International Journal of Advanced Engineering Research and Science (IJAERS)
Peer-Reviewed Journal
ISSN: 2349-6495(P) | 2456-1908(O)
Vol-8, Issue-12; Dec, 2021
Journal Home Page Available: https://ijaers.com/
Article DOI: https://dx.doi.org/10.22161/ijaers.812.39

# Public Policies for Cooperation on Water Supply and Water Allocation between the Municipalities of Bombinhas and Tijucas, Santa Catarina State, Brazil

Alesson Alexandre Cardozo[1], Joaquim Olinto Branco[2], Graziela Breitenbauch de Moura[3], Rafael Burlani Neves[4], Asensio Navarro Ortega[5]

[1,2,3,4]Mestrado Profissional em Gestão de Políticas Públicas – PMGPP, Universidade do Vale do Itajaí - UNIVALI, Brazil.
[5]Departamento de Derecho Administrativo, Universidad de Granada, Spain.

Received: 10 Nov 2021,

Received in revised form: 18 Dec 2021,

Accepted: 21 Dec 2021,

Available online: 27 Dec 2021

©2021 The Author(s). Published by AI Publication. This is an open access article under the CC BY license (https://creativecommons.org/licenses/by/4.0/).

***Keywords*—Cooperation, Municipality, Public Policy, Water Supply, Water Allocation.**

***Abstract*—** *The rational use of water is a concern in several countries that face severe water crises, both due to lack of treatment and water itself. The objective of this study is to analyze the public policies of cooperation for water allocation and supply between the municipalities of Tijucas and Bombinhas, located in the State of Santa Catarina, Brazil. Primary and secondary data were used regarding the Public Policies applied in the cooperation of water use between the municipalities. The primary data were collected through a bibliographic survey, document analysis that supported the transaction in reference, and legislative consultation that provided the legal apparatus of this Grant. The secondary data was obtained through semi-structured interviews. According to studies carried out by Águas de Bombinhas, the amount of water authorized for catchment by Secretaria de Estado de Desenvolvimento Econômico e Social - SDE (250L/s) is sufficient for the hydric supply of the city, during low or high seasons, until 2049. Despite the quantity of water being sufficient for the existing demand, more than half of the interviewees, residents of the city of Bombinhas/SC, report that the lack of water is still recurrent. On the other hand, 60% affirm that the price charged by the company is considered fair, considering the service offered.*

## I. INTRODUCTION

Water has a fundamental importance in maintaining biodiversity (Bacci and Pataca, 2008; Pulido, 2015; Pes, 2019). The presence or absence of water creates habits, develops cultures, determines land use occupation, wins battles, and drives new generations (Bacci and Pataca, 2008).

The Water Resources available for human consumption on the planet are tiny, despite the approximately 1,386 km3 billion of water, 97.5% of which is composed of saltwater distributed among oceans, saline aquifers and salt lakes (Clark and King, 2005; Agência Nacional das Águas - ANA, 2021). Only 2.5% is freshwater, but 2/3 is not available for consumption, as it is contained in glaciers, frozen subsoils, snow, among others (ANA, 2021).

Understanding the importance of water makes evident the constitutionally normed fundamental right to life because without this resource there is no possibility of human existence (Macedo, 2010; Pulido, 2015; Pes, 2019).

By fundamental right, it is understood that which is innate of every individual. Due to constitutional supremacy, it has immediate application, constituting a

stony clause and cornerstone that underlies the dignity of the human person, where it establishes an existential minimum to man (Franceschina and Mozetic, 2015; Pes, 2019).

It occurred in the year 2015, at the UN headquarters (New York), a meeting of the Sustainable Development Summit, from which, new Goals for Sustainable Development, called SDGs, were established, providing a global work agenda in the next 15 years, defined as Agenda 2030 for sustainable development (Sousa, 2018).

In this line, water has gained a new status: that of Sustainable Development guideline, through SDG 06 (Drinking Water and Sanitation). SDG 6 has 08 goals to be achieved within the 2030 agenda, aiming to provide universal and equitable access to drinking water for all, among other purposes (Programa das Nações Unidas para o Desenvolvimento – PNUD and Instituto de Pesquisa Econômica Aplicada - IPEA, 2021).

Concerning the amount of water available for consumption, Brazil has 14% of the total fresh water on the planet (Vargas and Azevedo, 2004; Wolkmer and Pimmel, 2013), is the largest reserve (Senado Federal, 2014), despite the abundance, its distribution is not uniform, being 80% found in the Amazon region (ANA, 2011; Empresa Brasileira de Comunicação - EBC, 2021).

In Santa Catarina, 97.19% of the population has treated water supply (Associação Brasileira das Concessionárias Privadas de Serviços Públicos de Água e Esgoto – ABCON and Sindicato Nacional das Concessionárias Privadas de Serviços Públicos de Água e Esgoto - SINDCON, 2019), but 200 thousand inhabitants still do not have this benefit (Instituto Brasileiro de Geografia e Estatística - IBGE, 2019). The State in the high season periods (December - February) receives a high tourist contribution attracted by its scenic features, scenic beauty and biodiversity (PRADO *et al*., 2012; Walkowski *et al*., 2017). In some regions, as in Bombinhas/SC, the number of visitors can increase up to 220%, when compared to the low season (Águas de Bombinhas, 2017).

Due to the high demand and insufficient Water Resources, it forced the municipality to hire tanker trucks to complement the water supply (Águas de Bombinhas, 2017a; 2021). Considering the water scarcity, the Water Supply Grant is a solution.

The Water Concession Grant is the instrument by which, the public authority, grants authorization to the public or private interested party the right to use Water Resources, for a determined period, under the terms and conditions expressed in the act (Granziera, 2001; ANA, 2011; 2013; Almeida and Curi, 2016; Cessa and Rizzi, 2017; Lisboa *et al*., 2019). To supply the demand, Bombinhas has requested a Grant of Passage from the Municipalities of Tijucas and Porto Belo, to abstract water from the Tijucas River. The Tijucas River watershed is the largest in the Central Coastal Hydrographic Region, has a drainage area of 2,371 km² and a drainage density of 1.68 km/km² (Comitê Tijucas Biguaçu, 2019).

Analyzing the cooperation entered into between the municipal entities, the intimate connection of Public Policies in the transaction in reference is verified. No matter the origin, whether they come from the State or social movements, Public Policies make values explicit and give publicity to the priorities of individuals or groups, since it is how society shapes the yearnings (Barata, 2013; Fernandez and Pietrafeza, 2021).

Considering the request for a water allocation from Bombinhas to the Municipality of Tijucas for the abstraction of water from the Tijucas River, we ask the following questions: In the context of the Public Policy of sharing, the cooperation of Grant and supply between municipal entities is an alternative for the solution of water scarcity?

## II. MATERIALS AND METHOD

### 2.1 Study Area

Located on the northern coast of the State of Santa Catarina, the municipality of Bombinhas is limited to the North, East and South with the Atlantic Ocean and to the West with the Municipality of Porto Belo and has as geographical coordinates: Latitude 27º09'36" S and Longitude 48º32'32" W, from the Equator and the Greenwich Meridian respectively (Bombinhas, 2010).

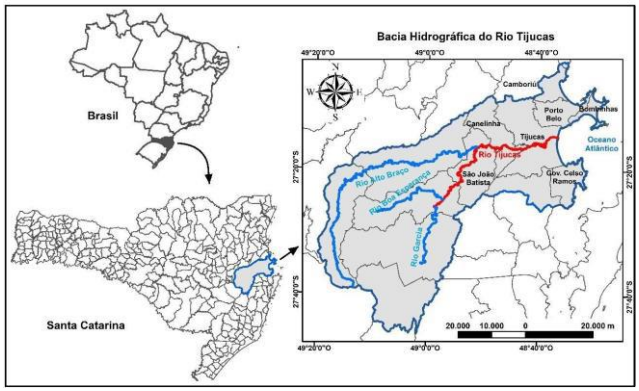


*Fig.1. Tijuca's River Basin*

Source: Fig. elaborated by the authors.

The Municipality of Tijucas, on the other hand, is also located on the North Coast of the State of Santa Catarina, bordering to the North with Camboriú, Itapema and Porto Belo, to the South with Governador Celso Ramos, to the

East with the Atlantic Ocean and West with Canelinha (Tijucas, 2020) and has as geographical coordinates (Fig. 01): Latitude 27º14'26" S and Longitude 48º38'4" W, from the Equator and the Greenwich Meridian, respectively (Cidade Brasil, 2019).

### 2.2 Data Collection

To conduct the research, primary and secondary data were used regarding the public policies applied to the capture and supply of water between the municipalities of Bombinhas and Tijucas, SC. The primary data were collected using a bibliographic survey and the current legislation referring to the Granting in Brazil, Santa Catarina and the Municipalities of Bombinhas and Tijucas.

The secondary data were collected using semi-structured interviews, using a script with 23 questions for people from the community and ten for the municipal authorities, focusing on the supply of treated water in the Municipalities of Tijucas and Bombinhas. Questions were asked about the community's knowledge, concerning the Granting and supply that occurred between the transacting Municipalities, as well as specific knowledge concerning the origin of the water resource they consume. We interviewed 50 residents from Tijucas and another 50 from Bombinhas, and 10 authorities in each municipality.

### 2.3 Data Analysis

After collecting primary data, the information was categorized and tables were prepared. After collecting the secondary data were organized in spreadsheets and interpreted through the use of tables.

## III. RESULTS AND DISCUSSION

### 3.1 Grant for water supply

The Grant is a legal instrument used in water management in the country, effective with the enactment of Federal Law No. 9.433/97 (Brasil, 1997), which established the National Water Resources Policy. The need for Grant occurs, for any use that changes the regime in the quality or quantity existing in the catchment site (Garcia *et al*., 2007; Cessa and Rizzi, 2017; Lisboa *et al*., 2019).

The definition of criteria for the Grant obligatorily goes through the analysis/study of a reference value of the competent body, which determines the upper limit of use (Pereira, 1996; Lisboa *et al*., 2019). However, according to Santos (2009), there is no uniformity regarding the type of Grant adopted in Brazil. The predominant model has as a standard, the establishment of a minimum flow rate in the water body, without concern about the losses of quantity or the possibility of using the excess water (Almeida and Curi, 2016). Despite having a specific character, the Grant waives regional analysis and should be guided by plans of Water Resources, land use and possible environmental impacts at the watershed level, defined through its committee (Conejo, 1993; Lisboa *et al*., 2019).

The problem plaguing the Watershed Committees is that community participation, as integral members, generates a favourable/positive perspective for the realization of sustainable ways of life in the watersheds, but that, there is still no effective participation of local citizens. One of the problems is that people are adapted to the paternalistic culture of the State, and the solution of conflicts must be instituted by the President, Governor, Mayor, in the conception that these are the only ones responsible for the implementation of Public Policies (Santos, 2009; Miranda, 2017; Silva and Teixeira, 2018).

The logic of a collegiate responsible for the watershed enables the participation of numerous social actors, generating a decision that passes through the sieve of people with different visions, helping to settle existing conflicts based on a reference to be worked (Presidência da República, 1997; Malheiros *et al*., 2013; Silva and Teixeira, 2018).

In Brazil, since the implementation of the National Water Resources Policy to date, the total number of water use permits granted by the National Water Agency (ANA) is 32,249, an agency that has the authority to manage the federal or interstate basin committees (ANA, 2021).

Analyzing the numbers by region, we can see that the Northeast Region has the most Granting Authorizations, accounting for 42.75%, followed by the Southeast Region 41.12%, Center-West Region 6.62%, North Region 5.80% and South Region 3.71%. The demand for the use of water is varied, according to data from a report prepared by the ANA, irrigation is responsible for 68.4% of the use of the captured water, followed by animal use which represents 10.8%, industry 8.8%, urban supply 8.6%, rural supply 2.4%, mining 0.8% and finally, thermoelectric 0.2% (ANA, 2017).

If we analyze Spain, some points are identical to the national Grant indexes, and in 2002, the following purposes were ascertained: Irrigation 63.8%, human supply, 11.4%, industry 5.9%, among others (Briz, 2018).

Santa Catarina, compared to the national level, had 118 Grant granted by ANA, being the 6th State with the smallest number of concessions. The reason for the low number may be related to the small number of watersheds under the domain of the Union, only 5, being the Rivers: Mampituba, Negro, Peperi-Guaçú, Pelotas and Canoas (Secretaria de Estado de Desenvolvimento Econômico e Social - SDE, 2014).

The state has a total of 18 hydrographic basins, 11 of which are isolated basins that flow eastward, flowing directly into the ocean and are part of the Atlantic Ridge, and 07 belong to the integrated system of the Interior Ridge, which is part of the Paraná-Uruguai basin. (SDE, 2014). In the State of Santa Catarina, the issuing of the Grant is a competence of the State Department of Sustainable Economic Development (SDE), through the Water Resources Board (ANA, 2021a), until 2019, the acronym was SDS. Granting must also obey the criteria defined by the Watershed Management Committees, more specifically its Water Resources plan (Comitê Tijucas Biguaçu, 2019).

In the state, since the promulgation of the Federal Law 9.433/97 (Brasil, 1997), the State Department of Sustainable Economic Development has granted until 2020, 3.447 concessions (ANA, 2021a). Among the total 2,839 refer to underground capture - 82.36% and 608 to surface capture - 17.64%. However, Ribeiro et al. state that the use of surface water is considered a priority over groundwater and should be used only when there is no other possibility of surface water supply (Ribeiro *et al*., 2014; França *et al*., 2018).

As an example, we use the city of Rio Verde/GO, belonging to the micro-basin of Ribeirão Abóbora. From the total amount of water captured through Grant, to supply the public system, 83% comes from the surface catchment and the remaining 17% represents underground catchment (Garcia *et al*., 2007), the percentage is similar to the Grants granted in Ceará (França *et al*., 2018). In Spain, the exploitation of groundwater is above its use capacity, but the extrapolation is due to the water shortage that the country faces at certain times of the year (Ceará, 2017).

Moving on to make a comparison of the purposes of the request for Granting in Brazil, the irrigation activity represents 58.77%, while in Santa Catarina 3.74%. The segment that most requested Granting was for animal husbandry 30.81%, public supply 13.34%, industry 11.28% and mining 3.19%. The disparity at a national level is that Santa Catarina has a predominance in the cattle-raising branch.

Despite the large number of water concessions granted in the State of Santa Catarina, when interviewing the community of Tijucas, 100% declared that they did not know of any public policy for water concessions in the country. The population of Bombinhas, on the other hand, 97.5% said they did not know and 2.5% chose not to answer. Concerning the authorities of the municipality of Tijucas, 80% declared they did not know and 20% chose not to answer the questionnaire. In Bombinhas, on the other hand, 90% declared they had no knowledge and 10% did not answer.

Among the 3,447 concessions granted in the state, 71 refer to concessions in municipalities belonging to the Tijucas River Basin: (Upper Valley) Angelina 10, Rancho Queimado 05, Leoberto Leal 01, Major Gercino 02; (Middle Valley) Nova Trento 04, São João Batista 08, Canelinha 02; (Lower Valley) Tijucas 11, Itapema 01, Porto Belo 05, Bombinhas 03, Governador Celso Ramos 01 and Biguaçu with the total of 18. The quantity represents 2.05% of the Granting in Santa Catarina, the rest being distributed among the other watercourses. And, among the grants granted to entities belonging to the Tijucas River Watershed, is the concession granted to the Municipality of Bombinhas, through Grant Ordinance No. 166 of 06/30/2017; Process No. DSUST 00000670/2017, requested on 04/06/2017, with a term of validity from 06/30/2017 to 06/30/2027 (10 years), for water withdrawal from the Tijucas River for public supply of the applicant municipality.

*Table 01. Responses of interviewees in the municipalities of Tijucas/SC and Bombinhas/SC - Community and Authorities.*

| QUESTIONS | | TIJUCAS | | | |
|---|---|---|---|---|---|
| **Does the Grant represent an environmental risk?** | | **No** | **Yes** | **Did not answer** | **Total** |
| | **N** | 33 | 7 | --- | 40 |
| | **%** | 82,5 | 16,5 | --- | 100 |
| **Were you aware of the Grant?** | | **No** | **Yes** | **Did not answer** | **Total** |
| | **N** | 15 | 35 | --- | 40 |
| | **%** | 37,5 | 62,5 | --- | 100 |
| **What is the counter-delivery of Bombinhas** | | **No** | **Yes** | **Did not answer** | **Total** |
| | **N** | 37 | 2 | 1 | 40 |
| | **%** | 92,5 | 5 | 2,5 | 100 |

| QUESTIONS | | BOMBINHAS | | | |
|---|---|---|---|---|---|
| **Does the Grant represent an environmental risk?** | | **No** | **Yes** | **Did not answer** | **Total** |
| | **N** | 35 | 4 | 1 | 40 |
| | **%** | 87,5 | 10 | 2,5 | 100 |
| **Were you aware of the** | | **No** | **Yes** | **Did not answer** | **Total** |

| | | | | | |
|---|---|---|---|---|---|
| **Grant?** | **N** | 16 | 23 | 1 | 40 |
| | **%** | 40 | 57,5 | 2,5 | 100 |
| **What is the counter-delivery of Bombinhas** | | **No** | **Yes** | **Did not answer** | **Total** |
| | **N** | 30 | 9 | 1 | 40 |
| | **%** | 75 | 22,5 | 2,5 | 100 |
| **Do you have treated water from Águas de Bombinhas?** | | **No** | **Yes** | **Did not answer** | **Total** |
| | **N** | --- | 40 | --- | 40 |
| | **%** | --- | 100 | --- | 100 |
| **Do you think the price is fair?** | | **No** | **Yes** | **Did not answer** | **Total** |
| | **N** | 15 | 24 | 1 | 40 |
| | **%** | 37,5 | 60 | 2,5 | 100 |
| **Is the lack of water recurrent?** | | **No** | **Yes** | **Did not answer** | **Total** |
| | **N** | 15 | 21 | 4 | 40 |
| | **%** | 37,5 | 52,5 | 10 | 100 |

| **QUESTIONS** | | **ANSWERS GIVEN BY THE AUTHORITIES OF THE MUNICIPALITIES OF BOMBINHAS/SC** | | | |
|---|---|---|---|---|---|
| **Does the Grant represent an environmental risk?** | | **No** | **Yes** | **Did not answer** | **Total** |
| | **N** | 8 | --- | 2 | 10 |
| | **%** | 80 | --- | 20 | 100 |

| **QUESTIONS** | | **ANSWERS GIVEN BY THE AUTHORITIES OF THE MUNICIPALITIES OF TIJUCAS/SC** | | | |
|---|---|---|---|---|---|
| **Does the Grant represent an environmental risk?** | | **No** | **Yes** | **Did not answer** | **Total** |
| | **N** | 6 | 2 | 2 | 10 |
| | **%** | 60 | 20 | 20 | 100 |

Source: Questionnaire applied. Note: Prepared by the Authors.

### 3.2 Environmental Sustainability at the Water Catchment Site

The water catchment in the Tijucas River is located at Estrada Geral Porto da Itinga, s/nº, Bairro Itinga, Municipality of Tijucas, ZIP Code 88.200-000, comprised by the following UTM coordinates 727590.95 m E 6981520.00 m S, Zone 22J, Datum SIRGAS 2000 (Secretaria de Estado de Desenvolvimento Econômico e Social - SDE, 2017).

The consumptive flow rate required by Água de Bombinhas, according to a technical demand survey, submitted to the SDE, along with Proceedings No. 670/2017, is 210 L/s. But the maximum flow rate granted by the Secretariat was 250 L/s (SDE, 2017).

To meet the demand of water supply in the Municipality of Bombinhas, during the low season period of the year 2018, 39.1 L/s were needed, while in the high season of the same year, the demand was 98.2 L/s. However, it is estimated that for the year 2023, during the low season period 44.9 L/s will be required, concerning the high season period of the year in reference, the Municipality will have a demand de 113,9 L/s (Águas de Bombinhas, 2017).

If only half of the volume granted is considered, it is already enough to meet the entire resident and floating population of the municipality until the year 2049.

The capture regime was proposed of 24 hours, during all days of the month, with a maximum daily capture of 18,144.00 m3/day, being sufficient to meet the needs of the applicant (SDE, 2017). However, the State Department of Sustainable Economic Development granted the maximum daily volume captured at 21,600.00 m3 and monthly limited to 648,000.00 m3 (SDE, 2017).

According to art. 13 of Law 9433/97, the grants in basins under the domain of the Union are conditioned to the priorities defined in the Water Resources Plans for each basin, and the class in which the body of water is classified must be respected. It is important to mention the main reference water levels defined at the national level: Q7.10, the minimum water level of 7 days duration with 10 years of recurrence; Q90 and Q95, water levels whose probabilities of exceedance are 90% and 95%, respectively, defined by estimating the permanence curve of natural water levels (Almeida and Curi, 2016). Thus, each state of the federation, according to the guidelines of each managing body, has the autonomy to set the limits and reference flows, regarding the Grant, varying between the states.

Regarding the States, each one has its way of regulating the matter. If we analyze the legislation in

Spain, we can see that there is no division of competence - Union, States, and Municipalities, as in Brazil, but rather than water is a single competence, belonging to the State Administration (Luz and Gomes, 2011).

Regarding the Grant, Spain is much more comprehensive compared to Brazil, the definition of the limit of water use is the responsibility of the Hydrographic Confederations (equivalent to Hydrographic Basins), which have the consultative, participatory, decision-making, and planning power (Luz and Gomes, 2011; Briz, 2018).

If Santa Catarina is analyzed according to the technical criteria for catchment, the SDS Ordinance No. 36 of July 29, 2008, establishes that the waters of the state domain, for analysis of water availability, will be used as a reference flow rate, the Q98 - flow rate of permanence for 98% of the time (SDE, 2017).

Each state of the federation, according to the guidelines of the managing body, has the autonomy to define the limits and the reference flow rates, regarding the granting of concessions, varying among the states. Ceará, Paraíba and Sergipe have established that the authorizable limit is the annual Reference of 90% (Q90%), which can be captured daily and uninterruptedly. Bahia, on the other hand, adopts the same quotient, but the capture reference is daily and not annual (Stinghen and Mannich, 2019).

As for the states that make up the southern region of the country, when analyzing the maximum allowable flow rate, it appears that the Rio Grande do Sul gives autonomy to each watershed to set up and manage its plan, but while it does not exist, the flow rate will be 90% - Q90 (Governo do Estado do Rio Grande do Sul, 2014), with no maximum percentage defined, as there is in Santa Catarina. In Paraná, in turn, the adopted reference flow rate is the permanence 95% of the time (Q95%), limited to 50% of the reference flow rate (Stinghen and Mannich, 2019).

At the point of water catchment, the Q98 is 18.70 m3/s, according to state legislation that for Granting purposes, the maximum flow (equivalent to 50% of Q98), is 9.35 m3/s or 9,350.00 L/s.

About the environmental sustainability of the Tijucas River, it is observed that the authorization granted by the SDE was for the maximum capture of 250 L/s and the water body has an outflow of 9,350.00 L/s. Thus, the allocation represents only 2.67% of the capacity, meaning that it will not compromise the volume of water in the river (SDE, 2014).

The community of Tijucas when asked if the Water Use Grant represented some environmental risk, informed that they are confident that it will not affect the environmental sustainability of the Tijucas River, despite their confidence, of the residents living in Tijucas, 37.5% informed that they were unaware of the Grant and 62.5% were aware of it. While among the residents of Bombinhas, 40.0% did not know, 57.5% knew and 2.5% chose not to answer (Table 01).

Despite the relatively high percentage of those who did not know about Grant between the municipalities, about 90% of the interviewees have lived for more than 10 years in Tijucas and Bombinhas 95% (Tabela 01).

Among the municipal authorities in Tijucas, 60% believe there is no risk, 20% that there is and 20% did not answer. While 80% in Bombinhas affirm that there is no risk and 20% chose not to answer (Table 01).

As the Grant authorized the capture of only 2.67% of what is allowed, it is believed that the environmental sustainability of the Tijucas River was observed, with the amount being incapable of producing negative environmental effects in the Tijucas River Valley. Since the reference value preserves the flow of water, supplying the needs of Bombinhas since the authorized catchment of 250 L/s was authorized, with the expiration of the Grant in 30/06/2027.

### 3.3 Legal Possibility of Transaction

In Brazil, the supply of drinking water is a municipal competence, but privatization is the trend (Ramos, 2005; Díaz and Nunes, 2020; Gonçalves, 2017), because the Federal Law n. 14.026 of 07/15/2020, that updated the legal framework of basic sanitation, has the scope of delegating this service to the private sector (Brasil, 2020), for a period of 20 to 30 years (Vargas and Lima, 2004; Gonçalves, 2017).

This trend encounters many reservations since the water trade is focused on profit and not on the satisfaction of citizens (Tovar, 2003; Gonçalves, 2017). Thus, the combination of water scarcity and power (Barlow and Clarke, 2003) can cause much environmental damage, since the conception that the private sector can offer efficiency is illusory.

Analyzing the legal instrument and all corresponding legislation, we can see the legitimacy of Águas de Bombinhas in requesting the Grant for the use of water (registration ID # 96859), being its responsibility to capture from the Tijucas River spring (27º16'14" S and 48º41'50" W).

The capture point is located on Estrada Geral do Porto da Itinga (Bairro Itinga), left bank, with the type of capture in gravity derivation channel and the Environmental License authorized the implementation of a 500mm diameter cast iron pipeline in a total length of 27.4 km,

from the point of Estrada Geral Itinga to Rua José Ponciano da Silva, at the Water Treatment Plant - WTP (Previous Environmental License No. 4822/2017) (Fig. 02). The catchment point meets the guidelines for land use, as well as respects the forest and environmental legislation in force (Municipal Viability Certificate number 054/2017).

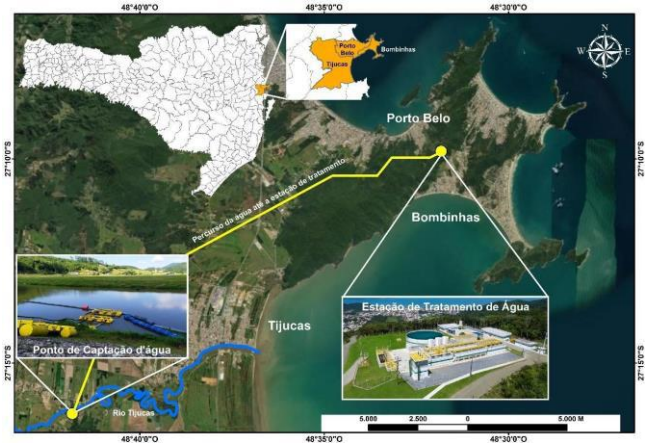


*Fig.2: Water intake from Tijucas River to the Zimbros Water Treatment Plant.*

Source: Figure elaborated by the authors.

It is extremely relevant to analyze not only the location, but the environmental management that seeks to control, reduce or avoid the impacts caused by the enterprise (Donnaire and Oliveira, 1995; Silva and Costa, 2016).

The environmental agency responsible at the time was the Environment Foundation - FATMA and, according to the Preliminary Environmental License (under No. 4822/2017), authorized the construction of the enterprise of capture, adduction and treatment of water for public supply.

The Grant and environmental licensing, when analyzed in an articulated manner, contribute to the efficient management of Water Resources, environmental preservation based on the mechanisms of control and command (Lanna, 1994; Silva and Costa, 2016). These instruments help in the establishment of sustainability indicators, based on a technical and careful assessment of the territory's carrying capacity (Silva and Costa, 2016; Genz *et al*., 2019).

The recognition of the limitation of Water Resources imposes the need to evaluate environmental impacts (Campos *et al.*, 2002; Chacon-Pereira *et al*., 2018), being fundamental to the effective engagement of society in decision making.

In Brazil, the management of Water Resources is organized by hydrographic basins, either in water bodies owned by the Union or the States (Porto and Porto, 2008; Silva and Costa, 2016; Silva and Teixeira, 2018). Concerning the Grant for water use, the Watershed Committees play a key role in the development of technical studies and opinions, regarding the applications (Pereira, 2016).

Given this importance, the applicant sent a letter (on May 31, 2017), requesting support from the Tijucas River Hydrographic Basin Committee (SDE, 2017). Despite the request for collaboration, within the process itself, no institutional response was issued, remaining silent regarding the appeal. The absence of response is a relevant fact.

In other studies, such as the allocation of water for the Cubatão River, SC, a lack of interest from the members of the Committee was also observed, related to the discontinuity of the work, lack of transference of financial resources, added to the lack of definition of the State System of Hydric Resources Management itself, being hypotheses that attribute a performance that does not meet the expectations of the hydrographic basin (Ramos, 2005).

Águas de Bombinhas, in the act of applying for the Grant, showed that the amount of water was enough to meet the resident population of the city, but that in the summer months the demand increased by up to 220%, causing collapse of the system (SDE, 2017).

The economy of Bombinhas is centred on tourism, due to the 4th best beach in the country (Águas de Bombinhas, 2017). Thus, according to the stated need and when analyzing the process as a whole, the notorious collaboration and encouragement that the Municipality of Tijucas provided to the interests of the applicant should be mentioned. As observed, in order to conduct the raw water captured to the water treatment plant, located in Bairro Zimbros, there would be the need for the implementation of approximately 27km of canalization, passing through the municipalities of Tijucas and Porto Belo. The passage through the first was authorized using administrative easement, through Municipal Law No. 2695, December 7, 2017.

The total deployment on public roads in Tijucas totals 1,330m in length. The remaining passage, 7,570m refer to private property areas (Tijucas, 2020). All areas were declared of public utility, for expropriation purposes, through Municipal Decree No. 1312/2018.

By consulting the bibliographical references, it was found several real cases of Granting and concession of water from local rivers, but none of them, had magnitude as the present one, being verified the Public Policy of

cooperation between the municipal entities of Tijucas and Porto Belo, to meet the water needs of Bombinhas, referring to the extensive easement granted by the former.

As consideration for the authorization of the use of the administrative right of way of Tijucas, in addition to the recuperation of the roads to their previous state, there were the charges for the implementation of the base for paving with graded gravel (E=20cm) and a 5cm layer of hot mix bituminous concrete in an area of 4,980m2, in addition to the execution of work with the same characteristics in an area of 23,520m2, on Avenida Emília Ramos, Bairro Universitário (Tijucas, 2020).

The population of Bombinhas, when asked if they were aware of the consideration that the municipality should provide, 75% said they were not aware of the obligations, 2.5% did not answer, and 22.5% said they were aware. Regarding the latter, they were asked if they were in favour, 30% said no, 2.5% chose not to answer, and 67.5% said yes (Table 01). The people who said they were against the transaction were asked the reason, and the most recurrent answers were: in the municipality, there is a water source; the lack of water has not improved. As for those who were in favour, they were also asked about the reasons and the most recurrent answers were: improved water shortage; improvements in the water treatment system.

On the other hand, the population of Tijucas, when asked if they were aware of the consideration that the municipality of Bombinhas should pay for the rights-of-way, 92.5% said they were unaware of the obligations, 2.5% did not answer, and 5% said they were aware. Despite the knowledge or not of the obligations assumed by the municipalities, they were asked whether or not they were in favour of the implementation of the water catchment system, 40% said yes, 10% chose not to answer, and 50% said no (Table 01). The most recurrent answers were: because the municipality lacks water; because of the lack of community involvement in the transaction. As for those who were in favour, the most frequent responses were: water is not only for the municipality of Tijucas; duty of solidarity.

Once the acts in the Executive and Legislative sphere are understood, the Public Policy of Cooperation between the Municipalities of Bombinhas and Tijucas is observed, in which both are subjects of rights and duties, and that the purpose of the pact signed was to provide the Municipality of Bombinhas, conditions in the public water supply for the resident and floating population.

Based on all the procedures cited, on June 30, 2017, Ordinance No. 166 was issued by the Deputy Secretary, which authorized the Grant for the Use of Water Resources, granting a maximum capture flow rate of 250L/s, with a daily captured volume of 21,600.00m3 and a monthly volume of 648,000.00m3, valid for a period of 10 years (SDE, 2017).

Bombinhas' water supply system was completed in 2018 and will start operating according to the population's water needs only in 2019. The work is a milestone for the municipality, as well as for the entire state of Santa Catarina.

The efficiency of the Zimbros Water Treatment Plant is a positive aspect, since in Brazil the loss of treated water is approximately 38% (Trata Brasil, 2017; G1, 2017), in Bombinhas it is around 15% (Portal Saneamento Básico, 2020).

The implementation of Bombinhas' new water system showed a higher utilization than the previous one since in July/2017 the water loss was between 35% and 30% in high and low season, respectively (Águas de Bombinhas, 2017).

Of the people living in the municipality of Bombinhas interviewed, 100% said they had treated water in their residence from Águas de Bombinhas. When asked about the price of the tariff practiced by the company, 60% said it is fair, while 37.5% think it is not and 2.5% did not answer; (Table 01), when asked the reason: most do not trust the water treatment system, others think the water quality is bad. For the authorities of Bombinhas, the price charged is fair, compared to the amount invested in the new water treatment system.

Regarding the lack of water, 52.5% (Table 01), state that it is still recurrent, especially in high season, although the system has been operating since 2019, but, it has not yet been properly tested due to the Covid19 pandemic. When tourism returns to its usual characteristics, the development can be fully evaluated. In the meantime, the data on water demand versus the water captured, indicate that the volume is sufficient to supply the resident and floating population of the municipality.

## IV. CONCLUSION

In Brazil, there is a high number of Granting Authorizations granted by ANA, however, the State of Santa Catarina is responsible for only 0.36% of the total, for capturing waters under the jurisdiction of the Union. About the grants issued by the SDE, from 1997 to 2020, the number was 3,447, of which 2.05% originated from water captured from the Tijucas River. The case under analysis becomes unique because there was a public policy of cooperation between municipalities, signed by Bombinhas, Porto Belo and Tijucas.

The authorization for the abstraction of raw water from the Tijucas River represents 2.67% of the authorized flow, with a maximum daily capture of 18,144.00 m3, which is sufficient to supply the needs of the applicant. With the capture site, according to the environmental agency at the time (Fundação do Meio Ambiente - FATMA) and the Municipality of Tijucas, the installation works carried out at the collection point met all the environmental guidelines.

In this sense, it can be seen that both the water abstraction permit and the necessary works for the installation of the referred work did not represent a risk to the Tijucas River, being guided under the guidelines of environmental sustainability, in the condition of supplying the present need, without affecting the interest/right of future generations.

Despite this, the omission of the Tijucas River Hydrographic Basin Committee, within the granting process that went through the SDE, is something relevant, and that could not be overlooked, because, although the risks are low, a grant of this magnitude, which may serve as a model, should at least have the Committee's interest in the administrative process, in order to make some technical points to be observed by the applicant and the State Secretariat.

Regarding the Granting Process, it is pointed out that it was carried out within the strict legality, observing the precepts and guidelines established by the legislation in force, serving the present cooperation between the municipal entities, as a model to the other entities of the federation, as well as the Public Policy to supply the hydric shortage faced by several Brazilian regions.

Despite the large undertaking, Águas de Bombinhas, due to the pandemic (COVID-19), was not able to put the system into operation at full power. According to studies carried out by the company, the amount of water authorized for capture by the SDE (250L/s) is sufficient for the hydric supply of the city, during low or high seasons, until 2049.

Finally, considering the whole procedure of the Grant in reference, it can be seen that it meets what is defined in the Sustainable Development Goal 06 - Water and Sanitation, which seeks to solve the problem of water shortage, providing the resident and floating population of Bombinhas access to treated water, observing the principles of environmental sustainability.

## ACKNOWLEDGEMENTS

The authors gratefully acknowledge support for this research from the bolsa Uniedu, Fundo de Apoio à Manutenção e ao Desenvolvimento da Educação Superior – FUMDES / Secretaria da Educação do Governo do Estado de Santa Catarina/UNIVALI - Brazil and thank the editors and anonymous reviewers for their many helpful suggestions.

## REFERENCES

[1] Agência Nacional das Águas - ANA. (2013), Conjuntura dos Recursos Hídricos no Brasil: 2013. Agência Nacional de Águas. Brasília: ANA, 434 p.

[2] _____. (2011), Outorga de Direito de Uso de Recursos Hídricos. Cadernos de captação em recursos hídricos. Vol. 06, Brasília, 54 p.

[3] _____. (2021), "Água no Mundo. Situação da água no mundo", available at: https://www.ana.gov.br/textos-das-paginas-do-portal/agua-no-mundo/agua-no-mundo, (acessed 08 oct 2021).

[4] _____. (2021a), "Outorgas emitidas", available at: https://gov.br/ana/pt-br/assuntos/regulacao-e-fiscalizacao/outorga/outorgas-emitidas, (acessed 19 dec 2021).

[5] Águas de Bombinhas. (2017), Estudo de Concepção do Sistema de Abastecimento de Água do Município de Bombinhas-SC. Tomo III – Modelagem Hidráulica. Bombinhas, 182 p.

[6] _____. (2017a), Plano de Emergência Operacional do Município de Bombinhas-SC. Versão II. Bombinhas, 25 p.

[7] _____. (2021), "Reservatórios de Bombinhas têm capacidade para reservar cerca de três milhões de litros de água tratada", available at: https://aguasbombinhas.com.br/reservatorios-de-bombinhas-tem-capacidade-para-reservar-cerca-de-tres-milhoes-de-litros-de-agua-tratada/ (acessed 25 apr. 2021).

[8] Almeida, M. A. and Curi, W. F. (2016), "Gestão do uso de água na bacia do Rio Paraíba, PB, Brasil com base em modelos de outorga e cobrança", *Revista Ambiente e Água*, Vol. 11 No. 4, Taubaté, pp. 989-1005.

[9] Associação Brasileira das Concessionárias Privadas de Serviços Públicos de Água e Esgoto – ABCON and Sindicato Nacional das Concessionárias Privadas de Serviços Públicos de Água e Esgoto – SINDCON. (2019), Panorama da Participação Privada no Saneamento 2019. Brasília, 92 p.

[10] Bacci, D. L. C. and Pataca, E. M. (2008), "Educação para a Água", *Estudos Avançados*, Vol. 22 No. 63, Universidade de São Paulo, pp. 211-226.

[11] Barata, R. B. (2013), "Epidemiologia e Políticas Públicas", *Revista Brasileira de Epidemiologia*, São Paulo, Vol. 16, No. 1, pp. 3-17.

[12] Barlow, M. and Clarke, T. (2003), Ouro azul. São Paulo: M. Books do Brasil, 368 p.

[13] Bombinhas. (2010). Plano Municipal de Saneamento Básico de Bombinhas. Prefeitura Municipal de Bombinhas, 59 p.

[14] Brasil. Presidência da República. (2020), "Lei Federal nº 14.026, de 15 de julho de 2020", available at:

http://www.planalto.gov.br/ccivil_03/_ato2019-2022/2020/lei/l14026.htm (acessed 12 may 2021).

[15] _____. (1997). "Lei Federal nº 9.433, de 08 de janeiro de 1997", available at: http://www.planalto.gov.br/ccivil_03/leis/l9433.htm, (acessed 23 feb. 2021).

[16] Briz, E. M. S. (2018), Perspectiva Histórica das Políticas Hidráulicas no Brasil e na Espanha. Universidade Federal do Ceará. Centro de Tecnologia. Programa de Graduação em Engenharia Civil: Saneamento Ambiental. Fortaleza.

[17] Campos, J. N. B, Studart, T. M. C. and Costa, A. M. (2002), "Alocação e realocação do direito de uso da água: uma proposta de modelo de mercado limitado no espaço", *Revista Brasileira de Recursos Hídricos*, Vol. 7 No. 2, pp. 5-16.

[18] Ceará. (2017), "Execução de serviços de análise da integração dos instrumentos de gestão com foco na outorga, cobrança e fiscalização dos recursos hídricos no Ceará: relatório 17 experiências internacionais com outorga e alocação de água", Governo do Estado do Ceará, Secretaria dos Recursos Hídricos.

[19] Cessa, R. M. A. and Rizzi, T. S. (2017), "Identificação de microbacias contendo pivôs centrais no município de Sorriso (MT): estudo contributivo à outorga do uso de água", *Revista Agrogeoambiental*, Pouso Alegre, Vol. 9 No. 4, pp. 23-31.

[20] Chacon-Pereira, A., Batalhão, A. C. S., Silva, L. P. and Neffa, E. (2018), "Educação ambiental na gestão de recursos hídricos baseada no modelo de licenciamento ambiental", *Revista Desenvolvimento e Meio Ambiente*, Vol. 49, p. 36-59, dezembro 2018.

[21] Cidade Brasil. (2019), "Município de Tijucas", available at: https://www.cidade-brasil.com.br/municipio-tijucas.html, (acessed 11 may 2020).

[22] Clarke, R. and King, J. (2005), O Atlas da Água. O mapeamento completo do recurso mais precioso do planeta. Tradução: Anna Maria Quirino. Publifolha, São Paulo, 128 p.

[23] Comitê Tijucas Biguaçu. (2019), "Biblioteca – notícias". Comitê de Gerenciamento Bacia Hidrográfica do Rio Tijucas, available at: http://www.aguas.sc.gov.br/base-documental-tijucas/noticias-tijucas?start=144, (acessed 20 feb. 2021).

[24] Conejo, J. G. L. (1993), "A Outorga de Usos da Água como Instrumento de Gerenciamento dos Recursos Hídricos", *Revista de Administração Pública*, Rio de Janeiro, Vol. 27 No. 2, pp. 28-62.

[25] Díaz, R. R. L. and Nunes, L. R. (2020), "A evolução do saneamento básico na história e o debate de sua privatização no Brasil", *Revista de Direito da Faculdade Guanambi*, Guanambi, Vol. 7 No. 2, pp. 1-23.

[26] Donnaire, D. and Oliveira, E. C. (1995), Gestão Ambiental na Empresa: Fundamentos e Aplicações. São Paulo: Atlas, 240 p.

[27] Empresa Brasil de Comunicação - EBC. (2021), "Onde Está a Água no Brasil?" Região Hidrográfica Amazônica, available at: https://www.ebc.com.br/especiais-agua/agua-no-brasil/, (acessed 10 oct. 2021).

[28] Fernandez, N. F. and Pietrafeza, P. (2021), "Problemática Ambiental e Políticas Públicas de Meio Ambiente no Distrito Federal", *Revista Brasileira de Desenvolvimento Regional*, Blumenau, Vol. 9 No 3, pp. 221-248.

[29] França, J. M. B., Luna, R. M., Monteiro, C. M. G., Sousa, J. A. C. and Neto, J. C. (2018), "Panorama das outorgas de uso dos recursos hídricos no Estado do Ceará no período de estiagem 2009-2017", *Águas Subterrâneas*, Vol. 32 No. 2, pp. 210-217.

[30] Franceschina, A. O. M. M. and Mozetic, V. A. (2015), "O Direito à Água e sua Afirmação Jurisprudencial Partindo do Sentido de Um Direito Humano Fundamental", *Em Tempo*, Marília, Vol. 14, pp. 205-223.

[31] G1. (2017), "Brasil perde quase 40% da água tratada com vazamentos e fraudes, aponta estudo", available at: https://g1.globo.com/economia/noticia/brasil-perde-quase-40-da-agua-tratada-com-vazamentos-e-fraudes-aponta-estudo.ghtml, (acessed 24 apr. 2021).

[32] Garcia, A. V., Oliverira, E. C. A., Silva, G. P., Costa, P. P. A. and Oliveira, L. A. (2007), "Disponibilidade Hídrica e Volume de Água Outorgado na Micro-Bacia do Ribeirão Abóbora, Município de Rio Verde, Estado de Goiás", *Caminhos de Geografia*, Uberlândia, Vol. 8 No. 22, pp. 97-106.

[33] Genz, F., Barbosa, V. C. and Rocha, J. C. S. (2019), "Integração dos Procedimentos de Outorga e Licenciamento ambiental: estudo de caso do estado de Sergipe", *Bahia Análise de Dados*, Salvador, Vol. 29 No. 2, pp. 99-124.

[34] Gonçalves, M. B. V. B. (2017), "Privatização da Cedae: Na Contramão do Movimento Mundial de Remunicipalização dos Serviços de Saneamento", *Geo UERJ*, Rio de Janeiro, No. 31, pp. 81-103.

[35] Governo do Estado do Rio Grande do Sul. (2014), Institui o Plano Estadual de Recursos Hídricos do Estado do Rio Grande do Sul – PERH/RS. Resolução CRH nº 141. Diário Oficial do Estado. Ano LXXII, nº 060, de 21 de março de 2014. 6 p.

[36] Granziera, M. L. M. (2001), Direito das Águas: Disciplina Jurídica das Águas Doces. 1ª ed. São Paulo: Atlas, 256 p.

[37] Instituto Brasileiro de Geografia e Estatística – IBGE. (2019), "Estatística Populacional e Geográfica do Município de Bombinhas", available at: https://www.ibge.gov.br/cidades-e-estados/sc/bombinhas.html, (acessed 27 jan. 2020).

[38] Lanna, A. E. L. (1994), Instrumentos de gestão ambiental: métodos de gerenciamento de bacias hidrográficas. Brasília: IBAMA, Instituto Brasileiro do Meio Ambiente e Recursos Renováveis, 243 p.

[39] Lisboa, L., Silva, D. D., Moreira, M. C., Silva, A. J. and Uliana, E. M.. (2019), "Sistema para análise das outorgas de captação de água e diluição de efluentes na bacia do rio Piracicaba (MG)", *Engenharia Sanitária Ambiental*, Vol. 24 No. 5, pp. 929-937.

[40] Luz, G. G. and Gomes, V. P. (2011). "A Gestão do Abastecimento de Água no Brasil e na Espanha"available at: https://www.academia.edu/35459348/A_GEST%C3%83O_DO_ABASTECIMENTO_DE_%C3%81GUA_NO_BRASIL_E_NA_ESPANHA, (acessed 18 dec 2021).

[41] Macedo, R. F. (2010), "Água, um direito fundamental", *Direito e Democracia*, Vol. 11 No. 1, pp. 76-94.

[42] Malheiros, T. F., Prota, M. G. and Pérez, M. A. (2013), "Participação comunitária e implementação dos instrumentos de gestão da água em bacias hidrográficas", *Revista Ambiente e Água*, Taubaté, Vol. 8 No. 1, pp. 98-118.

[43] Miranda, A. S. (2017), "Gerenciamento de Bacias Hidrográficas - Estudos de Caso da Bacia Hidrográfica do Rio Iguaçu No Município de Nova Iguaçu", *Revista Tamoios*, São Gonçalo (RJ), Vol. 13 No. 1, pp. 37-49.

[44] Pereira, J. S. (1996), Análise de Critérios de Outorga e de Cobrança pelo Uso da Água na Bacia do Rio dos Sinos. Dissertação. Programa de Pós-graduação em Engenharia de Recursos Hídricos e Saneamento Ambiental da Universidade Federal do Rio Grande do Sul, 162 p.

[45] Pes, J. H. F. (2019), "O Direito Fundamental à Água Decorrente do Regime Democrático e dos Princípios Constitucionais", *Revista Brasileira de Filosofia do Direito*, Belém, Vol. 5 No. 2, pp. 01-20.

[46] Portal Saneamento Básico. (2020), "Águas de Bombinhas/SC Reduz o Índice de Perdas de Água Tratada para 15%", available at: <https://saneamentobasico.com.br/outros/geral/aguas-bombinhas-perdas-agua/>, (acessed 01 may. 2021).

[47] Porto, M. F. A. and Porto, R. L. L. (2008), "Gestão de Bacias Hidrográficas", *Estudos Avançados*, Vol. 22 No. 63, pp. 43-60.

[48] Prado, G., Oliveira, J. P. S. and Ramos, R. G. (2012), Marketing de Cidades Litorâneas e o Turismo na Cidade Guaratuba, Litoral do Paraná. Anais do VII Seminário de Pesquisa em Turismo do Mercosul. Universidade de Caxias do Sul – UCS, 11 p.

[49] Programa das Nações Unidas para o Desenvolvimento - PNUD; Instituto de Pesquisa Econômica Aplicada - IPEA. (2021), "Plataforma Agenda 2030", available at: http://www.agenda2030.org.br, (acessed 03 feb 2021).

[50] Pulido, C. B. (2015), "O direito fundamental à água e sua intrincada satisfação no Direito colombiano", *Revista de Investigações Constitucionais*, Curitiba, Vol. 2 No. 1, pp. 65-87.

[51] Ramos, P. R. (2005), Modelo para Outorga de Uso de Água Utilizando a Metodologia Multicritério de Apoio à Decisão: Estudo de Caso da Bacia Hidrográfica do Rio Cubatão do Sul. Universidade Federal de Santa Catarina. Tese. Florianópolis, 280 p.

[52] Ribeiro, M. A. F. M., Barbosa, D. L., Batista, M. L. C., Albuquerque, J. P. T., Almeida, M. A. and Ribeiro, M. M. R. (2014), "Simulação da Prioridade de uso das Águas Superficiais como um Critério para o Instrumento da Outorga", *RBRH – Revista Brasileira de Recursos Hídricos*, Vol. 19 No. 2, pp. 135-145.

[53] Santos, J. S. A. M. (2009), Construção de cenários ambientais para a governança da água em bacias hidrográficas com tecnologias de sensoriamento remoto e geoprocessamento: estudo de caso na Bacia do Rio Tijucas, Santa Catarina, Brasil. Tese, Programa de Pós-Graduação em Engenharia Ambiental, Universidade Federal de Santa Catarina. Florianópolis, 329 p.

[54] Secretaria de Estado de Desenvolvimento Econômico e Social - SDE. (2014), Recursos Hídricos de Santa Catarina. Atlas Geográfico de Santa Catarina – Fascículo 2 – SPG, 31 p.

[55] _____. (2017), Processo de Outorga de Uso DSUST 00000670/2017. Processo SPP nº ESDS508179. Autos físico. Autuado dia 06 abr. de 2017. Finalizado dia 13 jul. de 2017,123 p.

[56] Senado Federal. (2014), "Escassez de Água. Senado Federal em discussão", Ano 5, Vol. 23, available at: https://www12.senado.leg.br/emdiscussao/edicoes/escassez-de-agua/contexto/demanda-sera-cada-vez-maior-em-todo-o-mundo>, (acessed 07 nov. 2019).

[57] Silva, A. F. and Costa, M. T. (2016), "Outorga de Direito de Uso de Recurso Hídrico como Instrumento que precede o Licenciamento Ambiental no Estado do Rio de Janeiro", XIX Congresso Brasileiro de Águas Subterrâneas, pp. 01-17.

[58] Silva, J. F. A. and Teixeira, M. G. C. (2018), "A Atuação do Comitê de Integração da Bacia Hidrográfica do Rio Paraíba do Sul: Delineando uma Análise a Partir da Perspectiva Relacional", *OS - Organizações e Sustentabilidade*, Londrina-PR, Vol. 6 No. 1, pp. 78-97.

[59] Sousa, T. P. (2018), "Água (ODS 6), Programa Cisternas e o Novo Regime Fiscal Brasileiro", *Vianna Sapiens*, Juiz de Fora, Vol. 9 No. 1, pp. 236-259.

[60] Stinghen, C. M. and Mannich, M. (2019), "Diagnóstico de Outorgas de Captação e Lançamento de Efluentes no Paraná e Impactos dos Usos Insignificantes", Revista de Gestão de Água da América Latina - REGA, Vol. 16, pp. 1-10.

[61] Tijucas. (2020), "Aspectos Geográficos, Município de Tijucas", available at: http://www.tijucas.sc.gov.br/especiais/aspectos-geograficos, (acessed 11 may 2020).

[62] Tovar, L. (2003), "A Privatização dos Serviços da Água", available at: https://www.resistir.info/links/links_autor_ate_31dez03.html, (acessed 08 may 2021).

[63] Trata Brasil. (2017), Cartilha Ação Global: 10 Anos da Lei de Saneamento. Sistema Nacional de Informações sobre Saneamento – SNIS. Brasília, 8 p.

[64] Vargas, J. C. B. (2021), "Complexidade, leis de escala urbana e perdas na distribuição de água potável: análise da rede de cidades do sul do Brasil", *Ambiente Construído*, Porto Alegre, Vol. 21 No. 3, pp. 65-78.

[65] Vargas, M. C. and Lima, R. F. (2004), "Concessões Privadas de Saneamento no Brasil: Bom Negócio para quem?", *Ambiente & Sociedade*, Vol. 7 No. 2, pp. 67-93.

[66] Walkowski, M. C., Damo, M. R. S. and Loch, C. (2017), "Projeto Acolhida na Colônia no Estado de Santa Catarina-SC: Um território de identidade e turismo sob a ótica da Linguagem de Padrões", *Revista Turismo - Visão e Ação - Eletrônica*, Vol. 19 No. 2, pp. 319-347.

[67] Wolkmer, M. F. S. and Pimmel, N. F. (2013), "Política Nacional de Recursos Hídricos: Governança da Água e Cidadania Ambiental", *Sequência*, Florianópolis, No. 67, pp. 165-198.