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Management and use of water from the community well in the people of VÁRZEA GRANDE in VÁRZEA NOVA – BA

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Abstract: The management and use of water in semi-arid regions are important factors that can ensure the permanence of populations in these regions, when it is well distributed and used appropriately. In the village of Várzea Grande, water from the community well is distributed to the residents of four villages: Várzea Grande, Tanque Novo, Conceição and Umburaninhas. However, the distribution system has caused problems because the beneficiaries do not have regular access to water to meet their essential needs. This led to the need for this research, which aims to analyze the management process and the use of water from the community well in the village of Várzea Grande, carried out by families living in the communities of Várzea Grande, Tanque Novo, Conceição and Umburaninhas in Várzea Nova - BA. To this end, we carried out bibliographical research, documentary research and field research, as well as semi-structured interviews with the residents of these villages, the person responsible for distributing the water and the municipality's agriculture secretary. The research is exploratory in nature, with a qualitative/quantitative approach. The study shows that water management is carried out on an individual basis and water is currently used for various purposes such as domestic use and animal watering. However, water does not reach all consumers on the given days, leading this population to seek alternative ways of accessing water to meet their basic needs, pointing to the need to implement a participatory management model that can meet the demand for water in the communities.

Key words: Varzea Grande; water management; villages; water in the semi-arid region

1 Introduction

The management and use of water in semi-arid regions are important factors that can ensure the permanence of populations in these regions when it is well distributed and used appropriately. It is important that there is sufficient quantity and that this resource is of adequate quality for the population's consumption. With this in mind, this paper discusses the management of water from the community well in the village of Várzea Grande and the use made of it by families from four villages that are supplied by pipes that take the water to these communities.

The village of Várzea Grande is located in the municipality of Várzea Nova - BA, and as the municipality does not have a perennial river, families living in the villages use water from dams, reservoirs and artesian wells. It is therefore worth noting that well-drilling activity has intensified in the municipality due to the need for access to water and its availability in the region, as most of the water used in the municipality is underground. Despite its availability, even if it is

limited in some cases, due to the fact that 70% of the subsoil in the Brazilian semi-arid region is made up of crystalline rock, which makes it difficult to form springs and make the water potable, the water found underground is usually salinized (Malvezzi, 2007), making it unsuitable for human consumption.

The Várzea Grande community well was drilled in 2010 by the Environmental Engineering and Water Resources Company of Bahia (CERB), with a flow rate of 80m^3/h and a depth of 106m. It works with a pump that distributes water to the communities of Várzea Grande, Tanque Novo, Conceição and Umburaninhas, and this water is currently managed by a resident of the village of Várzea Grande, appointed by the Várzea Nova town hall, according to the municipality's agriculture department.

Since the community well was drilled in the village of Várzea Grande, there have been problems with water management, due to the distribution of this resource being carried out by a person defined by the town hall. The residents of the villages often claim that they don't receive water on the established days and that they don't have other alternatives for accessing water. They also claim that some beneficiaries receive more than others, because the volume that reaches their properties isn't enough to supply the reservoirs and carry out their activities.

Some of the beneficiaries of the water also argue that, after the community well was drilled, they noticed an increase in the level of salinity of the water, a factor that has influenced the activities carried out by these people, given that it was initially used primarily for human consumption. In this sense, it is important to conduct a survey of the activities carried out using this water, because depending on the situation, some families will use more of it than others.

This gave rise to the research problem of how the process of managing water from the community well in the village of Várzea Grande, located in Várzea Nova - BA, and the use of this water by families living in the villages of Várzea Grande, Tanque Novo, Conceição and Umburaninhas takes place. In order to answer this question, the research aims to analyze the management process and the use of water from the community well in the village of Várzea Grande, carried out by families living in the communities of Várzea Grande, Tanque Novo, Conceição and Umburaninhas in Várzea Nova - BA. To this end, the following specific objectives were developed: to characterize the social actors involved in the process of managing and using water from the Várzea Grande community well; to understand how the process of managing water from the Várzea Grande community well takes place; and to identify the ways in which families from the villages of Várzea Grande, Tanque Novo, Conceição and Umburaninhas use water from the community well.

In view of this, this research has great relevance for the community it deals with, both in the sense of recognizing and valuing it, and in the sense of being able to present a problem experienced by these families since 2010. It is also important for the scientific community, given that the villages in question are located in a municipality in the interior of Bahia, in a semi-arid region that is still little known and sometimes neglected by public authorities, but which has specificities that are important to discuss and can add new insights and knowledge to the field of water resources studies, regarding the use and management of water resources in semi-arid regions.

The research topic was also chosen due to the author's contact with the locality under investigation since childhood, which, based on the process of training and access to discussions about water in semi-arid regions, awakens us to the research problem that is experienced by the community and makes an in-depth scientific investigation possible.

2 Water in the Brazilian semi-arid region

Water is a finite natural resource, necessary both for survival and for carrying out essential and diverse activities, so it needs to be of sufficient quantity and adequate quality to be used by the population. In this sense, there is a tendency in places with difficult access to water, such as the semi-arid region of Brazil, for local residents to face great difficulties in obtaining enough water to meet their needs, given that this region goes through prolonged periods of drought and

difficulties in storing this resource in sufficient quantity for their survival, while facing periods of drought (MALVEZZI, 2007).

Much of the water used by the residents of this region is taken from underground through the drilling of wells, which, according to Vasconcelos (2015, p. 9), can be defined as "a generally vertical, man-made system that acts on the subsurface, used for the capture, recharge or observation of groundwater through artificial or natural mechanisms". Thus, because the well is a source of water and access to it, the residents of the villages of Várzea Grande, Tanque Novo, Conceição and Umburaninha, the locations studied in this research, which are located in the semi-arid region of Brazil, as not all inhabitants are able to drill a private well, use groundwater from drilling carried out by CERB, in order to contribute to the maintenance of these families, then community wells are established, whose water is for collective use.

It is therefore necessary to provide access to water in order to meet the basic needs of all these families. In this sense, it is important to have a management system that is able to distribute water properly.

3 Community water management in the semi-arid region

Community management, according to Machado et. al. (2016a, p. 7) "is an alternative for providing water supply and sanitation systems to localities, especially rural communities, which are neglected by the traditional players who provide water supply services". According to the authors, community management is presented as an alternative way of supplying water, especially to rural communities, through water supply systems. Thus, as it is implemented, access to water is made possible for those in need.

This management has also been effective on a local scale, according to Serrano.

Community management and associative forms of water provision have been effective at the local scale; in the absence of the State, other social actors, including associations and international organizations, have assumed a relevant role to attend to those areas where a secure water supply has not arrived. There is a wide variety of local governance schemes that can be replicated in other latitudes (2011, p.13).

Community management thus manages, according to the author, to meet the demands of localities where a secure water supply is not available, in the absence of social actors such as the state. In addition, the various local governance schemes can also be replicated in other localities, a very important aspect given the great difficulties encountered by many communities, especially rural ones, in accessing water supplies.

These rural communities often face water supply and management problems, because according to Machado et al. (2016a, p 12).

Since the 1950s, there has been a significant shift of the population from rural areas to cities, and investments in water supply have been prioritized in urban areas. The rural areas continue to face problems in terms of feasibility of implementation and management, such as: low population concentration, low household density, distance from the water treatment plant, different cultures in each community and user income.

From this perspective, the population of rural areas lives with different problems related to water, because in most of these locations, residences are further apart and the population is smaller than in urban areas, which makes it difficult for these families to have equal access to water, as well as for residents to reach agreements regarding the distribution of this resource, due to this distance. In addition, the water consumed by these families does not usually come from a treatment plant, sometimes because they are far from the treatment plant, as the authors state, and sometimes because of the difficulty of accessing treated water, requiring them to look for alternatives such as using water from artesian wells, cisterns, "water Tank" cars and so on. Another aggravating factor is the financial issue, as many families do not have enough income to pay for the treatment of water distributed by a treatment plant, thus making access to this resource impossible.

Still on the subject of community management, these same authors state that "Water management in rural communities by the population is an opportunity that involves the whole community around an ideal, involving everyone's participation, giving their opinion, suggesting and helping local development." (MACHADO et al.2016b, p. 10). In this sense, it can be seen that community management, as well as providing access to water for the families involved, also promotes popular participation in this water supply system, so that these people can give their opinion and propose measures for better management of this water resource.

Community management also acts as an incentive for community development, according to Pineda (2013, p. 160).

It is clear that community management has the potential to contribute to the universalization of drinking water supply services and to have an impact on community development, not only through the benefits of access to an improved source of water, but also by strengthening community cohesion and increasing their social capital, providing them with the security to undertake other projects for their benefit.

In view of this, it can be seen that in addition to providing access to good quality water, community management is able to strengthen communities, in the sense that residents can establish agreements to develop other social projects for the benefit of the group itself.

However, Machado and other authors present some problems related to community management on rural properties.

A major problem with this model is the lack of technical assistance in the operation and maintenance of water supply systems, as well as the difficulty of finding resources to buy spare parts. In many communities there is some kind of financial support from some entity, be it public (city hall), private (water company) or non-profit (NGOs). In some localities, the municipality pays for the energy needed to activate the pump and/or pays for the system operator. Residents pay the organization a contribution towards the cost of operation and maintenance activities, but this amount is often not enough to cover expenses (MACHADO et al. 2016b, p.10).

Thus, according to the authors, in addition to the operation and maintenance of the water supply systems, the community management model requires financial support, which is usually paid for by the public authorities through town halls or other entities, since the costs of water supply cannot always be paid for solely by the residents of the communities, as their contributions are not enough to cover expenses such as energy, replacement parts and the remuneration of the water supply system operator.

Regarding the distribution and management of water, the promulgation of *Federal Law no. 9.433*, of January 8, 1997, known as the *Water Law*, establishes the National Water Resources Policy, in its Article 1 of this Law. The National Water Resources Policy has, among its foundations, the following items:

I - water is a public good;

II - water is a limited natural resource with economic value;

III - in situations of scarcity, the priority use of water resources is human consumption and animal watering;

IV - the management of water resources must always provide for the multiple use of water;

V - the river basin is the territorial unit for implementing the National Water Resources Policy and operating the National Water Resources Management System;

VI - the management of water resources must be decentralized and include the participation of public authorities, users and communities (BRASIL, 1997).

As seen in Law no. 9.433/97, it is ensured that water, as well as being a public good, must be managed with the participation of everyone, from the public authorities to users. This will ensure that everyone has access to it in order to meet their needs.

Subsections III and IV also highlight some of the uses of water, which, despite the fact that, in cases of insufficiency, is primarily used for human consumption and animal watering, respectively, its management should make it possible to use it for a variety of purposes, thus helping to carry out the activities necessary for human survival. As this law is not complied with and water management is not participatory, there is a possibility of conflicts arising and even the incitement of others that already exist.

The need to implement community management in semi-arid regions is therefore clear, since, in addition to enabling access to water in adequate quantity and quality, especially for rural populations who suffer so much from the difficulty of accessing this resource, it promotes the strengthening of these communities, enabling the development of collective activities and planning for the common good of these families.

4 The quality and possible uses of water in semi-arid regions

The National Environmental Council (CONAMA) No. 20/86 classifies the waters of Brazilian territory, according to their salinity, into fresh water (salinity less than or equal to 0.5%), brackish water (salinity between 0.5% and 30%) and saline water (salinity greater than 30%).

With regard to water quality, groundwater with a high salinity content is common in the semi-arid region, and several factors contribute to this, according to the National Water and Basic Sanitation Agency (ANA).

In Brazil, most of the semi-arid northeast, around 600,000 km^2, is made up of crystalline terrain. The association in this region of low rainfall, irregular rainfall distribution, a thin weathered mantle, if not absent, and sparse vegetation cover, especially in the Caatinga biome, favors surface runoff to the detriment of infiltration. Thus, in the crystalline semi-arid region of Brazil, wells often have flow rates of between 1 to 3 m^3/h and high saline content, often above drinking water standards. Despite this, in many small communities in the northeastern interior, these wells are the only source of supply available (ANA, 2007, p. 85).

It can also be seen that, in addition to these factors such as the constitution of the terrain and the irregularity of rainfall, which increase the salinity of the water in this region, the amount of water available to the families who live there is small, due to the low flow of these aquifers, so they have no alternative but to use the available water to meet their basic needs.

This salinity can also be explained by the accumulation of salts in the soil and in the fractures of the crystalline rocks.

"The high salinity of the groundwater in the semi-arid crystalline region of the northeast is related to the low rainfall, which means that the salts carried by the rain (aerosols) and accumulated in the soil and fractures are not leached out. High evaporation favors the concentration of salts. Thus, the water, which infiltrates and accumulates in the fractures and soil, becomes richer in salts" (ANA, 2007, p. 86).

According to the ANA, it is possible to understand that due to the low amount of rainfall, the salts present in the soil and in the fractures are not leached, but are also concentrated due to high evaporation, so when water infiltrates these environments, it promotes an increase in salts.

Despite the high salinity content, "in general, the chemical quality of water in crystalline terrains is good. The problems, when existing, are related to the high salinity, which is typical of the crystalline aquifers of the semi-arid northeast, and the high hardness of the water and salinity, observed in some areas where limestone rocks occur." (ANA, 2007, p. 85). This is the reality experienced by the families who use the water from the Várzea Grande community well. Although the well's technical data sheet indicates that the water is suitable for human consumption, according to the water users, it has a brackish appearance, with a salinity content, which has led the families to look for alternative ways of acquiring water for consumption, such as buying water that is transported and distributed in "pipa" cars.

In relation to water quality in semi-arid regions of Brazil, in a study carried out in Mossoró, RN, to assess the quality

of water from artesian wells supplying 22 rural communities, a sample of water was collected from each community and it was observed that in the communities analyzed, except for one, all the others were classified in category C2 (medium salinity), reaching category C4 (very high salinity), which have slightly moderate to severe restrictions on use. These waters are restricted in their use for irrigation (COSME et al, 2018).

In view of the significant number of artesian wells in Brazil's semi-arid regions with high salinity levels, rural communities are looking for alternatives to use this water in order to make the most of this much-needed resource, as Carvalho et al. (2014) show, growing green corn with brackish water in the region of Carmópolis - SE. Despite the limitations and problems that the use of this water can generate for the population and the environment, green corn is moderately tolerant to higher levels of water salinity, so with the help of a desalinator, performing the simple distillation process in order to reduce the levels of salts present in the water, it was possible to grow this crop.

In view of this, it is possible to see that the water found in semi-arid regions with high salinity levels, despite having various limitations, can still be utilized, since it is a resource that is difficult to access and needs to be put to the best use, seeking to promote a better quality of life for these populations.

5 Material and methods

This research aims to produce new knowledge related to the problem identified, which is "How does the process of managing water from the community well in the village of Várzea Grande, Várzea Nova - BA, and the use of this water by families living in the villages of Várzea Grande, Tanque Novo, Conceição and Umburaninhas take place?". We are interested in using scientific knowledge to propose possible solutions to this problem.

The research is exploratory, of a mixed nature, objective and subjective, and therefore has a qualitative/quantitative approach. The use of the qualitative/quantitative approach after conducting the field research resulted in open and closed questions, giving the researcher the possibility of statistical and textual analysis, which ensured a better understanding of the problem being researched, through the multiple ways of analyzing the data.

In order to achieve the proposed objectives, a documentary study was carried out of the minutes of the Community Association of Várzea Grande, the village where the community well is located. The minutes present reports on the period, during which the well was drilled, as well as a field study by visiting the site of the community well and the villages that receive its water. Access to the villages where the research was carried out was made possible using motorcycle transport, leaving from the headquarters of the municipality of Várzea Nova, following BA 144, in the direction of the city of Jacobina, entering a side road near the Várzea Nova vehicle weighing scale, heading west. These surveys made it possible to obtain enough information to characterize the social actors involved in the investigation, as well as the villages surveyed.

In order to collect the data, pre-prepared questionnaires were given to the person responsible for managing the water from the community well (I), the Secretary of Agriculture, Environment and Water Resources of the municipality of Várzea Nova (II) and a representative of some families, chosen at random, men and women, from the localities of Várzea Grande, Umburaninhas, Tanque Novo and Conceição (III), who benefit from the water, as well as a free and informed consent form for all the participants.

The community well in Várzea Grande supplies an estimated 113 families, broken down into 12 families from Várzea Grande, 6 families from Tanque Novo, 70 families from Conceição and 25 families from Umburaninha. However, due to the difficulty in contacting these residents because of the COVID-19 pandemic, the questionnaires were only administered to 36 family representatives, taking all the necessary precautions to avoid contamination by the virus. These interviewees were distributed by community, with six from Tanque Novo, the entire universe of users, and 10 from each of the other three villages.

The questionnaires were used to measure the amount of water received by the beneficiaries, as well as the days on which this water was distributed. The application of the questionnaires, together with the photographic records, also made it possible to identify the activities that are carried out with the use of water from the community well by the families of the aforementioned villages, meeting the second and third specific objectives of this research.

Bibliographical research was also carried out on works related to the subject and journal articles. This research aimed to structure the discussion on the process of community well water management and the use of water from community wells in the semi-arid region, providing theoretical support for understanding the reality of the villages studied.

After collecting the data and analyzing the questionnaires, we tried to identify the points that converged and diverged between them, and then produced charts, tables and graphs to compare the results, putting them into context with the reality witnessed during the field visits.

6 Characterization of the study area

Várzea Grande is located in the municipality of Várzea Nova - BA, in the Center North of Bahia, Territory of Identity Piemonte da Chapada Diamantina, which has a semi-arid climate with a Caatinga biome. The rainfall is irregular and most pronounced between the months of November and March, with an annual rainfall of 493.1mm and an average temperature of around 22°C. It is part of the São Francisco hydrographic basin, sub-basin of the Salitre River and its intermittent rivers are the Santo Antônio stream and the Orlando stream. The soils are classified as Cambissolos, Latossolos and Neossolos (SEI, 2014). The location of the municipality of Várzea Nova in the state of Bahia can be seen in Figure 1.

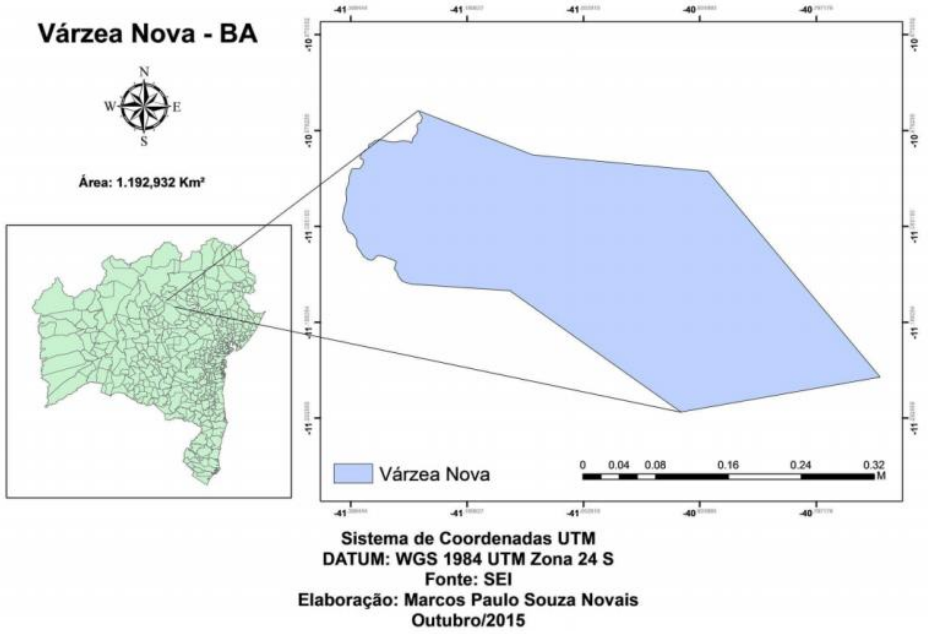

Figure 1. Map of the municipality of Várzea Nova. Location of the municipality of Várzea Nova in relation to the state of Bahia. Source: NOVAIS, Marcos Paulo Souza, 2015

The four villages involved in the research are completely within the territory of the municipality of Várzea Nova and also border each other, facilitating both access to them and the distribution of water to the population living there.

The villages to be studied are located in the municipality of Várzea Nova, with an estimated distance of: Várzea Grande at a distance of 11 km from the municipal seat, Tanque Novo at 12.5 km, Conceição at 15 km and Umburaninha, the most distant village among them, located 18 km from the seat, with a total average population of 123 families, distributed in 15, 8, 70 and 30 respectively.

The economy of these villages is focused exclusively on agricultural production, planting crops such as corn, beans

and castor beans, as well as providing services such as sisal extraction on the surrounding properties, in addition to raising medium and small animals such as goats, sheep, cattle and poultry, mainly to help ensure food security for their families.

Residents are supplied with water through plate cisterns, the purchase of water from "pipa" cars, the use of water from artesian wells, as well as a community dam, the latter only for families from Várzea Grande.

Conceição has a Community Association, with temporary headquarters, which works to organize residents, make requests to public authorities to meet the needs of the local population, as well as seeking improvements for the community itself.

The communities of Conceição and Umburaninha have been receiving water from the community well in Várzea Grande since 2016, due to the obstruction of the water outlet of the Umburaninha well, which previously supplied these two villages.

7 Survey results

7.1 The social actors involved in the research

The main agents involved in the research are the person responsible for managing the community well's water since it was drilled, CERB, which was involved in drilling and installing the well, the municipality's Secretary of Agriculture, Environment and Water Resources, representing the public authorities, as well as the residents of the communities of Várzea Grande, Tanque Novo, Conceição and Umburaninhas, who benefit from the community well's water.

These residents have lived in these communities for some time, as can be seen in the graph in Figure 2.

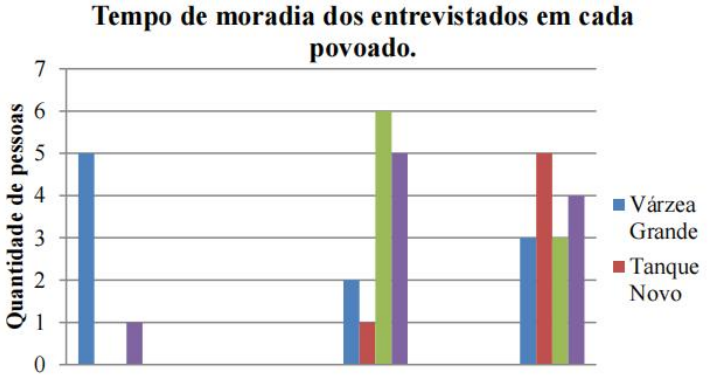

Figure 2. Length of time interviewees have lived in the villages of Várzea Grande, Tanque Novo, Conceição and Umburaninha

Figure 2 shows that the majority of residents have lived in these areas for more than 16 years. In addition, a striking characteristic presented by these residents during the interviews is that most of them have lived in these communities since they were born, because their families had already settled there, and they decided to also build their lives in these villages. Thus, when they were interviewed and spoke about the communities, despite showing some dissatisfaction with the water issue, some of the interviewees said that they had an affectionate relationship with the place where they live and had no interest in moving to the municipality's headquarters or to another location, registering their identity and sense of belonging to the community.

The inhabitants of these villages carry out various activities that ensure their permanence in the countryside, including agriculture. Regarding the occupation of these people, we can see the distribution in the graph in Figure 3.

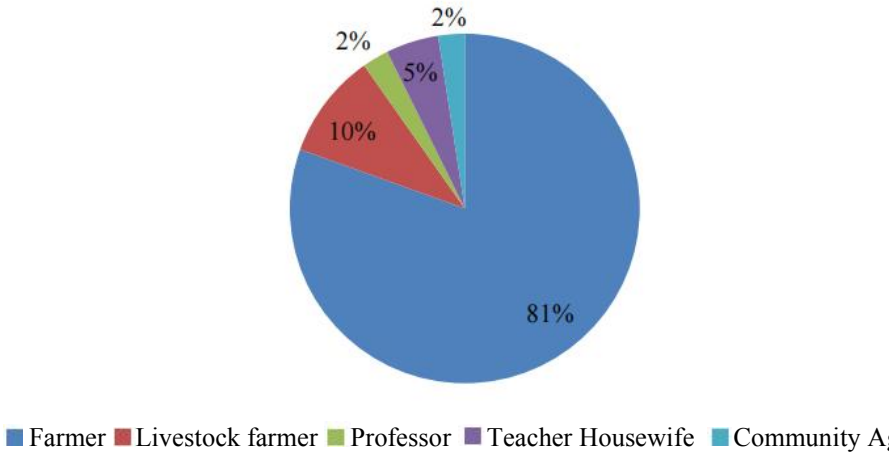

Figure 3. Occupation of survey respondents in Várzea Grande, Tanque Novo, Conceição and Umburaninha

Source: Survey data, 2021

As can be seen in Figure 3, farming is the main activity carried out by the residents of the four communities, accounting for 81% of all interviewees, so we can see the main crops they grow in Figure 4.

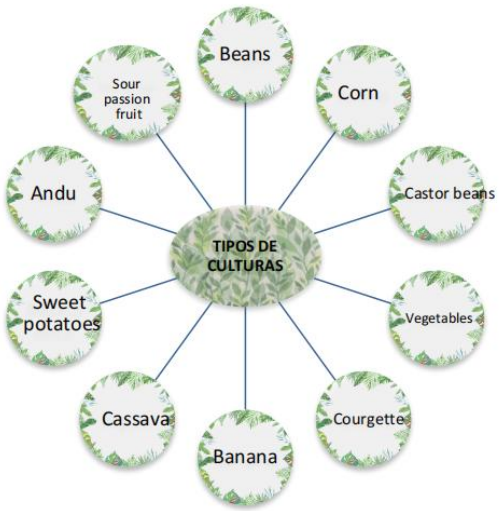

Figure 4. Crops cultivated by residents of the villages of Várzea Grande, Tanque Novo, Conceição and Umburaninha

Source: Research data, 2021

The crops grown revolve around rainfed agriculture, planted mainly during periods of thunderstorms (spring and summer), with species adapted to the municipality's climatic conditions.

7.2 The process of managing and using water from the community well in Várzea Grande

The community well in the village of Várzea Grande was drilled in 2010 by CERB, with the aim of meeting the water demand of the population of this village, as well as Tanque Novo, since these localities did not have a source of supply and faced many difficulties regarding the lack of water.

During the planning period and the search for partnerships to drill the well, general meetings were held at the Community Association of the village of Várzea Grande, with the participation of members of the public authorities such as the mayor, deputy mayor and secretary of agriculture. Thus, in 2010, the community well was drilled to meet the desiccation needs of these families. The participation of these representatives was recorded in the minutes of the meetings, in order to confirm that these representatives had guaranteed the drilling of the well, as well as the residents' struggle to meet their local water supply needs.

According to the residents, as soon as it was drilled, the well was gushing and the water flowed into a stream on the property of the person who gave up an area of his land to drill the well.

At first, in order to use the water from the well, since there was still no date set for its installation and the families' need for water persisted, a pump was placed in the well to draw water and pump it to the surrounding properties, initially only in the village of Várzea Grande (ACPPVG, 2010).

In order to distribute the water to the residents, the members of the Community Association chose, at a general meeting in 2011, a resident of the village and a member, to distribute the water to the families (ACPPVG, 2011).

The community well was installed in 2012, according to information recorded in the minutes of the Community Association of the village of Várzea Grande and the well's technical data sheet, issued by CERB in 2010.

With the installation of the well, the other families living in Várzea Grande, as well as in the neighboring village of Tanque Novo, began to receive water through their own pipes. The water from the community well was then pumped into a polyethylene/fiberglass water tank with a capacity of 10,000 liters.

When the community well was installed, a pump was inserted that turns on and off at scheduled times and the water distribution was the responsibility of the resident of the property where the community well was drilled. A masonry shelter was built to protect the pump and pipes.

In 2016, the water from the community well, used for human consumption and other activities carried out by the residents of Várzea Grande and Tanque Novo, began to be distributed to two other villages, Conceição and Umburaninha.

The villages of Conceição and Umburaninha were included in the distribution of water from the Várzea Grande well, due to the lack of water for these families. In the village of Umburaninha there was already a well drilled by CERB, which supplied its residents, as well as those living in Conceição. However, in 2016, due to some political disagreements between the residents of the two villages, according to the president of the Conceição Village Association and some of those who benefited from the water, the well ended up blocked, making it impossible to withdraw water for use by the families. Given this situation, the community well in Várzea Grande now meets the water demand of four villages: Várzea Grande, Tanque Novo, Conceição and Umburaninha.

When two more villages were included in the distribution of water from the Várzea grande well, the demand for water distribution to these families increased, as can be seen in the diagram in Figure 5.

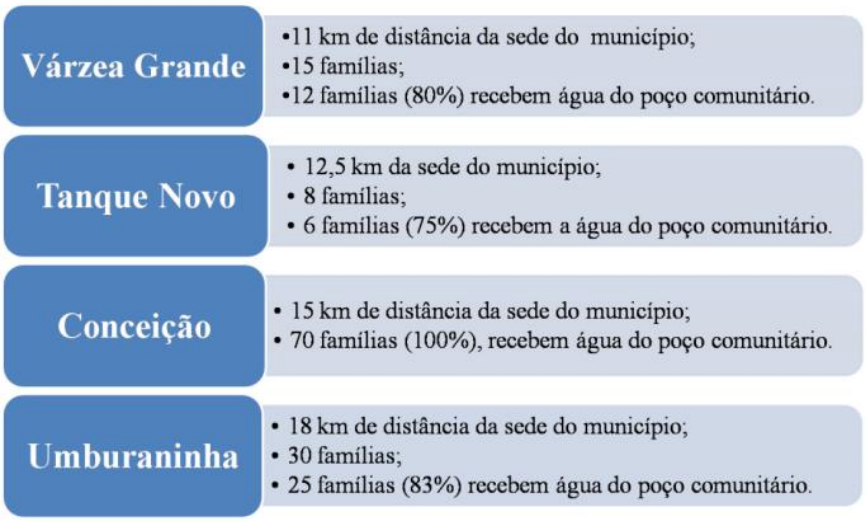

Figure 5. Distance between villages and percentage of families supplied with water from the Várzea Grande community well Source: Research data, 2022

By comparing the percentage of families who are supplied with water from the well in the diagram, we can see the need for this water to be distributed on certain days and to reach these families frequently. It should also be noted that it is in the most distant villages, both from the municipal headquarters and from the well, where the greatest number of families benefit from the water. In this sense, it is worth emphasizing the importance of having a frequent and regular supply, since this water is used for essential activities such as consumption, domestic use and animal watering.

7.3 Water management at the community well in Várzea Grande

The community well in Várzea Grande was managed by two people from the time it was drilled before it was installed. The first person responsible for distributing the water from this well was a resident of the village itself.

To manage the water from the community well, an associate was initially chosen by the members of the local Community Association, who received a stipend from the members of the Association, with a view to organizing the distribution of the water, in order to avoid disagreements between those in need, as well as ensuring that all these residents had access to the same quantities of water. However, in September of the same year, at a meeting of the Association, the residents claimed that they couldn't afford to contribute to the maintenance of the water "fiscal" and asked the mayor to make the municipality responsible for paying her this allowance, and the mayor, who was present at the meeting, accepted the proposal. The choice of the person responsible for distributing the water was also intended to ensure fair distribution that would meet the needs of each family and, with the financial contribution from the public authorities, the residents of these villages would have no cost for the water they would be consuming (ACPPVG, 2011).

In 2012, after the community well was installed, the management of this water was left to the owner of the land on which the well was drilled, who began to receive a subsidy from the town hall. According to the residents, the substitution happened because the person responsible for distributing the water was the owner of the land where the community well was drilled, so both the representative of the public authorities and the residents claimed that, as CERB had not opened a direct entrance to the well, without having to enter through private property, he did not accept other people circulating on his land. The man in charge would then turn the pump on and off every day to fill the water distribution box for the pipes in the villages of Várzea Grande and Tanque Novo.

Since 2016, when the villages of Conceição and Umburaninha began receiving water from the Várzea Grande well, distribution to consumer families has been carried out every other day, as can be seen in Figure 6.

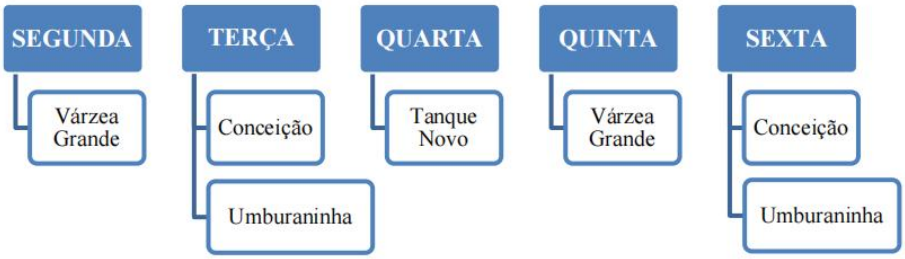

Figure 6. Distribution of water from the Várzea Grande community well during the week

Source: Research data, 2021

The water distribution times are always from 8 a.m. to 5 p.m., with the time already programmed into the pump. This data, both from the distribution table and the timetables, is based on information from the secretary of agriculture and the water distributor.

The water distribution days for these villages were established after several meetings between the secretary of agriculture and the residents of these communities and the person responsible for distribution, given that families in all the communities often complained about the lack of water. Even so, the beneficiaries claim that there is no guaranteed day of

water distribution, so that when asked about the days of distribution, there was no consensus between the answers of any of the beneficiaries of the four villages, since they said that the water should arrive every other day, or twice during the week, but in practice, they claimed that the water arrives only once, with no certain day or time.

In addition, these beneficiaries claimed that there are cases of pipes that have been broken by some of the users, preventing the water from reaching the other communities, and still other cases where they change the pipes for wider ones, with the capacity to distribute a greater volume of water to meet their needs, leaving other families downstream without the resource.

7.4 Use of community well water by families in the villages of Várzea Grande, Tanque Novo, Conceição and Umburaninhas

The water from the Várzea Grande community well has been used for various purposes since it was drilled. As this water is suitable for human consumption, according to an analysis carried out by CERB in 2010, many families living in the villages it supplies make continuous use of this resource, despite the fact that it is brackish, as described by these users.

Due to the brackish aspect of the water from the community well, in addition to the fact that the quantity distributed is limited and even insufficient for each family, some of these people have sought alternatives to acquire more and less brackish water for consumption, giving other uses to the water distributed from this well.

One of the alternatives found by these beneficiaries was the installation of cisterns for family consumption, to collect rainwater, obtained through social programs run by the federal government and built between 2003, 2006 and 2008 by some families, such as the residents of Conceição and Umburaninha. In addition, especially in the other two villages, there are also those families who buy water for their consumption and reservoirs from "pipa" cars.

Based on the reality experienced by these residents, it is worth recognizing that access to drought-relief technologies has also reduced these families' exclusive dependence on water from the community well, given that almost all of them have had access to cisterns for family consumption, which capture and store rainwater, guaranteeing water security during periods of drought.

However, even with access to cisterns for family consumption, these residents continued to use water from the community well for other purposes. Overall, the community well in Várzea Grande supplies an estimated 113 families. The use of water from the community well by families in the villages of Várzea Grande, Tanque Novo, Conceição and Umburaninha can be seen in the graph of Figure 7.

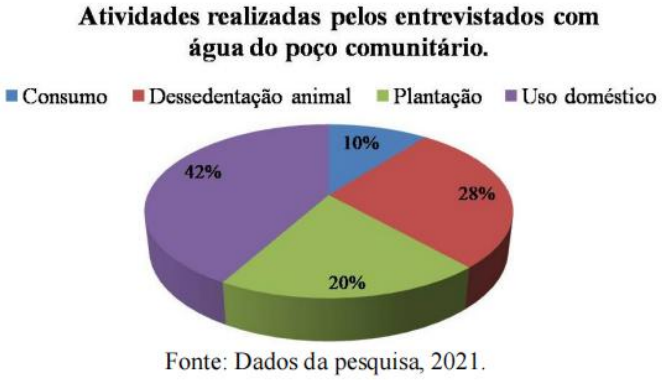

Figure 7. Use of water from the community well in Várzea Grande Source: Survey data, 2021

As a result, it can be seen that the water from the community well is still being used for a variety of purposes, mainly for domestic use, animal watering and watering some crops, such as vegetables and fruit trees. This use of water for various activities is mainly justified by the basic need for water, which guarantees the survival of these families in rural

areas.

In the village of Várzea Grande, families use the water from the well mainly for vegetable production, domestic use and animal watering. The animals that consume this water are cattle and sheep. In Tanque Novo, six families use the water for consumption, domestic use and animal watering.

In the village of Conceição, field research and interviews showed that the families in this community consume the most water because it is the village with the largest number of beneficiaries. The water is used for agricultural and vegetable production, animal watering, domestic use and also for consumption. In Umburaninha, on the other hand, families use water mainly for animal watering and domestic use.

Those families who consume water from the community well, even with a limiting factor, which is the brackish taste of the water reported by users, have found in the distribution of water from this well a possibility to ensure their permanence in the localities.

Access to water from this well still faces some obstacles, such as the increase in users since the residents of Conceição and Umburaninha were included in the distribution, the growth in the number of families in the villages, a factor reported by the president of the Conceição Association, as well as the difficulty in supplying and distributing water to these communities, mainly due to the insufficient amount of water distributed daily from the well, and problems with the pipes. Some beneficiaries also criticize those users who receive water and have wells drilled on their properties, because the water they receive could be distributed to those who don't have access to other sources of water.

8 Final considerations

Water is an indispensable resource for human survival, and in regions where access to this resource is difficult, such as semi-arid regions, the population needs attention and care to provide for their basic needs. The purpose of water is therefore to meet the diverse needs of this population, guaranteeing their permanence in these regions.

The water from the community well is distributed to the villages of Várzea Grande, Tanque Novo, Conceição and Umburaninha and, although initially the water was mainly used for the consumption of this population, it is currently used for various purposes, thus complying with the guidelines established by the Water Law, used for consumption, domestic use, animal watering and agricultural production.

Regarding the water management applied in the distribution of this resource to the aforementioned communities, it can be seen from the results of the research that although the communities have several residents and have been using water from the community well for a long time, water management was initially carried out with the participation of the members of the Community Association of the Village of Várzea Grande, but since 2012 it has been carried out in a centralized manner, which compromises its distribution to users, since it does not reach the villages on the days that have been agreed upon and also incites some conflicts that already exist between these residents.

It is therefore understood that in order to alleviate or even remedy this problem identified in the localities, it is recommended that the community well in the village of Umburaninhas be reinstalled, in order to once again serve this village and also the village of Conceição, as was done before the well was blocked in this locality.

Another possibility would also be to apply the community management model to manage the distribution of water from the community well in Várzea Grande, together with training processes for the beneficiaries of the four villages, because as well as having the collaboration of the water users, there would be no expense for the public authorities in keeping just one person to carry out this activity, which would guarantee the distribution of water to the local population who use this resource. By enabling communication between them and the work of members of all the villages, it would also encourage the strengthening of the communities, as it would be possible for the residents to carry out other projects in

the social sphere, which would benefit everyone involved.

Conflicts of interest

The author declares no conflicts of interest regarding the publication of this paper.

References

[1] AGÊNCIA NACIONAL DE ÁGUAS-ANA. Panorama do enquadramento dos corpos d′água do Brasil, e, Panorama da qualidade das águas subterrâneas no Brasil: cadernos de recursos hídricos 5. Cord. geral, João Gilberto Lotufo Conejo. Superintendência de Planejamento de Recursos Hídricos. Brasília-DF 2007. Disponível em: <http://portalpnqa.ana.gov.br/Publicacao/PANORAMA_DO_ENQUADRAMENTO.pdf> Acesso em: 1/09/2020.

[2] ASSOCIAÇÃO COMUNITÁRIA DOS PRODUTORES DO POVOADO DE VÁRZEA GRANDE – ACPPVG. Várzea Nova – BA. Ata de Reunião da Assembleia Geral Extraordinária da Associação dos Produtores Rurais do Povoado de Várzea Grande. 2010. Livro nº 2, p. 68-75.

[3] ASSOCIAÇÃO COMUNITÁRIA DOS PRODUTORES DO POVOADO DE VÁRZEA GRANDE. Várzea Nova – BA. Ata de Reunião da Assembleia Geral Extraordinária da Associação dos Produtores Rurais do Povoado de Várzea Grande. 2011. Livro nº 2, p. 76-78.

[4] BRASIL. Lei nº 9.433, de 8 de janeiro de 1997. Presidência da República. Casa Civil. Subchefia para Assuntos Jurídicos. Brasília, DF, 1997. Disponível em: <http://www.mpf.mp.br/atuacaotematica/ccr4/dados-da-atuacao/projetos/qualidade-da-agua/legislacao/leis-federais/lei-no-9-433-de-8-de-janeiro-de-1997/view> Acesso em: 05/12/2019.

[5] CARVALHO, L. S.; MARTINS, T. M.; SILVA, M. A. O.; SANTOS, M. D. S.; SILVA, J. P. S.; SANTOS, J. A.; ARAÚJO, P. J. P. UTILIZAÇÃO DE ÁGUA SALOBRA PRODUZIDA POR POÇO ARTESIANO NA PLANTAÇÃO DE MILHO VERDE (ZEAMAYS). Cadernos de Graduação - Ciências Exatas e Tecnológicas Unit. Aracaju. v. 2. n.1. 2014, p. 45-54. Disponível em: <https://periodicos.set.edu.br/cadernoexatas/article/view/895>Acesso em: 21/08/2020.

[6] COSME, C. R.; DIAS, N. S.; MELO, M. R. S., OLIVEIRA, A. M. P.; SILVA, G. F.; MOURA, E. S. R. Avaliação da qualidade das águas de poços em comunidades e assentamentos rurais em Mossoró RN.Acta Iguazu. Cascavel, v.7, n.2, 2018, p. 97-108.Disponível em: <http://erevista.unioeste.br/index.php/actaiguazu/article/view/16696>Acesso em: 21/08/2020.

[7] MACHADO, A. V. M. et al. ACESSO AO ABASTECIMENTO DE ÁGUA EM COMUNIDADES RURAIS: o desafio de garantir os direitos humanos à água. XII CONGRESSO NACIONAL DE EXCELÊNCIA EM GESTÃO. 2016a, p. 02-11. Disponível em: <https://www.inovarse.org/sites/default/files/T16_203.pdf> Acesso em: 12/01/2020.

[8] MACHADO, A. V. M. et.al.Gestão Comunitária da Água como Alternativa para o Atendimento dos Objetivos de Desenvolvimento Sustentável para o Abastecimento de Água no Brasil. XII CONGRESSO NACIONAL DE EXCELÊNCIA EM GESTÃO. 2016b, p. 02-11. Disponível em: <http://www.inovarse.org/sites/default/files/T16_204.pdf> Acesso em: 12/01/2020.

[9] MALVEZZI, Roberto. Semi-árido uma visão holística. Confea. Brasília, 2007. Disponível em: <http://www.agrisustentavel.com/doc/ebooks/semiarido.pdf> Acesso em: 27/05/2020.

[10] PINEDA, G. Y. F. GESTÃO COMUNITÁRIA PARA ABASTECIMENTO DE ÁGUA EM ÁREAS RURAIS: UMA ANÁLISE COMPARATIVA DE EXPERIÊNCIAS NO BRASIL E NA NICARÁGUA. p. 223. 2013. Dissertação (mestrado em Saneamento, Meio Ambiente e Recursos Hídricos) – Universidade Federal de Minas Gerais (UFMG). Belo Horizonte. 2013. Disponível em: <https://repositorio.ufmg.br/bitstream/1843/BUOS9ADGPN/1/disser_gfajardo_version_fion_final.pdf>Acesso em: 20/05/2020.

[11] SEI. Estatísticas dos Municípios Baianos / Superintendênciade Estudos Econômicos e Sociais da Bahia. v. 4. n. 2, ISSN 1519-4124 – Salvador: SEI, 2014. Disponível em: <https://www.sei.ba.gov.br/index.php?option=com_content&view=article&id=2441&Itemid=284>Acesso em: 19/08/2020.

[12] SERRANO, Judith Domínguez; grupo de Buena Gobernanza. HACIA UNA BUENAGOBERNANZA PARA LA GESTIÓN INTEGRADA DE LOS RECURSOS HÍDRICOS: documento temático de las américas. 2011. Disponível em: <http://www.oas.org/en/sedi/dsd/iwrm/past%20events/D7/6%20WWFGOBERNANZA%20Final.pdf> Acesso em: 12/09/2020.

[13] SILVA, Wend Rocha da; SILVA, Mérik Rocha; PIRES, Tatiani Botini. O USO SUSTENTÁVEL E A QUALIDADE DA ÁGUA NA PRODUÇÃO ANIMAL.REVISTA ELETRÔNICA NUTRITIME.ISSN 1983-9006 n. 5, 20 14, p. 3617- 3636. Disponível em: <https://www.nutritime.com.br/arquivos_internos/artigos/ARTIGO266.pdf> Acesso em: 23/02/2021.

[14] VASCONCELOS, Mickaelon Belchior. POÇOS PARA CAPTAÇÃO DE ÁGUAS SUBTERRÂNEAS: REVISÃO DE CONCEITOS E PROPOSTA DE NOMENCLATURA; Águas Subterrâneas, n.1, 2015, p. 01-12. Disponível em: <https://aguassubterraneas.abas.org/asubterraneas/article/view/28288/18401> Acesso em: 12/01/2020.

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