

Grants for irrigation of coffee crops in Rondônia – Southern Amazon, from 2010 to 2019



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ABSTRACT

The objective of this research is to present a survey of the scenario from 2010 to 2019 regarding the granting of rights to use water for irrigation purposes in coffee farming in the state of Rondônia located in the Southern Brazilian Amazon, to make information available to resource managers water resources for strategic decision-making purposes. For this purpose, bibliographic and documentary information was used, seeking to obtain reliable answers, since irrigation has direct impacts on the water resources available in river basins throughout the state. It is expected to provide managers of this resource with quality in planning actions in a decentralized manner, ensuring the development of economic activities, in a manner compatible with the multiple and environmentally sustainable use of water resources.

Keywords: Grant, Irrigation, Coffee farming, Water resources.

1 INTRODUCTION

Innovation in the field is a reality that permeates great debates in the modern world, which is increasingly demanding for the insertion of solutions that make it possible to increase production, both in quantity and quality. This discussion mainly involves the agricultural segment, which naturally has its challenges and goals, involved in the production of food to supply large urban centers, and, for this reason, is in constant search for better options for customized tools that meet its needs.

Irrigated agriculture, a growing reality on the planet, is undeniably a tool that makes it possible to increase production by using a set of techniques and equipment that currently have a series of technological innovations that allow the efficient and adequate management of water on the property. Thus, because it is not influenced by temporal or locational uncertainty, irrigation consists of an agricultural practice capable of supplying the total or partial water deficit to the plants in a planned manner.

In this sense, the relevance of irrigation in the planet's agricultural economy and food supply, as well as for local and regional development, with important social contributions is visible (Sojka *et*



al., 2006). In Brazil, the modernization of production units with irrigation systems has led to the implementation of innovative methods, a decisive factor that makes a significant contribution to productivity growth.

Irrigation brings with it the need to use surface and groundwater, a public good. Thus, it is the duty of the State to promote policies of rational use, integrated management and multiple use of this resource. To exercise this duty, the state has water resources management instruments provided for by Law No. 9,433/1997 (Brasil, 1997).

Among them is the Granting of Right of Use, which consists of an authorization that regulates the use of water resources, controlling the amount available and inducing the achievement of a certain objective in relation to water quality (ANA, 2019). Thus, theoretically, the concession granted means that water will not be a restrictive factor for the irrigator granted, who mostly capture it for the production of irrigated coffee.

Based on the survey of bibliographic and documentary information, this work aims to present a survey of the scenario from 2010 to 2019, regarding the granting of the right to use water for irrigation purposes in coffee growing in the state of Rondônia, in order to provide information to water resources managers for strategic decision-making purposes.

2 LEGISLATION REGARDING THE STATE GRANT

In Rondônia, Complementary Law No. 255/2002 (Rondônia, 2002b), regulated by State Decree No. 10,104/2002 (Rondônia, 2002a), established the State Policy and the respective Water Resources Management System.

From the legal framework, Resolution No. 04/2014 was issued by the State Council of Water Resources – CRH/RO, which deals with situations not subject to granting (Rondônia, 2014), while Ordinance No. 081/GAB/SEDAM, of March 23, 2017 (Rondônia, 2017), applies the issuance of authorization for the use of water resources and Ordinance No. 449/SEDAM-COREH, of November 19, 2019, to the waiver of the grant (Rondônia, 2019), forming the set of laws that govern the granting of the Right to Use Water Resources in the state.

The legal provisions list the types and terms for granting Grants of the Right to Use Water Resources. It will be presented below, that since 2010 there has been an increase in this water management procedure for use in the most diverse activities, year after year.

3 GRANTING OF GRANTS FOR AGRICULTURAL ACTIVITY

In the period studied, the use of water for coffee irrigation stands out among other agricultural activities, reaching the highest demand in 2019, when it reached 1,631 requests for grants, as can be seen in Table 1. Among the segments of irrigated crops, coffee is the one that has grown the most



significantly, due to investments in technologies, in order to produce more and more, in an improved way and adapted to local edaphoclimatic conditions (Rondônia, 2017).

Table 1. Irrigation grants in Rondônia from 2010 to 2019

Purpose of irrigation	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
Pineapple	1				1					
Acai Berry	13		5	5						
Rice	1		1							
Banana	22	7	7	2	5	1				
Cocoa	3			2						
Coffee	1631	352	336	392	121	66	66	18		
Capim/bovine culture					5	1				
Guava	2	1	1							
Soursop	1		1							
Garden	21	5	5		2					
Irrigation	37	1			13	13			7	3
Lemon	2	2								
Papaya	6		1	1	1					
Cassava	1	1								
Passion fruit	21	13	1	3		1				
Watermelon	4	1			3					
Corn	4	1			1					
Pastures	144	39	42	12	15	1				
Pepper	3									
Black pepper	1	1								
Orchard	1			1						
Okra	1				1					
Soy	4	1				3				

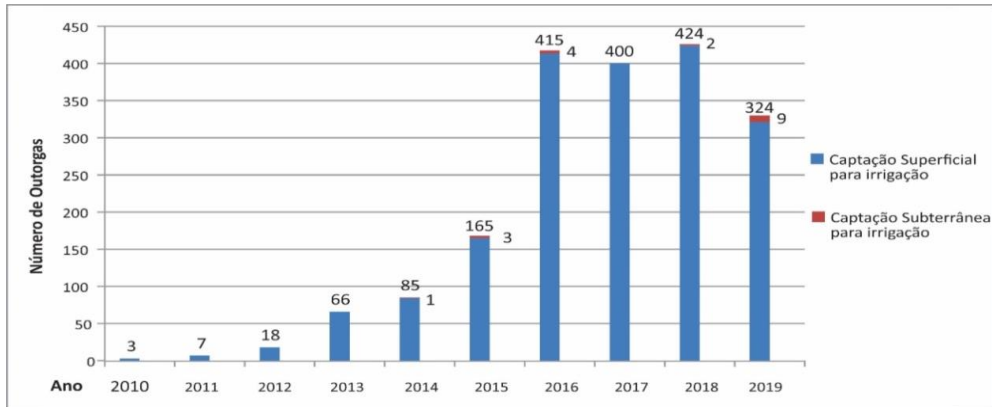
Source: SEDAM Grant Database (RONDÔNIA, 2020). Organized by the authors.

The analysis of Figure 1 in the following graph also shows that in the period from 2010 to 2019, the number of concessions for the use of water in irrigation increased significantly, particularly in surface water, given the great availability of water bodies in the state, distributed in seven river basins (Rondônia, 2002b). This, however, does not fail to make groundwater withdrawals less relevant, which also increased in the same period.

It is also observed that the largest increases in water withdrawal for irrigation occurred in the years 2016, 2017, 2018 and 2019, partly justified by the fact that it was from 2016 onwards that, according to the State Secretariat of Agriculture (SEAGRI) (Rondônia, 2017), there was the implementation of the Rondônia Coffee Quality and Sustainability Contest (Concafé), program created by the State Government with the objective of encouraging better coffee production with the application of resources, lectures, planting and management demonstrations, among other actions developed with small producers through family-based agriculture, representing the largest production of irrigated clonal coffee in the region.



Figure 1. Number of concessions for irrigation with surface or groundwater abstraction, in the period from 2010 to 2019 in Rondônia.

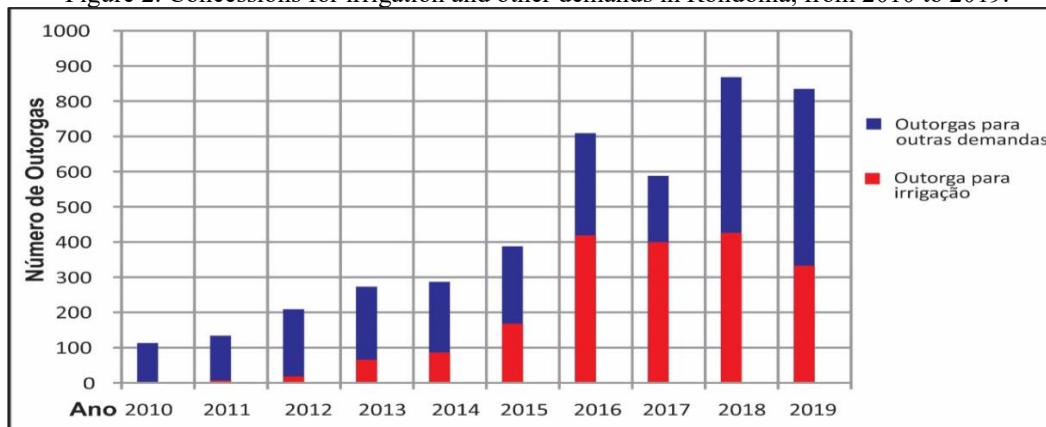


Source: SEDAM Grant Database (RONDÔNIA, 2020).
Organized by the authors.

The relevant increase in irrigated crops, especially coffee, considered one of the main agricultural activities in Rondônia, in addition to the socioeconomic importance that provides the generation of employment and income to more than 22 thousand families (Silva, 2016), bring with them the increase in concessions as instruments for the management of water resources in the state.

The survey of concessions shows that the number of grants increased in the ten-year period with a slight decrease in 2019, however, in relation to coffee, the increase was almost five times, compared to the previous year (Figure 2).

Figure 2. Concessions for irrigation and other demands in Rondônia, from 2010 to 2019.



Source: SEDAM Grant Database (RONDÔNIA, 2020).
Organized by the authors.

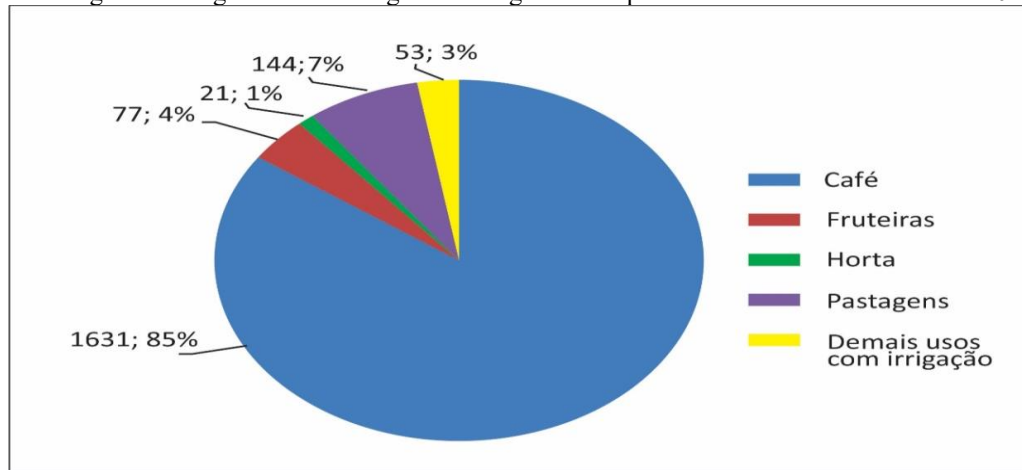
The use of irrigation aims to reach new markets through quality production, which associated with other innovative practices through planting, harvesting and soil improvement technology has made it possible to obtain high yields at a cost compatible with the exploitation of the crop, making the economic performance of the activity attractive to farmers throughout the state (PONCIANO *et al.*, 2009). As a result, the replacement of crops using clonal coffees with the use of irrigation



technologies has been a gradual and constant process, in some municipalities it has already reached 30% of the planted area (CONAB, 2016).

Still in relation to the irrigated activities with the highest percentage of cultivation in Rondônia when compared to coffee, one can immediately notice the great expansion that the cultivation of coffee has had in recent years. Currently, coffee farming in the state represents 85% of all activities that require water use and consequently depend on concessions for the use of water resources (Figure 3).

Figure 3. Percentages of uses granted with irrigation for agricultural production in Rondônia between 2010 and 2019.



Source: SEDAM Grant Database (RONDÔNIA, 2020).

Organized by the authors.

According to Marcolan *et al.* (2009) the increase in coffee cultivation in Rondônia is associated with the modern network of companies that sell machinery, equipment and implements for coffee cultivation and representations with direct technical assistance on the rural property for the sale of agricultural inputs, as well as industries and trades of the product. Adding these factors with the transfer of technological arrangements, what we have is the demonstration of large percentages of increase in production.

Also, according to Marcolan *et al.* (2009) agronomic research and technology transfer for coffee growing in the state have as their main support agency Embrapa of Rondônia, which persists in the objective of making coffee production more sustainable, through the adoption of new productive varieties, good agricultural practices (including grain quality), traceability and economic, social and environmental sustainability. These are actions that aim to meet the demands of the market, which requires and values the insertion of appropriate tools and conditions for production and the consequent certification of the product.

4 GRANTING OF GRANTS BY MUNICIPALITY

Regarding the concessions of concessions for the use of water resources by municipalities, the survey shows that approximately 99% of them use this mechanism for some sector of the local



economy. Only in the municipality of Teixeiraópolis was the procedure not recorded in the period studied. It is also observed that although some municipalities present a consolidated historical series in relation to water uses through concession procedures since 2010, the great highlight occurs in the municipality of Nova Brasilândia D'Oeste, which in seven years had 312 authorizations granted by the state management body, as shown in Table 2, and Figure 4, below.

Table 2. Number of concessions for the use of water resources by municipality in Rondônia from 2010 to 2019.

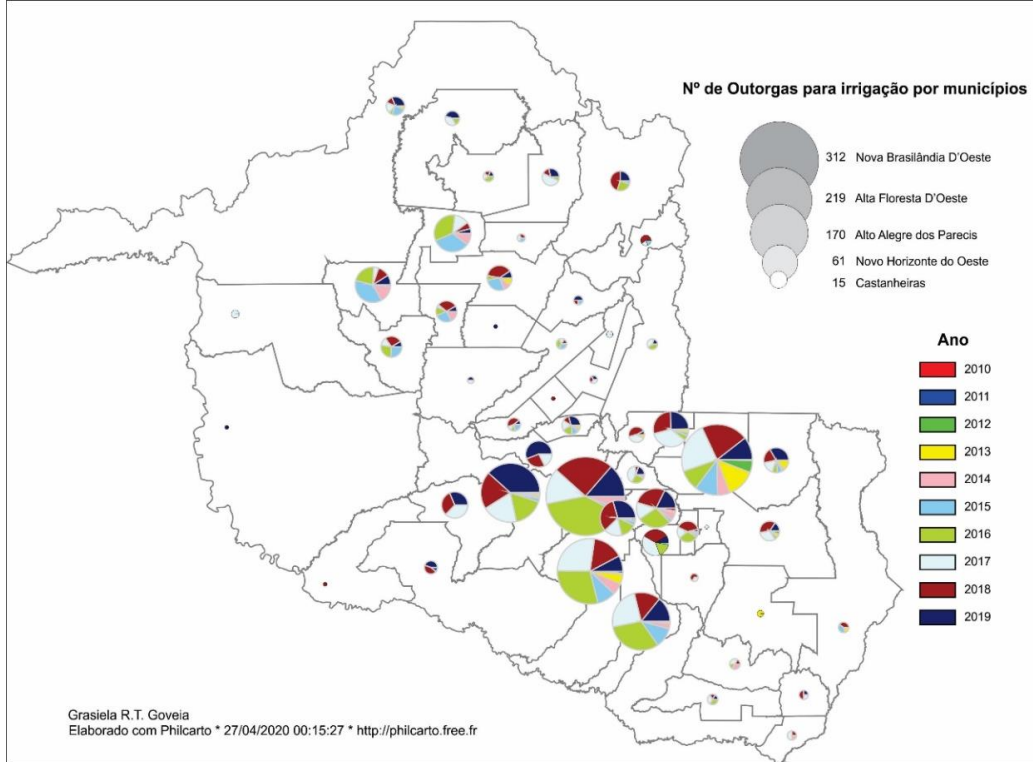
Municipality	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Total
Nova Brasilândia D'Oeste				1	17	5	123	46	77	43	312
Cacoal		1	14	34	14	27	24	60	55	27	256
Alta Floresta D'Oeste		2	1	11	12	20	64	59	33	17	219
São Miguel do Guaporé		1	1	2	2	3	30	35	37	68	179
Alto Alegre dos Parecis				2	5	19	54	41	25	24	170
Rolim de Moura	2		1		5	2	22	11	22	14	79
Alto Paraiso					7	23	23	9	4	3	69
Buritis		1			10	24	14	3	7	6	65
Minister Andreazza				2		2	3	22	18	16	63
New Horizon of the West	1	1				2	9	10	20	18	61
Santa Luzia D'Oeste						1	6	14	12	3	36
Rubber trees								13	11	11	35
Alvorada D'Oeste								6	9	19	34
Ariquemes				3	3	9	2		12	3	32
Espigão D'Oeste				4	1	2	2	5	6	10	30
Campo Novo de Rondônia						6	6	3	6	2	23
Monte Negro					4	6	3	1	7	2	23
Sao Felipe D'Oeste					1	1	7	4	9	1	23
D'Oeste Hatchet						1	5		9	5	20
Good Pimenta			1	1			1	6	7	3	19
Urupá				1	1	2	3	3	2	5	17
Old Port				1		4	1	3	2	5	16
Chestnut trees					1		4	6	1	3	15
Cujubim							1	7	2	4	14
President Medici				1				5	6	1	13
Jamari Candles							2	4		5	11
Mirante da Serra						2	1	1	4	1	9
São Francisco do Guaporé		1							4	4	9
Cherry trees							2	2	1	1	6
Corumbiara					2		1	2	1		6
Jaru						2	2	1	1		6
Itapuã do Oeste							2	1	1	1	5
Ji-Paraná							2	2		1	5
Vale do Anari						1		1	3		5
Vilhena				1		2			2		5
Cabixi					1			2	1		4
Colorado of the West								1	2	1	4
Theobroma						1			1	2	4
New Mamoré								3			3
Ouro Preto do Oeste								1	1	1	3
It seemed to be								1	2		3
Crespo River						1		1	1		3
Chupinguaia				2							2
Governor Jorge Teixeira								1		1	2
Paradise Valley								2			2
Cocoa										1	1
Costa Marques									1		1
Guajará-Mirim										1	1



New Union									1		1
Pepper Trees of the West								1			1
Primavera of Rondônia								1			1
Teixeirópolis											

Source: SEDAM Grant Database (RONDÔNIA, 2020). Organized by the authors.

Figure 4. Map of the number of irrigation grants by municipalities in Rondônia, between 2010 and 2019.



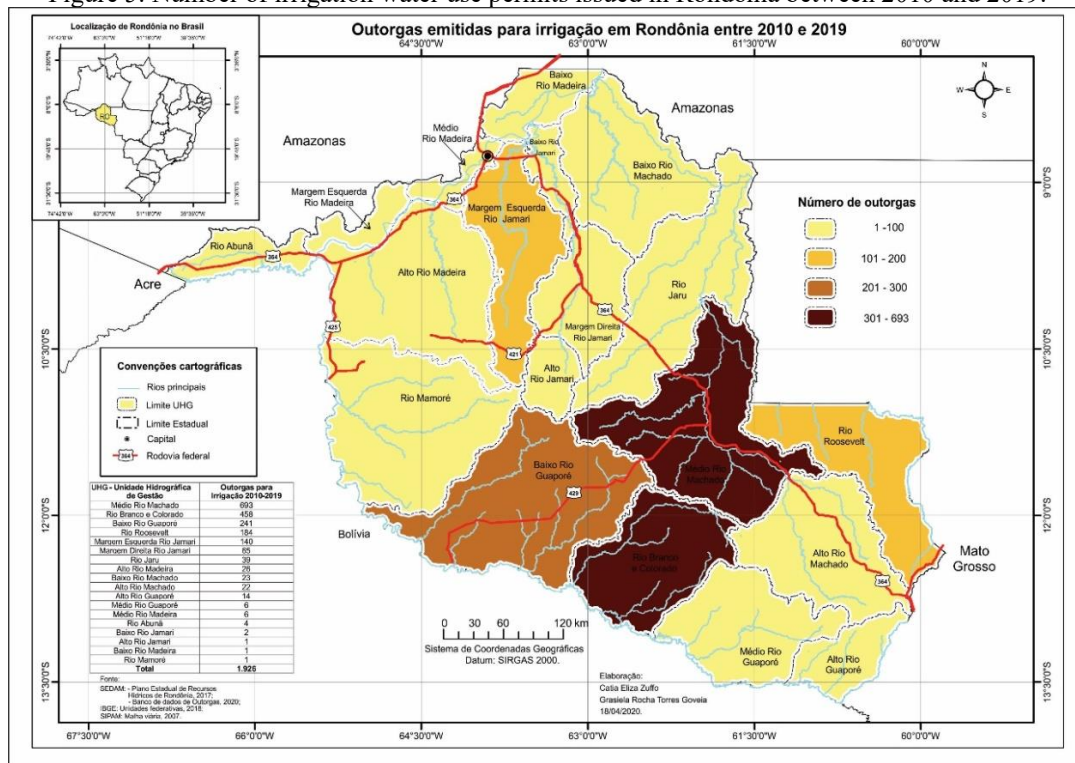
Source: Goveia (2020) with data from the SEDAM Grants Database (RONDÔNIA, 2020).

When analyzing the incidence of the development of irrigated crops by municipalities, compared to the authorizations for granting the use of water resources, it is soon verified that they are concentrated in some of the main hydrographic basins of the state, which by the State Water Resources Plan (Rondônia, 2018), were subdivided into Hydrographic Management Units (UHG), and eighteen of these had a record of grants for irrigation in the period analyzed, the Middle Machado River and the Branco and Colorado Rivers stand out for the total number of grants, followed by the Lower Guaporé River, which is booming.

This factor induces the perception of the geographical constitution of the territory of Rondônia, which has in its composition a great availability of surface water, a favorable condition for the models of irrigation crops, as shown in the map in Figure 5.



Figure 5. Number of irrigation water use permits issued in Rondônia between 2010 and 2019.



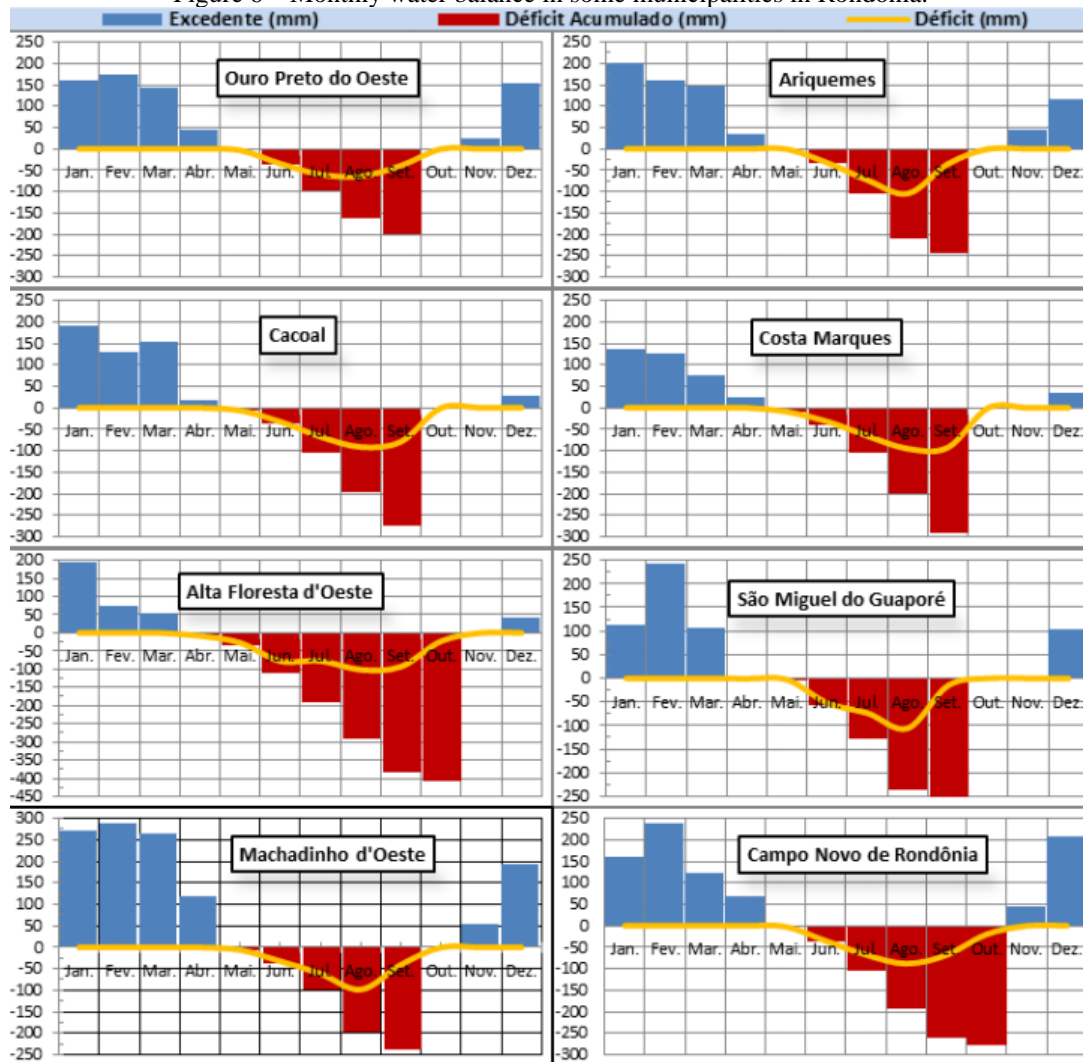
Source: Zuffo and Goveia (2020) with data from the SEDAM Grant Database (RONDÔNIA, 2020).

It is noteworthy that in the drier months there is an increase in demand and the rivers have relatively low water levels, which can exponentiate conflicts. An observation of the monthly water balances (Figure 6), in addition to indicating the most critical months, also presents different intensities of accumulated deficit. In practical terms, it means that larger volumes of water are needed to meet the water demands of irrigated crops in places with greater deficit, and probably greater volumes of water to be captured.

In this situation, demand may be greater than water supply, and the risks of conflict become more likely. Such risks are even more accentuated when there is doubt in the value of the quantity captured or offered, that is, due to the existence of clandestine abstractions, and on the other hand, due to the lack of an adequate water resources information system.



Figure 6 – Monthly water balance in some municipalities in Rondônia.



Source: Climatological Bulletin of the State of Rondônia (Period 1999-2010).
Organized by the authors.

The large concentration of grants in the central region of the state reflects the importance of coffee growing as the main agricultural activity in the state in the period analyzed, which begins to expand strongly to all municipalities, requiring large amounts of water for its cultivation, especially the surface ones.

In the same way, irrigation processes are beginning to bring with them technological arrangements, the perspective of which is to increase quality and quantity. Added to all this, it is important to highlight the fact that the state has the ideal conditions for the development of the crop, and technologies, such as smart irrigation, come to contribute to the growth of production.

5 FINAL THOUGHTS

In the last decade, the use of irrigation in coffee cultivation has become common among producers in order to enhance the productivity of clonal coffee beans in Rondônia and good agricultural



practices have provided improvement in post-harvest quality. All the effort helps in the development of the state, however, if there is a lack of water, this will significantly affect agricultural activity.

Thus, it is essential to guarantee water resources to the various regions and small farmers, especially between the months of May and October, using, among other instruments, the Granting of the Right to Use water abstracted for irrigation purposes, not allowing withdrawals without the proper management instrument, except in the cases provided for in the legislation.

Hydrographic management units such as the Middle Machado River, the Branco and Colorado Rivers and the Lower Guaporé River have a high demand due to the number of concessions issued. This indicates that they are priorities for public actions that foster a significant increase in water availability and water use efficiency in the respective Hydrographic Basins.

Likewise, strategic measures for the conservation of water resources can be carried out in places with high accumulated water deficit, such as Alta Floresta d'Oeste. This municipality, together with Nova Brasilândia D'Oeste, Cacoal and São Miguel do Guaporé have the highest number of grants issued between 2010 and 2019, which reinforces the need for strategies in favor of the efficiency of water use and water production in the respective Hydrographic Basins.

Most of the grants were granted from 2016 onwards, which demonstrates the increased interest in the use of irrigation by coffee growers and the effect of institutional actions to strengthen coffee farming with technology in the state.

The use of more efficient irrigation systems in the use of water and energy has also increased in recent years, and this favors lower flows in the collection and the availability of water for more users. This is just one example of increased efficiency of water use provided by the conscious use of technologies that can contribute to the preservation of water resources and sustainability of irrigated coffee farming.

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