Chapter 1 Water multifuctionality, financial management and sustainability in the Pardo River Basin, Brazil

Capítulo 1 Multifuccionalidad del agua, gestión financiera y sostenibilidad en la cuenca del río Pardo, Brasil

FERRARESI-DE ARAUJO, Geraldo José*†, NIÑO-CASTILLO, Jacob Elías, RONQUIM-FILHO, Adhemar and ORANGES-CEZARINO, Luciana

Universidade de São Paulo, Faculdade de Economia, Administração e Contabilidade
Universidad Autónoma de Guerrero, Facultad de Turismo, Maestría en Ciencias Gestión Sustentable del Turismo, UAGro.
Universidade de São Paulo, Faculdade de Economia, Administração e Contabilidade
Universidade Federal de Uberlândia, Faculdade de Gestão e Negócios

ID 1st Author: *Geraldo José, Ferraresi-De Araujo* / **ORC ID**: 0000-0002-2773-8641

ID 1st Co-author: *Jacob Elías, Niño-Castillo* / **ORC ID**: 0000-0003-0728-3798

ID 2nd Co-author: *Adhemar, Ronquim-Filho* / **ORC ID**: 0000-0001-5072-6131

ID 3rd Co-author: *Luciana, Oranges-Cezarino*/ **ORC ID**: 0000-0001-5556-8275

DOI: 10.35429/H.2022.1.1.13

*geraldoferraresi@usp.br

N. Niño, M. Valencia and M. García. (AA. VV.) Sustainability, Rurality and Society. Handbooks-TIV-©ECORFAN-Mexico, Guerrero, 2022.

Abstract

Before the worsening of environmental issues, nations have been rethinking the management of their natural resources in order to promote sustainable development as well as promoting economic growth, environmental preservation and social inclusion. Among these resources, water can be highlighted. Therefore, the objective of the article is to analyze the fundraising for the preservation of the Pardo Basin based on Decree Number 58 771, of 12/20/2012 and how it has been applied for its preservation. The methodology used was the research applied from the bibliographic survey with SciELO, Web of Science and the Integrated System of Water Resources Management of the State of Paulo. It can be seen that PDC 3 received the largest investments, in sanitary sewage, solid waste, treatment and final disposal or other solid waste management actions, river water drainage and actions aimed at promoting pollution containment diffuse, process prevention and control. The second most important was PDC 5 referring to loss control in water supply systems, with an emphasis on public supply networks. With these financial resources raised in the collection, from a ten-year plan, executed through a multi-annual plan, -contact a strategic investment in the areas of sewage system, solid waste, drainage of river waters and prevention and control of erosion processes. Therefore, the Pardo Basin Management Committee has been working and making strategic investments to ensure the sustainable management of water resources in the Pardo Hydrographic Basin.

Hydrographic basin, Environmental management, Water resources, Pardo River, Sustainability

1. Introduction

Water resources are of fundamental importance for life, even with the increase in the consumption of this raw material on a global scale, given the increase in agricultural and industrial activities, in this sense it has also become an increasingly costly and scarce resource. Aware of this reality, governments, companies and non-governmental organizations have increased the instruments for planning, execution and control of water resources according to the concept of sustainable development, which according to the Brundtland report presented by the World Commission on Environment and Development (1987) defined as that which meets the needs of future generations to satisfy their own needs" (p.46) so that environmental, economic and social activities are maintained and preserved.

Brazil, can be considered a country in a privileged position in relation to the nations of Mediterranean Africa, the Middle East, Australia and Chile, according to the National Water Agency (2019) worldwide, or a country where there are about 12% of the planet's water availability, but its distribution is not uniform in the national geographic space. The northern region of the country concentrates about 80% of the amount of available water, but represents only 5% of the Brazilian population. The regions near the coast have more than 45% of the population, therefore, they have less than 3% of the country's water resources.

In this order of ideas, even in a privileged hydrological position, the country must pay attention to the management of its water resources, given the inequality of its distribution in the national territory and its strategic importance for the preservation of life and the economic-social development of Brazil. In this sense, watershed management becomes fundamental. The National Hydrographic Division, instituted by the National Water Resources Council, establishes the twelve Brazilian Hydrographic Regions, namely: Amazonia, Tocantins-Araguaia, NE-West Atlantic, Parnaíba, NE-East Atlantic, São Francisco, East Atlantic, Southeast Atlantic, Paraná, Paraguay, Uruguay and the South Atlantic.

Especially regarding the Paraná River Basin, according to the National Water Agency (2015) it has an area of about 879 873 km², and is located in the states of Paraná, Santa Catarina, Rio Grande do Sul, São Paulo, Minas Gerais, Mato Grosso do Sul, Goiás and Federal District. Given its location in the most industrialized and populated region, according to the National Water Agency (2015), the estimated current water demand in the Paraná Hydrographic Region (base year 2010) is 736 m³/s of captured flow (6.4% of its average flow), equivalent to 31% of Brazil's total demand. The largest water uses in the hydrographic region are for irrigation (311.4 m³/s), industry (202.0 m³/s) and urban supply (177.2 m³/s).

One of the basins that is part of the Paraná water catchment is the Pardo Basin, located in the northeast of the state of São Paulo, between parallels 20º 51' and 21º 50' South Latitude and meridians 46º 41' and 48º 12' West Longitude, covering 14 cities, with emphasis on the city of Ribeirão Preto (Dos Santos *et al*., 2008). According to Sampaio (2013) the Pardo River Basin was defined as Water Resources Management Unit 04 (UGRHI 04) by the Water Resources Law for the 1994/95 biennium and given the environmental impacts caused by both agricultural, industrial and urban activities in the UGRHI 04 region and the need to preserve its water resources, riparian forests were granted to supply water suitable for consumption by the inhabitants of the region under study under Decree Number 58 771 of December 20, 2012, which approved and set the amounts to be charged for the use of water resources owned by the State of São Paulo in the Pardo Water Resources Management Unit, in accordance with Decree 50 667 of March 30, 2006, which regulated the provisions of Law 12 183, of 2005, which deals with the charge for the use of water resources in the domain of the State of São Paulo.

Therefore, given the importance of the water resource both for life and for economic and social development, in the current scenario of environmental degradation caused by agricultural, industrial and urban activities, a study on watersheds is justified, in this article, specifically the Pardo Watershed, where the main objective was to analyze the collection of funds for the conservation of the Pardo Watershed as of December 1, 2011, Decree 58 771 of December 20, 2012 and how it has been applied for its conservation.

2. Methodology

2.1 Classification of research

The present research is classified as applied, according to Lakatos and Marconi (2001), since it analyzes fundraising for the preservation of the Pardo Basin based on Decree Number 58 771 for its preservation. In addition, it is considered a formal study. The object of the study is considered descriptive, as it describes the current scenario of the management of fund raising and investment of financial resources in the Pardo Watershed. Regarding the time of the study, it is considered transversal, since the bibliographic and data collection took place at a single moment, and field research was carried out based on the comments obtained from each of the interviewees.

2.2 Data and collection instrument

The construction of the references was carried out through desk research, thanks to the documentary-bibliographic stage through the collection, reading and selection of articles published in print and digital form in the databases Scientific Electronic Library Online (SciELO), Web of Science and by the Integrated Water Resources Management System of the State of Paulo in the search for key words such as: Pardo River Basin; Sustainable Development and Sustainability.

2.3 Data analysis

With the information gathered during the bibliographic review, we proceeded to the application of the interpretative analysis of the data, which aims to expose the results and findings obtained in the different forms of production of the vital liquid and uses-abuses that are carried out on a daily basis through the various human activities both in the countryside and in the city (Caregnato & Mutti, 2006).

2.4 Water

The element water (H2O), composed of two hydrogen molecules and one oxygen molecule, is used in practically all segments of humanity, being vital and indispensable for human survival, since it is an essential and considerable part of the formation of living beings (it is estimated that the human body is composed of more than 2/3 water), which is necessary for all forms of life.

This mineral chemical substance has the attributes of being odorless (without odor), tasteless (apparently without distinguishable taste) and colorless (without perceptible color).

It can be found in three physical states in the environment (biosphere): liquid (seas -salty- and rivers -sweet-), solid (snow and ice -sweet-) and gaseous (clouds and fog -sweet-) -water vapor-. Water remains in the same quantity on our planet (in great abundance), but it is mainly limited by population growth, which causes a reduction in the quantity per capita.

Despite its large proportion on the planet (flow of 41 000 km³ in a year), equivalent to more than seventy percent of the globe, little of it refers to fresh water (2.5%), as it is mainly found in the oceans, and of this small percentage, even less is available for human consumption (0.3%), when it is found on glaciers (4/5 at the poles) or in places of difficult access.

Access to potable water in the world (suitable for drinking) is unbalanced, being very limited in regions such as Africa, such as the Nile River basin, and Asia, such as the Middle East. The picture is bleaker when we have the information that research leads to the conclusion that more than half of the world's population will suffer from a lack of drinking water from 2025 onwards, which will make this resource increasingly relevant and a priority because of its scarcity, justifying its current title of "white gold".

The state of minimization of drinking water will increase the value of this good in the coming decades, in addition to serving as a pretext for the insurgence of a climate of belligerence, especially in places where scarcity will reach unbearable levels. Pollution and contamination factors are also important causes of drinking water scarcity, which calls for more effective public policies to combat them, on the part of governments, mainly because they involve the health of the population. Moreover, according to Sirvinskas (2005).

It should be noted, just as a curiosity, that since the Earth cooled many millennia ago (56 million years ago), the same amount of water remains, i.e., 1.4 billion cubic kilometers (salty and fresh). Only 90 million cubic kilometers (fresh) are ready for drinking, but not all of this stock is available in nature, and only renewable resources can be used through rainfall, reducing to 34 million cubic kilometers per year, corresponding to 0.002% of the planet's water. Currently, almost 70% of the world's water is used for agriculture, 22% for industry and 8% for housing.

2.4.1 Difference between the terms water and water resources

The element water can be called a water resource when it is used for economic purposes. According to Granjeiro, Pinheiro and Miranda (2020), the vision of the infinity of water for human enjoyment, which was common sense a little more than twenty years ago, has crumbled and, like any other mineral resource, increasingly demands payments from its users, and the image of a good with free access for all is fading. The Dublin Declaration on Water Resources and Development, signed in 1991, recognizes "freshwater as a finite and vulnerable resource, essential for sustaining life, development and the environment...all competing uses and should be recognized as an economic good" (Principle No. 4). Its indispensability stimulated the creation of a World Water Day, for which March 22nd of each year was chosen. Water resources are water with economic value, i.e., water that is no longer in the state of an environmental resource, which is found when it is no longer used by man.

The expression "water resources" was used in the Federal Constitution. Although this phrase does not always necessarily translate into the correct economic use of a natural resource. Although "water" and "water resource" are not absolutely identical concepts, we will use these terms without specific distinction, since the law did not use them with strict division (Machado, 2001).

Thus, to avoid further doctrinal delays on terminology and its correction, for didactic and facilitating purposes, in this presentation, specifically, we will no longer dissociate water from water resource in order not to have a deeper understanding of the concept, which is not a close objective of this study. Thus, water is the natural element, and the water resource is this, subway and surface, used in use or economic activity.

3. Results

Brazilian river basins, this is one of the foundations of the National Water Resources Policy (PNRH), which establishes that the River Basin is a "territorial unit for the implementation of the National Water Resources Policy and the implementation of the National Water Resources Management System", and its management is exercised by Committees.

Hydrographic basin is the "set of lands drained by a river and its tributaries. Thus, the basin comprises the main watercourses and their tributaries (main and tributary)" (Sirvinskas, 2005, p. 310). Therefore, it is a geological unit that possesses an aquifer of significant extension or "territorial unit for the execution of the PNRH and the operation of the National Water Resources Management System" (Article 1, Chapter V, PNRH). The River Basin Committees are made up of representatives of the Union, the State, and the Federal District whose territories are, even partially, in their respective areas of operation; of the Municipalities located, in whole or in part, in their area of operation; water users in their area of operation; and civil water resource entities with proven operations in the basin. Among the attributions of these Committees are: Propose to the National Council and the State Water Resources Councils the accumulations, derivations, catchments and releases of little expression, for purposes of exemption from the obligation to grant rights to use water resources, according to their domains; establish mechanisms for charging for the use of water resources and suggest the amounts to be charged; (Art. 38, Chapters: V and VI of the PNRH).

Water management, in a more complete, updated form and in accordance with the modern conception, is found in the PNRH, which created the National Water Resources Management System. The responsibility for implementing the PNRH fell on ANA, an autonomous federal entity created by Law Number 9,984/2000. According to the PNRH (Article 1), water is considered a public good (the state sector is responsible for regulating, controlling and charging for its use, as well as stimulating rational uses), endowed with economic value (due to its finite and limited nature), seeking more efficient water management in all its uses, as well as decentralization in the organization of the system with the effective participation of all stakeholders. The most important instruments of the PNRH are the granting of rights to use water resources and their collection (Sirvinskas, 2005, p. 310).

Public participation and stakeholder involvement is an extremely important tool, which contributes greatly to decision making and the reduction of conflicts inherent in the integrated water resources management process. Participation offers the community the opportunity to exercise its rights, as well as to recognize its responsibilities, an essentially ethical attribution (Gallo, 2007).

The granting of rights to use water resources is an administrative act by which the Granting Authority, whether of the Union or the State, allows the applicant to use the water resources for a determined period and under certain conditions. It is provided for in Article 12, PNRH, for certain activities, having the function of maintaining quantitative and qualitative control, and is granted for a maximum of thirty-five years, being extendable (Article 16, PNRH).

The concession is a right to use water, in order to control which and the amount of water resources in a given place, providing more accurate information to the State on the local water volume and consumption pressure (Demajorovic *et al*., 2015). It is an instrument for implementing demand management systems and rational water use, regulating the type of activity to be implemented in the basin, contributing to the management of the territory (Almeida, *et al*., 2016).

Due to its geographical location and natural characteristics, the Pardo River watershed constitutes an environment of great natural value; where human activities are conjugated that with the passage of time alter the natural heritage (Niño-Gutiérrez, 2017) which, substantially modifies the environment causing impacts at the local level and with this, progressive social repercussions are gestated. The area surrounding the study area is characterized by exuberant and dense plant growth and by the cracking of the lithological substrate, which, together with the existence of thin soils, produces a high infiltration coefficient. Surface runoff is relevant and is expressed through the supply of aquifers from some springs that, although they provide little flow, are constant and sufficient to maintain fluvial dynamics.

Citizen participation, as well as social actors are extremely important tools, which contribute greatly to decision making and the reduction of conflicts inherent to the process of integrated water resources management. Participation offers the community the opportunity to exercise its rights as well as to recognize its responsibilities, an essentially ethical attribution (Gallo, 2007).

It is important to note that the geological stability that prevails in the Pardo watershed plays a fundamental role in the regional climate, which has benefited from the presence of a large body of water that has increased the humidity in the atmosphere. The hydrogeological analysis of the basin is of particular importance, not only because it is necessary to adequately use the water for the satisfaction of human needs (although during its use the local inhabitants moderately modify the hydric dynamics of the subsoil and surface water), but also because of the natural conditions of stability of the materials of the Pardo River, all this, allows the area to be multifunctional since, environmental education activities, scientific research, monitoring of the elements of nature among others are carried out (Niño-Gutiérrez, 2014).

The granting of rights for the use of water resources, has the character of an administrative act from which the Granting Authority, based on the Union or the State, allows the applicant of the concession to use the water resources for a determined period and under certain conditions. It is provided for in Article 12, PNRH, for certain activities, having the function of maintaining quantitative and qualitative control, granted for a maximum of three to five years, being extendable (Article 16, PNRH).

The concession is a water use right, with the purpose of controlling the quantity and amount of water resources in a given place, providing more accurate information to the State on the local water volume and consumption pressure (Demajorovic *et al*., 2015). It is an instrument for implementing demand management systems and rational water use, regulating the type of activity to be implemented in the river basin, contributing to the management of the territory (Almeida, *et al*., 2016).

With the donation, the discharge of sewage and other waste is regulated and ordered, avoiding shortages at qualitative levels, in addition to ensuring that users can have access to the water resource. There are Brazilian states that have not effectively implemented this regime (Lisboa *et al*., 2019), which is not the case in the State of São Paulo, where the concession process is processed by the DAEE, and in the case of rivers, before the ANA.

Charging for the use of water resources, has to do with the revolution in water management derives, mainly, from its scarcity in quantity and quality, stimulating its onerousness, since free use has been increasingly seen as dishonest, since it is not an individual good, but diffuse, of all. On the other hand, regardless of considering water as a scarce resource, it is necessary not to lose sight of the fact that its demand is increasing due to population growth and the different socioeconomic activities that are being developed with growing vigor. Although the PNRH already provides for charging for water use, it was with the commitment of the society and of the River Basin Committees that the user was induced to a rational use, seeking to balance availability and demand and, consequently, a harmonizing redistribution of the social costs resulting from its misuse. It should be noted that urban users until now paid for the distribution of water and not for the water itself.

Charging for water use is unprecedented, having been implemented on the European continent for decades. It gained momentum with ECO-92 and, in Brazil, its first implementation dates back to 2003, instituted by the Federal Government in the Paraíba do Sul river basin, covering municipalities in the states of São Paulo, Rio de Janeiro and Minas Gerais. In 2005, the São Paulo Legislative Assembly approved Bill No. 676/2000, which was sanctioned by the State Government, which provides for charging for the use of water resources owned by the State, setting the limit value at R$ 0. 01 (one cent of the Brazilian Real) to be charged per cubic meter of volume captured, extracted or derived, above the maximum limit of 10m³ to be charged to domestic, industrial and agricultural users (the latter with the benefit of having the right to four years to adapt to the new charge).

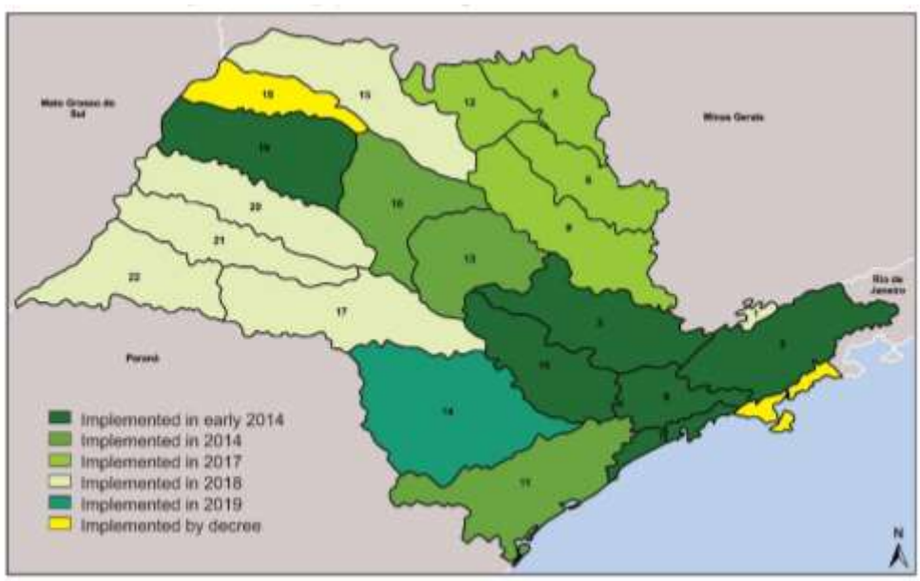
Charging for the use of water resources, more than an instrument to generate income, is an inductor of cultural changes, for the water economy, for the reduction of losses, for management with environmental justice, this because, it is charged from those who use and pollute, advancing towards a sustainable management of this precious good. It remains latent that water charges have a more moral and educational effect, aiming only at avoiding water wastage, since the amount foreseen for the charge is insignificant.

In the State of São Paulo, the Watershed Committees were responsible for planning and implementing the collection, as well as the power to define the collection methodology within their area of operation (Leite *et al*., 2010), relying, for this purpose, on the prerogative of the Legislative Assembly to monitor and oversee the application of resources from water use charges. The amounts obtained from the collection should be invested, among others, in the creation of funds to invest in works for the recovery of rivers and other sources of water resources. The spirit of charging for water use is to economically attack the unimportant user who makes inappropriate use of this resource, based on the maxim "touch your pocket". Therefore, it is necessary to raise awareness and practice sustainable actions to guarantee the fundamental resources for our survival.

Charging for the use of water is part of a general principle of environmental law that imposes the payment of costs to those who will potentially profit from the use of environmental resources. The collection, therefore, is fully within the context of the most modern techniques of environmental law and is socially just. The charge for the use of water resources is not an end in itself, but, on the contrary, an instrument used to achieve specific ends. The charge is not in the nature of a tax. The purposes of water charges are: a) to recognize water as an economic good and to give the user an indication of its real value; b) to obtain financial resources to finance the programs and interactions contemplated in the water resources plans.

Charges for the use of water resources must be made based on the legal criteria established by law, given that their priority use must take place in the river basin that generated the economic resource. The application of the resources can be done on a non-repayable basis, i.e., the money returns to its origin with a view to financing projects and works that alter, in a manner considered beneficial to the community, the quality, quantity and flow regime of water bodies (Antunes, 2000). The payment is mandatory for those who collect water directly from rivers and lakes; use water from deep wells; and discharge sewage into rivers located in watersheds. Figure 1 shows the update in the regions that have already implemented the charge in the State of São Paulo.

Figure 1 Water Use Charge in the São Paulo State Watershed



Source: Integrated Water Resources Management System of the State of São Paulo (2019)

The purposes of the charge are: to indicate the real value of water; to encourage rational use; and to obtain financial resources for the Watersheds. In the State of São Paulo, the requirement is still restricted to urban industrial use (State Decree 50 667/2006). Recognizing water as an economic property is to make users aware of its real value, which will lead to rationalization in water use, as well as, eventually, to obtaining subsidies for investments in plans and programs, especially in places with high levels of water demand, including those with high population concentration as a result of migration from the countryside to the city, which encourages the growth of urbanization, sometimes industrialization or irrigated agriculture.

Charging contributes to environmental protection, as investment in sustainable watershed management can be significantly lower than the costs required to obtain new forms of water supply or treatment (Alencar *et al*., 2018). It can be understood as a reaction to the constant degradation of watersheds, rationalizing water use, providing resources to finance investments in the watershed itself (Vera *et al*., 2017).

The PNRH, among other concepts, consolidated sustainable planning and integrated management as a way of ratifying the impossibility of separating qualitative characteristics from quantitative ones, recognizing the economic value, charging for use, incentivizing the conscious use of the vital liquid for life with the idea of conserving and generating economic resources for the repair and maintenance of water availability (Oliveira *et al*., 2017 and Niño-Gutiérrez, 2005). The uptake process still occurs gradually in the various Brazilian basins (Acselrad, Azevedo & Fomiga Johnsson, 2015), and not at the expected speed. For this culture to be strengthened, civil society would have to definitely commit to this barrier, so that public and political forces can walk this path in a greater number of basins (Santin *et al*., 2013).

Something similar occurs in watersheds in other latitudes such as Mexico, where water use is combined with wildlife, given that watersheds are areas that serve as habitat for the diversity of plant and animal communities that exist there. Forested, humid and rainy areas allow the existence of rich fauna communities (Niño-Gutiérrez, 2015), since permanent vegetation provides safe shelter for many species. Among the animals that inhabit the area under study are mammals, birds, reptiles, batrachians and fish (Niño-Castillo *et al*., 2020).

In addition to environmental recovery, charging for the use of water resources plays a prominent role in recovering the costs of public services to maintain their quality (Guimarães, 1993). It is not a tax, not even an express tax, but a public price derived from a patrimonial income of the Union or the States, which own the water, being economic instruments supported by the polluter pays and user pays principles, structured from the punitive point of view. or compensatory aspects to be incorporated in the production costs for water users (Assis *et al*., 2018). Charging for the use of water resources will minimize adverse consequences on water quality for consumers, especially since it will require counterparts from those who use a designated public resource. These earned amounts should return to the basin of origin through investments defined in the basin plans approved by the water resources committees (Demajorovic *et al*., 2015).

According to the National Water Agency (2015), the region covered by the Pardo Watershed is located in the Paraná Hydrographic Region, in which it has an approximate area of 879 873 km². According to Sampaio (2013), the Pardo River rises in the southern plateau of the state of Minas Gerais, in the municipality of Ipuíuna, where its waters continue after 550 km to the Grande River. The most spatially significant tributaries of the Pardo basin are the Canoas and Araraquara rivers, and the São Pedro, Floresta and Prata streams on the right bank, and the Tambaú, Verde and Fartura rivers and the Tamanduá stream on the left bank. The Pardo River has approximately 84% of its course in the State of São Paulo. The Pardo River Basin was instituted by São Paulo State Law Number 9 034, December 27, 1994, as Water Resources Management Unit 04-UGRHI 04.

For the Integrated Water Resources Management System of the State of São Paulo (2012), the Pardo River Basin comprises 23 municipalities, where the Basin's economy is based on the agricultural sector (agro-industry sucroalcohol, citrus and pastures), industry, commerce and services consolidated in the Ribeirão Preto region. In terms of water demand, the Basin is classified as "in the process of industrialization", with reasonable water availability compared to other basins in the state, and water quality varies from average to good.

According to the Secretariat of Sanitation and Water Resources of the State of São Paulo (2012), the Basin's economy is based on agriculture, industry, commerce, and services, mostly consolidated in the Ribeirão Preto region. In agriculture, sugarcane and citrus crops stand out, in addition to pastures, which occupy approximately 22% of the basin area (Ocelli Pinheiro *et al*., 2022). As a result of sugarcane cultivation, the sugar-alcohol production chain is developed, and also in the secondary sector, the region is home to important "Local Productive Arrangements", such as the medical-hospital, dental and precision instrumentation and automation industries in the urban agglomeration of Ribeirão Preto.

For the Integrated Water Resources Management System of the State of São Paulo (2016), the Pardo River Basin Committee was installed on June 12, 1996. The Committee is composed of 27 municipalities, including Ribeirão Preto, which is the headquarters of the Executive Secretariat. These agglutinated cities are: Altinópolis, Águas da Prata, Brodowski, Caconde, Cajuru, Casa Branca, Cássia dos Coqueiros, Cravinhos, Divinolândia, Itobí, Jardinópolis, Mococa, Pontal, Sales de Oliveira, Santa Cruz da Esperança, Santa Rosa do Viterbo, Santo Antônio da Alegria, São José do Rio Pardo, São Sebastião da Grama, São Simão, Serra Azul, Serrana, Sertãozinho, Tambaú, Tapiratiba and Vargem Grande do Sul. Its coverage has a drainage area of 8 993 km² and a population of 1 092 477 inhabitants.

On December 20, 2012, it was granted by Decree Number 58 771, which approved and set the values to be charged for the use of water resources in the domain of the State of São Paulo in the Pardo Water Resources Management Unit. In this sense, and in line with Decree Number 50 667, of March 30, 2006, which regulated the provisions of Law Number 12 183, of 2005, which deals with the charge for the use of water resources in the domain of the State of São Paulo.

In this sense, according to the deliberation of the Pardo River Basin Committee Number 278, on March 6, 2020, in which the guidelines and criteria for the distribution of FEHIDRO resources and the charge for the use of water destined for the CBH-Pardo area for 2020 were approved, they add up to the value of R$ 1 636 076.95 of FEHIDRO participation and R$ 606 163.83 of the charge for water use. Essentially, these resources are used for the execution of multi-year projects, in line with the ten-year plan for the Hydrographic Basin between 2016 and 2027.

According to the Integrated Water Resources Management System of the State of São Paulo (2019), they are in line with the actions prioritized by the River Basin Committee, classified and organized in accordance with the provisions of CRH Deliberation Number 190 of December 14, 2016. The prioritization of resources took into account the provisions of Article 2 chapter of CRH Deliberation Number 18 of November 8, 2016, endorsed on December 14, 2016, as can be seen in Table 1.

Table 1 Distribution of investments by PDC´s (in R$) for the year of 2020.

Description		Investment	%	Charge	%	Total	%
		Value		Value		Value	
Available resources		807 975.00	-	4 816 000.00	-	5 623 975.00	-
Total investment		807 975.00	-	4 816 000.00	-	5 623 975.00	-
PDC’s	PDC1	0.00	0.0	290 292.73	6.0	290 292.73	5.2
	PDC2	0.00	0.0	59 614.09	1.2	59 614.09	1.1
	PDC3	0.00	0.0	2 722 003.90	56.5	2 722 003.90	48.4
	PDC4	0.00	0.0	623 091.44	12.9	623 091.44	11.1
	PDC5	807 975.00	100.0	277 452.18	5.8	1 085 427.18	19.3
	PDC6	0.00	0.0	322 816.20	6.7	322 816.20	5.7
	PDC7	0.00	0.0	0.00	0.0	0.00	0.0
	PDC8	0.00	0.0	520 729.46	10.8	520 729.46	9.3
Del. CRH 188/16, Art. 2°	Item I	0.00	-	349 906.82	7.3	349 906.82	6.2
	Item II	807 975.00	100.0	3 622 547.52	75.2	4 430 522.52	78.8
	Item III	0.00	-	843 545.66	17.5	843 545.66	15.0
+balance/deficit		0.00		0.00		0.00	

Source: Integrated Water Resources Management System in the State of São Paulo (2019).

As can be seen in Table 1, PDC 3 received the most investments, as it proposes to invest in sanitary sewerage from sanitary sewerage projects and works, in urbanized areas, solid waste from collection, treatment and final disposal system projects and works, or other solid waste management actions, river water drainage from urban storm drainage system projects and works, and actions aimed at promoting pollution containment, dissemination, prevention and control of erosive processes from projects, works and actions to prevent and control soil erosion or sedimentation of water bodies.

The investment in CDP 3 is substantially higher than in others given the urgency of waste management in large urban centers and the consequent prevention of both water pollution and disease prevention. In this sense, it is of superlative socio-environmental value and strategic for the sustainable development of cities. The second most important can be referred to JDP 5 related to the control of losses in water supply systems with projects, works and services for the control of losses in the supply systems of the different water user sectors, with emphasis on public supply networks.

This is the second most important CDP, given the importance of preserving water resources not only in river basins but also in large urban centers. The loss of this resource means not only an unacceptable waste, but also the loss of public resources from taxpayers, which causes a double damage to society. Moreover, in the field of public policies, it makes no sense to create a whole structure for the preservation of watersheds and their water resources if this is wasted in large consumption centers.

4. Conclusions

Since the elaboration of the famous Brundtland Report (Our Common Future, 1987) and its dissemination at the Earth Summit (Rio de Janeiro, 1992), it has been repeated and almost universally accepted that ecology is a fundamental value for human life and that sustainable development consists of implementing three types of solidarity simultaneously: within one's own community, with the rest of the world's inhabitants and with future generations. This solidarity-based veneer makes the concepts of ecology and sustainable development attractive to the mass media and to society as a whole, since they harbor ideas that are acceptable to all socioeconomic, political, cultural, religious and environmental actors.

Faced with worsening environmental problems on a global scale, nations have rethought the management of their natural resources with the aim of promoting sustainable development, as well as promoting economic growth, environmental preservation and social inclusion. Among these resources, water stands out. This precious resource for life and development has been used in a predatory manner by the productive system, particularly by agricultural, industrial and urban activities. On this point, even Brazil, being a privileged country in terms of water resources, has an unequal distribution in the geographic space, which requires responses from public authorities to this situation.

To this end, particularly in the State of São Paulo, river basin committees were created with the aim of making water resources more efficient and ensuring their sustainability and, subsequently, charging for the water resources consumed was authorized. Specifically in relation to the Pardo River Basin, this charge was allowed as of Decree No. 58,771 of December 20, 2012. The charge for the use of water destined for the CBH-Pardo area for the year 2020, add up to the value of R$ 1,636,076.95 of the FEHIDRO quota portion and R$ 4,606,163.83 of the charge for water use.

In this sense, the policy of charging for water resources aimed at their conservation and optimal use in the face of the danger of their scarcity due to their predatory and irresponsible consumption is perfectly justifiable, as long as the economic resources are used exclusively for the conservation and maintenance of this important natural resource, in addition, for greater reliability in the management of these resources, it is essential to maintain principles such as legality, morality, efficiency, publicity and impersonality.

With these resources, based on a ten-year plan, executed through a multi-year plan, it is possible to contract a strategic investment in the areas of sanitary sewage, solid waste, river water drainage and prevention and control of erosive processes. Therefore, the Pardo Basin Management Committee has worked and made strategic investments to ensure the sustainable management of water resources in the Pardo River Basin.

5. References

Acselrad, M. V.; Azevedo, J. P. S. D. & Formiga-Johnson, R. M. (2015). Cobrança pelo uso da água no Estado do Rio de Janeiro, Brasil (2004-2013): histórico e desafios atuais. Engenharia Sanitaria e Ambiental, 20, 199-208. http://old.scielo.br/scielo.php?pid=S1413-41522015000200199&script=sci_abstract&tlng=pt

Agência Nacional de Águas. (2019). Brasil tem cerca de 12% das reservas mundiais de água doce do planeta. Brasília, DF.

Agência Nacional de Águas. (2015). Região Hidrográfica Paraná. Brasília, DF.

Alencar, K. M., Moreira, M. C., & Silva, D. D. D. (2018). Custo da cobrança pelo uso da água em bacia hidrográfica do Cerrado Brasileiro. Revista Ambiente & Água, 13(5): http://old.scielo.br/scielo.php?pid=S1980-993X2018000500307&script=sci_abstract&tlng=pt

Almeida, M. A. D., & 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 & Água, 1(11): 989-1005.

Antunes, P. D. B. (2000). Direito Ambiental. Rio de Janeiro.

Assis, W. D. D., Ribeiro, M. M. R., & Moraes, M. M. G. A. D. (2018). Proposição de melhorias para o sistema de cobrança pelo uso da água bruta da Bacia Hidrográfica do rio São Francisco. Engenharia Sanitária e Ambiental, 23, 779-790.

Brundtland, G. H. & Comum, N. F. (1987). Relatório Brundtland. Our Common Future: United Nations. https://www.are.admin.ch/are/en/home/media/publications/sustainable-development/brundtland-report.html

Caregnato, R. C. A. & Mutti, R. (2006). Pesquisa qualitativa: análise de discurso versus análise de conteúdo. Texto & Contexto-Enfermagem, 15 (4): 679-684 https://www.scielo.br/j/tce/a/9VBbHT3qxByvFCtbZDZHgNP/abstract/?lang=pt

Demajorovic, J.; Caruso, C. & Jacobi, P. R. (2015). Cobrança do uso da água e comportamento dos usuários industriais na bacia hidrográfica do Piracicaba, Capivari e Jundiaí. Revista de Administração Pública, 1(49): 1193-1214. https://www.redalyc.org/articulo.oa?id=241042209006

Gallo, Z. (2007). Ethos, a grande morada humana: economia, ecologia e ética. Itu.

Guimarães, P. C. V. (1993). Instrumentos econômicos para gerenciamento ambiental: a cobrança pelo uso da água no estado de São Paulo. Revista de Administração de Empresas, 33(5): 1-10. https://www.scielo.br/j/rae/a/StbWGjKSjhSMBT5k45Sm8Fj/?lang=pt

Grangeiro, E. L. D. A., Ribeiro, M. M. R., & Miranda, L. I. B. D. (2020). Integração de políticas públicas no Brasil: o caso dos setores de recursos hídricos, urbano e saneamento. Cadernos Metrópole, 1(22): 417-434. https://www.scielo.br/j/cm/a/S4VN4qKQf9q8cLcKnfh9FDm/?format=pdf&lang=pt

Instituto Geografico e Cartografico. (2020). Mapa hidrográfico do Estado de São Paulo. São Paulo, SP.

Lakatos, E. M., & Marconi, M. A. (2001) Fundamentos metodologia científica. São Paulo.

Lei Núm. 9 433, de 08 de janeiro de 1997. (1997, 08 de janeiro) Política Nacional de Recursos Hídricos, Brasília.

Leite, G. B., & Vieira, W. D. C. (2010). Proposta metodológica de cobrança pelo uso dos recursos hídricos usando o valor de Shapley: uma aplicação à bacia do rio Paraíba do Sul. Estudos Econômicos (São Paulo), 1(40): 651-677. https://www.revistas.usp.br

Lisboa, L., Silva, D. D. D., Moreira, M. C., Silva, A. D. J., & Uliana, E. M. (2019). Sistema para análise das outorgas de captação de água e diluição de efluentes na bacia do rio Piracicaba (MG). Engenharia Sanitaria e Ambiental, 1(24): 929-937. https://www.scielo.br/j/esa/a/jDJKCBH6hPFGxsF5XvhW97w/abstract/?lang=pt
Machado, P. A. L. M. (2001). Direito ambiental brasileiro. São Paulo.

Niño-Castillo, I. N.; Niño-Gutiérrez, N. S.; Niño-Castillo, J. E. & Rojas-Copa, A. E. (2020). Territory, vulnerability and sustainability in the coastal-tourist strip of Acapulco. Journal of Business Development Strategies, 6(17): 7-19. https://www.ecorfan.org/spain/researchjournals/Estrategias_del_Desarrollo_Empresarial/vol6num17/Journal_of_Business_Development_Strategies_V6_N17_2.pdf

Niño-Gutiérrez, N. S. (2005). Propuesta de ordenación territorial en Costa Chica, Guerrero. El caso del Guineo. En III Congreso Internacional de Ordenación del Territorio "Los retos de la Ordenación del Territorio. Memorias. https://www.academia.edu/34711552/Propuesta_de_ordenaci%C3%B3n_territorial_en_Costa_Chica_Guerrero_El_caso_del_Guineo

Niño-Gutiérrez, N. S. (2014). Parque Natural El Fondo: geografía y turismo. México, D. F.: Eón.

Niño-Gutiérrez, N. S. (2015). Flora and Fauna in Federal Protected Areas of Mexico (FPAM): A sustainable vision?. ECORFAN Journal-Ecuador, 2(3): 189-195. https://www.ecorfan.org/ecuador/journal/vol2num3/ECORFAN%20Journal-Ecuador%20V2%20N3_5.pdf

Niño-Gutiérrez, N. S. (2017). Natural heritage and tourism in a higher education institution in South Mexico. ECORFAN Journal-Mexico, 8(19): 29-38. https://www.ecorfan.org/journal/v8n19/ECORFAN_Journal-Mexico_V8_N19_3.pdf

Ocelli Pinheiro, R., de Paula, L. F., & Giardino, F. (2022). Agricultural Heritage: Contrasting National and International Programs in Brazil and Italy. Sustainability, 14(11), 6401. https://www.mdpi.com/2071-1050/14/11/6401

Oliveira, A. R. M. D., Borges, A. C., Matos, A. T. D., Silva, D. D. D., & Pruski, F. F. (2017). Mecanismos alternativos de cobrança pelo uso de recursos hídricos para assimilação de efluentes. RBRH, 22.

Sampaio, C. F. (2013). Avaliação ambiental do rio Pardo, Brasil: ênfase para Áreas de Preservação Permanente, ecossistemas aquáticos superficiais e condições físico-químicas da água. Dissertação de Mestrado, Escola de Enfermagem de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto.

Santin, J. R. & Goellner, E. (2013). A gestão dos recursos hídricos e a cobrança pelo seu uso. Sequência (Florianópolis), 199-221.

Dos Santos, M. M., Alencastre, C. E., Caetano-Chang, M. R., Kiang, C. H., Gastmans, D., & Crivelenti, R. (2008). Uso atual do sistema Aqüífero Guarani na Bacia Hidrográfica do Rio Pardo (UGRHI 04) (SP). Águas Subterrâneas.

Sistema Integrado de Gerenciamento de Recursos Hídricos do Estado de São Paulo. (2012). Relatório da situação dos recursos hídricos das bacias hidrográficas. São Paulo, SP.

Sistema Integrado de Gerenciamento de Recursos Hídricos do Estado de São Paulo. (2016). Termo de Referência para apresentação de projeto para Implantação do Programa de Educação Ambiental da Bacia Hidrográfica do Pardo, aprovado pela Deliberação CBH-Pardo nº 232, em 16 de dezembro de 2016. 2016. São Paulo, SP.

Sistema Integrado de Gerenciamento de Recursos Hídricos do Estado de São Paulo. (2019). Cobrança pelo uso da água. São Paulo, SP.

Sirvinskas, L. P. (2005). Manual de direito ambiental. São Paulo.

Vera, L. H. A., Montenegro, S. M. G. L. & Silva, S. R. (2017) Desempenho da cobrança pelo uso da água no domínio da Nação como ferramenta de gestão de recursos hídricos na bacia do rio São Francisco. Revista Brasileira de Recursos Hídricos, 22.