meetings and community work to prevent misuse and misdistribution of the resource. In addition, it is convenient for all users of the resource to control each other’s water use (BRANDSHAUG, 2019).

Rigolon (1997) believed the regulation of water use is a difficult task, once it is not only through comprehensive legislation that an efficient structuring will take place; additionally, it is necessary to have both material and human resources, so that this regulation can be better implemented.

Alves and Rabelo (2018) show that for every 10 inhabitants of the world (2.1 billion), three do not have access to drinking water at home and that the forecast is that by the year 2050, 33% of this population (2,3 billion) will face severe water restriction. However, although Brazil has a large availability of water, the volume of water is uneven in its regions and the semiarid regions that historically face water scarcity. However, the authors warn of what they call "democratization of drought". In Brito and Aguiar (2019) opinion, with no rain in 2016, the level of important reservoirs in the states of São Paulo, Rio de Janeiro, and Minas Gerais led the water crisis also affect the Brazilian Southeast and Midwest regions.

In the world, only 63% of the population has access to basic sanitation (BRITO & AGUIAR, 2019). In this sense, Saiani, Rodrigues and Toneto Júnior (2015) point out the following causes: "periods of drought, pollution of water resources, increased demand, insufficient water in the spring, deficiency in production, and problems in distribution" (p. 114). Brito and Aguiar (2019) stated that although Brazil has an "important" water reserve, it is necessary to create measures for better water resources management, such as environmental education, regulation, inspection, and control of consumption policies.

For Brazil (1988), an issue that generates debates concerns the waste and water scarcity in some Brazilian regions. In the opinion of Gomes, Bittar and Fernandes (2016), one of the practices to avoid waste would be the rational and efficient use of water, as it is a fundamental practice in maintaining its quantity. They also emphasize that the measurement, comparison, and sharing of data can assist in the process to achieve best practices in the management of this resource; it is necessary to make the population aware of this.

As discussed so far, the public water resources management presents difficulties and characteristics that must be studied carefully, as water is a public good - both essential and limited. This sector must adopt measures that are regulatory (CONFORTO, 2000), but that, at the same time, manage to meet the demands of the environment and men in a democratic way.

Belotti (2015) believes that good governance of common goods requires trust, civic engagement, collective rules, and a social organization capable of making decisions collectively. In turn, Fernandes *et al.* (2020) state that citizen participation in the context of water governance, in many situations, is seen simply as the goodwill of citizens to accept previously established decisions, without there being an effective consultation of what measures really benefit the community.

In the opinion of Coutinho *et al.* (2017) opinion, water governance's democratization is a common reason for social struggles. In this sense, Fernandes *et al.* (2020) argue that it is necessary to establish forms of collaborative and participatory management that align the interests of all stakeholders who use or depend on this common good so that, in this way, the decision-making process is represented as a focus on participatory pluralism management of water resources.

Stakeholder theory concepts and fundamentals

Stakeholders are all people or groups that have legitimate interests in an organization (DONALDSON & PRESTON, 1995). The Stakeholder Theory points to a legitimate relationship of interested parties when there is a real influence between the elements involved (LYRA; GOMES; & JACOVINE, 2009), guided by trust between the stakeholders and the organization (CONNER, 2016).

The relationships inherent to stakeholders are built based on three attributes: power, legitimacy, and urgency. Only those who interact with the organization due to the influence of at least one of these attributes will be considered a stakeholder, even though these relationships occur in (LYRA; GOMES; & JACOVINE, 2009) a harmonic or conflicting way. Therefore, PAGNUSSATT *et al.* (2018) describe a company's stakeholders as those who relate to it through its daily activities, which can be: shareholders, investors, consumers, employees, suppliers, buyers, distributors, community, press, social activist groups, among others. In the public water management management scenario, it appears that the entire community (citizens) constitutes a stakeholder, as it presents the attribute of legitimacy (democracy) and, in the case of water scarcity, of urgency.

For Freeman and Reed (1983), identifying stakeholders occurs through the recognition and understanding of the interests and participation of each involved in a negotiation and in the power they exercise over the organization. About the understanding of Freudenreich, Lüdeke-Freund and Schaltegger (2020), stakeholders generally have the

have the potential for unity and willingness to act and assertive decision-making, which promotes opportunities to obtain better results in business environments. In this sense, it is necessary to maintain a solid relationship with stakeholders, whether internal or external. Therefore, when creating a shared value purpose, everyone is given a specific motivation to collaborate with the organization.

Following this reasoning, Donaldson and Preston (1995) present an evolutionary vision of stakeholders, in which property rights are not an exclusive interest of shareholders, but include collective benefits for all interested parties, and managers must pay attention to all those involved, not only to the owners. Neglecting the existence of these participants can lead an organization to failure (LYRA; GOMES; & JACOVINE, 2009). When these stakeholders are identified, the dependency relationships between them are discovered, as well as which influences are exerted and the way in which they interact.

Edelenbos and Klijn (2005) explain that there is a field of study within governance that deals with the dependency relations between the actors in public policies: the Network Theory. The authors discuss the interactions between the subjects based on democratic legitimacy, emphasizing that the characters who have vital resources can influence decision-making and are interested in identifying the role played by employees, citizens, social groups, and private companies in public management.

Co-producing in the public service for the common good

The co-production of public services refers to the strategy of producing goods and services produced by the public administration through a democratic and participatory process that involves citizens and individuals who are not public employees (MATTIA & ZAPPELLINI, 2014). In this perspective, Bovaird and Loeffler (2012) assert that the State and civil society must work together in order to achieve good results, so that most people identify themselves in that context with a good society.

In turn, Nabatchi, Sancino and Sicilia (2017) state that public services co-production involves State actors (direct or indirect), considered as government agents, and lay actors, composed of citizens, clients, and producing citizens. Public agents are not always civil servants, and they can be hired by some governmental entity, such as non-profit organizations, civil society, or private organizations.

For Mattia and Zappellini (2014), a co-production of public search services

incorporates values and techniques of public services in public administration activities to reduce costs and improve the quality of services provided. In this sense, Osborne, Radnor and Nasi (2013) say which a citizen's role goes beyond inspection or collection of results from managers, reaching a responsibility for the production of efficient public goods and services.

Citizen's participatory action in the provision of public services benefits not only what it co-produces with the government, but also the whole society. Furthermore, it needs to be well planned to achieve the desired results (OSBORNE & STROKOSCH, 2013). There are many forms of co-production between citizens and the government. Among them, McGinnis and Ostrom (2012) quote the maintenance of personal security habits, and avoidance of risky situations; Alford (2014) mention the existence of brigade volunteers in case of fire; Linders (2012) consider the practice of informing the fire brigade about accidents and natural disasters, and the public consultation and participatory budgeting, and also reporting of tax fraud; Dias and Farias (2019) suggest the self-service on e-Gov platforms.

Co-production can be performed in activities that involve traditional or non-traditional services, especially when they meet public services and policies (NABATCHI; SANCINO; & SICILIA, 2017). Some co-production, as Dias and Gomes (2017), reference the field of education as the most common example of co-production for improvement of public services, therefore, when parents participate in school meetings and decide together the events, educational actions, and the application of financial resources in school management, in a way, they are co-producing with the educational system.

In Dias and Gomes (2017) perspective, the co-production of public services is generally a voluntary act on the part of the citizen who assumes the responsibility of collaborating with the delivery of a service in an optimal way. On the other hand, Osborne and Strokosch (2013) say it cannot be considered a simple supplement of public services delivery, but an indispensable component for the effective and efficient management of these services. However, Linders (2012) declares some governments reward citizens who propose or collaborate to solve social and collective problems, such as the case of the Barack Obama administration in the United States of America through the "challenge.gov platform". From the beginning of his administration, Barack Obama emphasized the importance of an open and inclusive government, directing American agencies to look for ways to consider the knowledge and experience of ordinary American citizens. The

federal government sought the talents and interests of thousands of Americans, teaming up with citizens to solve some of the country's most challenging and pressing problems. 42,000 Americans participated in more than 300 challenge competitions featured on the "challenge.gov platform" and received US\$35 million in prizes, as described on the Challenge website. An example is "Waves to Water", which promotes a competition for the design of modular desalination systems, capable of converting sea water into drinking water, offering a prize of up to US\$ 2.5 million in cash for the best proposals.

An efficient system for the delivery of public services should provide the empowerment of users. For this, it is essential that servers offer conditions for their participation, as they are the essential co-producers of the service. This empowerment of citizen, in a way, is associated with the users' abilities to interact with the services through their experiences, in order to achieve the intended results (OSBORNE & STROKOSCH, 2013).

The co-production of the public good or public services is considered by Moretto Neto, Salm and Souza (2014) as defined strategies for the realization of public services, in which the participants share responsibilities and power among themselves. They are usually co-producers of the public good: the public apparatus of the State; private organizations; third sector companies; community arrangements; and citizens as a whole.

The co-production of the public good is related to the public administration model and to public policies promoted by governments, private organizations, third sector companies, community arrangements, and citizens (MAGALHÃES & SOUZA, 2015).

Over the years, public administration has undergone several transformations. At first, public administration followed only a bureaucratic bias. Over time, it adapted to the social demand to implement "democracy, transparency, responsiveness, effectiveness, efficiency, participation, and even co-production of public services" (MORETTO NETO; SALM; & SOUZA, 2014, p. 165).

Salm and Menegasso (2009, p. 97) affirm that the study on the network of co-production of the public good must involve the models of public administration and the social reality to which they apply, "from this perspective, such models are complementary to each other, each one with its space of applicability in politically articulated society". In this sense, Moretto Neto, Salm and Souza (2014) ratify that the public good is co-produced in a network, and that network is formed by elements of

society that are inserted in any of these models of public administration, namely: old public administration model; new public management model; and model of the new public service.

Intersection between stakeholders and co-production in water management

In the 21st century, two groups of scholars have debated the country's water crisis. One group argues that the problem is due to poor management and not due to a real crisis of scarcity, whereas the other considers the problems related to social and economic development as aggravating (DEMAJOROVIC; CARUSO; & JACOBI, 2015). However, Pizaia, Machado and Jungles (2002) portray that as of the CF/88, Brazilian water resources should be managed in accordance with the systemic model of participatory integration. Besides, conformed to Brasil (1988), water is a natural good and must have ecological, social, and economic value, so that its management be decentralized and count on the participation of the public power, users, and community, to be effective and efficient.

In this sense, stakeholders must establish an effective influence on public organizations and have legitimate interests on offered services or products (LYRA; GOMES; & JACOVINE, 2009). As described by Freeman and Reed (1983), interested parties must exercise shareholding, economic or influential participation in these organizations. Considering that water resources can be managed by the government or by public service regulatory agencies, with the participation of stakeholders, the following question arises: Could participation of public power stakeholders lead to better management of water resources?

In order to answer this research question, a sequence of discussions and three reflections will be presented to guide the research agenda and culminate in the conclusions of this study.

Stakeholders who co-produce with the public good to better manage water resources

Participative management enables community and citizens to get involved, with true integration, to make the production and delivery of quality services possible in a co-produced way (DIAS & GOMES, 2017). Based on the subsidies brought by the Normative Democratic Theory, and the elements that meet democratic legitimacy in public administration, it is proposed that the main stakeholders to be taken into account

for water management would be citizens, customers, community, labor unions, shareholders, public employees, social groups (councils and non-governmental organizations), and private companies. Edelenbos and Klijn (2005) say these stakeholders could assume a more robust influence and responsibility as co-producers in the management of water resources towards more effective management.

In the democratic context, it is possible to favorably integrate these parties so that they are not only positioned as customers of the offered water services (DUNN & MILLER, 2007), but also as collaborators in the planning and execution of these services.

Public management, which is often characterized as being the bureaucracy itself, could prevent greater stakeholder participation and, consequently, the realization of co-production. The principles surrounding New Public Management (NPM) can be seen as follows: (1) governments have a responsibility to provide services or take responsibility for services delivery; (2) the government must empower citizens and communities to exercise self-government collaboratively; (3) the government must provide competition, encouraging citizens to create new and better ways of providing public goods for themselves and their fellow citizens; (4) governments must be guided by their missions (DUNN & MILLER, 2007). Items (2) and (3) stand out here as those that need further development in the context of water resources management. In this proposal and according to these authors, the notion of traditional hierarchy, in which the pyramid places managers at the top and other employees at the bottom, would be something to be reconstructed, as it suggests that employees are the most important members of the organization. Hence, the following reflection is presented:

Reflection 1: Citizens, customers, community, labor unions, shareholders, public employees, social groups, private companies, and whoever else has a legitimate interest or is affected by the decisions taken would be the stakeholders in the process of water resources management.

Public management to produce and co-produce public services and common goods

Aiming at better distribution of water, considering the rationing process in certain periods of drought, a hierarchy in the sharing process becomes necessary. Water supply to society is a priority, as the Water Code of 1934 states, based on the following hierarchy of use: (1) domestic; (2) urban; (3) industrial; and (4) irrigation. This ranking is

carried out considering the quantitative and qualitative impacts of water. It is also worth mentioning that there is a distinction between domestic and urban use, the first referring only to residences and the second supplying commerce and the general public (CONEJO, 1993). Moretto Neto, Salm and Souza (2014) describe the co-production of public services in its functional model has aspects of bureaucracy as predominant value and aims at producing public services for customers and not for a participatory community. Thus, freedom of action and participation are restricted.

The act of co-producing cannot be focused on the State's bureaucratic organization, but on public administration to produce and co-produce public services in conjunction with the various instances in society (SALM *et al.*, 2011). It concerns a model of public administration in which community and citizens share with the public management responsibilities and power in carrying out public services (MORETTO NETO; SALM; & SOUZA, 2014). Bureaucracy, in this context, concerns the regulation of activities of public and private organizations to serve public interests, aiming at common good (SALM *et al.*, 2011).

For Salm *et al.* (2011, p. 3), public goods can be produced “through public bureaucracy, non-governmental organizations, private companies focused on issues of public interest, community or networks of co-production of public services”.

It is worth mentioning that, regardless of whether or not the public good is managed in community, it is necessary to establish a hierarchy of roles, responsibilities, and interests, so that everyone have equal access to the resource without waste and without its definitive scarcity. In this context, it is important to remember that it is necessary to establish an adequate water resources management process in order to guarantee efficiency and sustainability (BELOTTI, 2015). Therefore, the following reflection arises:

Reflection 2: The stakeholders involved in the water resource management process are able to establish hierarchies of roles so that everyone has equal access to the use and consumption of water.

Good practices in water resources management

The theoretical foundation explored so far and the two previous reflections, allow us to conclude that the co-production between the public power and its respective

stakeholders regarding the management of water resources is possible, supported by initiatives for greater participation of interested parties. This co-production is a potential initiative to be promoted in order to more effectively mitigate the problem of water scarcity, which is no longer a new problem. The United Nations (UN) claim that more than 2.7 billion people are expected to suffer from lack of water in 2025. There are even fears that water will be a cause for conflict between nations. It is worth mentioning that the stakeholders of the water resources management process involve: citizens, customers, community, labor unions, shareholders, public employees, social groups, private companies, and whoever else has a legitimate interest or is affected by the decisions taken in these processes.

Many countries have managed to overcome this scenario, such as Israel (through investments to prevent leaks and to promote water reuse) (SILVEIRA *et al.*, 2015), India (through community management of rural water supply) (MORETTO & RANZATO, 2017), and Palestine (through the “Virtual Water” project for small Palestinian farmers) (TROTIER & PERRIER, 2017). Amid these good practices already adopted in other countries, this study proposes that the problem of water scarcity in Brazil will not be solved effectively without macro actions that go beyond isolated actions by public authorities. The problem of water scarcity needs greater participation of stakeholders in the public power to put into practice, more systematically and robustly, which is proclaimed by the ANA. The control of water resources must occur with the participation of public authorities, users, and the community. Successful initiatives in Brazil regarding greater social participation in other spheres, such as participatory budgeting, school, and neighborhood councils, can be extended to control water resources.

Back to the “challenge.gov platform” of the American government, this initiative proved to be a significant channel for the federal government to obtain solutions proposed by the population, even for problems related to natural phenomena. The American Department of Urban Development rewarded citizens who proposed redevelopment projects for regions affected by hurricanes. Adopting this perspective, the present article suggests that more explicit channels of collaboration between stakeholders of Brazilian public power and society be opened, especially for the management of water resources, which can also take place through financial incentives, such as the American case. Given the above, a new reflection is presented:

Reflection 3: It is possible to minimize water scarcity in some regions of Brazil using participatory management and co-production of water resources, so that as many stakeholders as possible are involved and that they clearly understand their responsibilities, rights, and duties, regarding good use and preservation of this common good.

DISCUSSION AND PROPOSED AGENDA ON THE LACK OF WATER IN SOME BRAZILIAN REGIONS AND ON CO-PRODUCTION IN PUBLIC MANAGEMENT

Lack of water in some Brazilian regions, such as in the northeastern semiarid and in Jequitinhonha and Mucuri Valley, located in the northern part of Minas Gerais state, has been triggering social and economic problems. As water is a public and vital good, its management must count on the participation of all those involved in a democratic collaboration process. The distribution of water has already been taking place based on the ration that this resource could create even worse problems if not being managed efficiently.

The literature raised in this essay focused on the objective of reflecting whether or not the relationship between stakeholders, through co-production, could improve water management, allow the elaboration of suggestions, encourage reflections and a more fruitful management of water resources. From this perspective, it was possible to identify that although water resources are highly susceptible to political influence and economic factors, they can be managed more adequately through participatory and good quality management. In that logic, stakeholders can present and engage in proposals for improvements of water distribution and reuse.

In his sense, the northeastern semiarid region and the Jequitinhonha and Mucuri Valley can benefit from these projects. The whole society including actors in both public and private sectors can collaborate to educate public knowledge concerning water conservation, such as how to reuse water and avoid water contamination so that the environmental awareness among public can be raised and the misuse of water be gradually eliminated. Therefore, it is believed that cooperation between the various stakeholders can provoke effective actions by sharing experiences and expertise for better water management.

With the engagement from the public authorities and other stakeholders related to water management, this resource could be better managed, avoiding situations of scarcity, with a better intersection in the implementation and management of public policies. It is likely that participatory management and the sense of “common good” have the capacity to encourage stakeholders, to promote co-production actions and projects, and to participate more effectively in actions aimed at the good use of water.

In order to assist in this conduct, some reflections were, then, formulated in order to bring to the discussion aspects that would be involved in the water resources management process, such as: participants who would be involved in the process, co-production as one of the ways to reduce problems, and the sense of the common good as a co-production promoter. However, given the theoretical approach of this essay, its objective was not to test them empirically, but to propose the reflections that serve as an initial attempt to better understand the relationships among diverse parties involved and to contribute to the discussions upon water management. Hence, some questions about how these reflections are translated into practice may yield future research agendas: Do stakeholders, who could be involved in the water resources management process, have space for this participation? How does this participation take place, according the approach of new public management? Are interested parties able to co-produce with the government in order to avoid water scarcity?

The immersion in the literature, for this study, revealed that customers should be treated as collaborators and that, by exercising legitimate power, they would have complementary duties and obligations to the public power to manage this finite resource. It was observed that bureaucracy may present inhibiting or facilitating aspects in the water management process and may be the subject of further studies.

Another point to be considered concerns the technological evolution, the new information networks, and the new possibilities with the advent of changes in public management. They would possibly provide better management and conservation of water resources, if there was an effective participation of stakeholders and a real assessment of the role of subjects in the regulation of sustainable consumption.

Nonetheless, as explained, the present study focused on reflections about interrelationships possibilities without, however, exhausting the subject, once it is an issue of importance for the development of the country, deserving emphasis on the agenda of public policies of the new government.

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