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Abstract

Water availability in rural areas is essential to production activities and quality of life. The aim of the current study is to evaluate the key role played by water resources in rural properties as a factor for farmers' permanence in the field in Southern Brazil. The research followed a qualitative and quantitative approach, which encompassed the application of semi-structured questionnaires to family farmers living

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1. Introduction

Water is a fundamental resource for humanity, either for consumption or for the economic and social development of populations. Water quality and availability are essential factors for human health and social welfare. However, the relationship between society and natural resources has been showing disturbing unsustainability in recent decades, a topic that has been discussed worldwide. According to Beck (1992), the topic 'sustainable consumption' comprises politicization of different issues, as well as interdependence between human insertion scales and problems generated at global context. The aforementioned study also emphasizes the growing unsustainability between production and consumption patterns in the world economy, mainly differences between rich and poor countries.

Water is a major element in agricultural production, mainly in small family farms. These places often integrate agricultural production focused on animal breeding, which demands great water consumption. However, the inappropriate use of this resource leads to environmental imbalances that, in their turn, impair production activities. This outcome discourages the maintenance of family farming and farmers' permanence in rural areas.

In light of the foregoing, the problem addressed in the current research refers to the knowledge about, and analysis of, the main aspects involving the relationship between water resource availability in rural areas and the quality of life necessary to encourage farmers to remain in the countryside, where water management is under the responsibility of landowners, but also depends on public policies developed at governmental sphere. According to Abramovay (1997), family farming refers to properties whose management and individuals belonging to the same family core do most of the work.

Therefore, the aim of the current study was to evaluate the key role played by water resources in rural properties as a determining factor for farmers' permanence in the countryside.

2. Theoretical Reference

Water resources are directly linked to life preservation on the planet. Biodiversity depends on water, human health depends to the quality of the water and the global economy is influenced by water availability. In short, we depend on this natural resource (PELLACANI, 2005). Agriculture is the sector that most uses water resources, mainly for irrigation purposes. Population growth itself requires increased food production (ALMEIDA, 2005). It is worth emphasizing that such high agricultural demand for water does not happen because farmers like to consume water or because they are not concerned about its availability; it happens because water is intrinsic to agricultural production processes. Water in rual areas is used for countless purposes such as irrigation, human and animal consumption, agricultural practices and animal breeding for

slaughter, among others (VILAS, 2003).

According to the 2010 National Water Agency (ANA) report about the water resources scenario in Brazil, 61% of water withdrew from Brazilian springs is usedfor rural activities, 54% of it is used in agricultural irrigation; 6%, in animals' drinking fountains; and 1% is used for domestic consumption. Thus, although irrigated areas are associated with increased productivity levels in rural areas, adopting appropriate irrigation practices is not a priority in them, since irrigation is sometimes disorderly done. This process can damage the soil-plant system and lead to increased waste of water resources.

In addition, among different water uses adopted in rural areas, it is worth mentioning its use for human supply in rural schools, where a significant number of children and young people spend a significant part of the day; consequently, they consume water, either through direct (intake / diet) or indirect (personal hygiene and other forms) manners. Water quality in rural schools is of paramount importance, since students, mainly young ones, are more susceptible to several diseases because they have lower immunity (CASALI, 2008). According to the aforementioned study, the main water contamination sources in rural areas comprise animal feces and urine, dead animal carcasses, inappropriate garbage disposal in the environment, organic material on soil surface, intensive fertilizer applications, and abusive use of insecticides, fungicides, herbicides, among others. These contaminants eventually get to these water sources and pollute them.

According to Beck (2011), risks go beyond the environmental scope, since they may endanger the living conditions on the planet. However, the aforementioned study does not rule out the environmental crisis, which is one of the most serious problems triggered by risk situations in contemporary society. This crisis can lead to significant changes in social landscape, as well. As man dominates natural resources, human activities gradually replace natural elements, and it is the cause of risks to production. Brazil ranks the 5th position in the world list of the largest pesticide and herbicide consumers; the country uses close to two hundred thousand metric tons of these products per year – most of this application is not controlled (REBOUÇAS et al., 2006). These compounds are extremely harmful to human health, at levels often not covered by the analysis methods available in most drinking water quality-determination laboratories in Brazil.

According to the study by Mélo (2014) about social and environmental unsustainability, what one calls environmental issue, either in the academic discourse or in citizens' daily discourse, is actually an economic issue (political economy), since the development of capitalism and intensified territory occupations have triggered the exploitation of environmental goods . These goods have been transformed into resources or commodities; such transformation process breaks the cycle of natural goods' use, which is focused on satisfying the material or symbolic needs of man and, consequently, it creates the framework of nature humanization by capital (meaning dehumanization).

We herein address the externalities of economic-social processes, mainly negative externalities that end up generating additional costs for society, which are not borne by companies / industries or by society itself when they trigger predatory, although sometimes involuntary, processes that can severely damage the environment. According to Oliveira (1999, p. 569), in the economic context "(...) we can say that there is negative externality when the activity of an economic agent negatively affects the welfare or the profit of another agent and no market mechanism can compensate this agent".

Another factor resulting from the disorderly use and occupation of urban and rural environments in the country lies on the siltation of water bodies - rivers and dams - at very high levels, and on the non-collection or innaproproate waste disposal in the environment, which is carried away by floods and transported by rivers. The rural environment is affected by the dominant health model adopted in the cities, a fact that makes individuals' living conditions and the environmental quality in the countryside chaotic (REBOUÇAS et al., 1999). According to Khan et al. (2008), water scarcity is one of the main factors affecting man's permanence in rural areas. The aforementioned study also highlights that public policies focused on the Brazilian scenario are not allowed, or effective enough, to generate the necessary conditions for individuals to remain in rural environments. It happens because family farming (corn, beans, vegetable cultivation, etc.) is the main activity developed by rural men to assure their survival in the countryside; however, poor water quality and the sufficient amount of it hinder man's permance in them.

3. Methodology

The procedures and the methodology adopted in the current research were defined based on classic Scientific Methodology authors, mainly on research techniques and methodologies by Gil (2008), Marconi and Lakatos (1999) and Turato (2003). The present research adopted a qualitative and quantitative approach. It is qualitative because it uses quantifiable information, i.e., the number of classified and analyzed answers; it is also qualitative because it takes into consideration the relationship between the world and individuals, which cannot be translated into numbers, and because it is supported by the approach of human culture and behavior in a specific context (GIL, 2009).

The research instrument (questionnaires) was handed out to participants who had signed the Free and Informed Consent Form, which explained the research aims, as well as the risks and benefits associated with such participation. Individuals were invited to freely and spontaneously participate in the study in order to avoid hurting ethical precepts. In addition, participants received a Confidentiality Agreement, which reinforced researchers' commitment to preserve their privacy. Both instruments, as well as the project, were submitted to the Research Ethics Committee (University of Cruz Alta) prior to their application; they were approved according to Opinion N. 920.656 and CAAE 39444114.1.0000.5.322.

Thus, a collinear research was carried out based on Marconi and Lakatos (1999), who highlight that, together with questionnaires and / or other research instruments, it is essential attaching a note or letter to participants, in order to explain the nature of the survey, its aims and the importance of getting their answers, as well as arousing their interest in completing and returning the questionnaire within a reasonable time.

A Field Research was carried out in the current study. Cartoni (2007), herein understands this term based on the definition according to whom, whenever researchers base their work on applied questionnaires to collect data to answer their problem, their work becomes a field research. In addition, Chizzotti (2003) has mentioned that the qualitative research is as an empirical work, which occurs through the development of a field research and which aims to gather and organize a comprehensive data set. The questionnaire was applied on-site to enable its delivery and collection in a faster way. This contact allowed greater interaction between researcher and participants, as well as the establishment of an informal dialogic relationship to enable grasping different characteristics and meanings in participants' discourse in the

starting questions of the present study.

The study site comprised Marmeleiro and Fontana Freda communities, which are, respectively, the 1st and 3rd Districts of Jaguari County, Midwestern Santa Maria microregion, Rio Grande do Sul State, Brazil. Jaguari County is known as the "city of natural beauty" due to its rich flora and geographical features such as mountains, valleys, rivers and floodplains. According to IBGE (2007), the population in the county encompasses 11,626 inhabitants, who are mostly descendants of European settlers, mainly of Italians. Its economy is based on the primary sector, which stands out for its tobacco, soybean, rice, grape and sugarcane production. The county is also acknowledged for its wine and cachaça production.

Participants in the current study comprised the residents of these communities (landowners) - the representative sample corresponded to 20% (twenty percent) of the total number of residents. This is a valid amount in terms of results, since, according to Turato (2003), the sample comprises a portion, a piece, a fragment, which is presented to demonstrate aspects of the nature or quality of something, or even a small part or amount of something, in order to show the quality, style or nature of the whole.

A semi-structured questionnaire, with open and closed questions, was applied to landowners in order to identify quantitative and qualitative data capable of evidencing their thoughts about water availability, management practices / policies and the importance given to such resource in rural properties. It is also worth mentioning Minayo (1994), who pointed out qualitative research as the ideal approach to be adopted in studies focused on investigating realities that cannot be quantified in all aspects, such as meanings, beliefs and values.

The evaluation of quantitative aspects was mostly based on adequate information, which were used to build the scenario where the research was carried out in order to collect economic and social data.

Content analysis was adopted to treat qualitative data. According to Godoy (1995), this method allows researchers to better understand individuals' representations of their reality. It comprised three different stages (pre-analysis, material exploration and treatment of results), which were also indicated by Bardin (2011) in his approaches to the use of content analysis.

3. Results and Discussion

After the predicted methodological steps of on-site data collection were fulfilled, there was satisfactory effectiveness in researcher-participant interaction. Landowners and their families were remarkably receptive during the previously scheduled researcher visits, given the richness and detail of information provided by them.

More than 90% of completed questionnaires per planned center were returned, which, in total, corresponded to 27 of the 30 visited properties: 14 in Marmeleiro and 13 in Fontana Freda communities. These rural properties present little difference in size, as shown in Figure 1a; they are representative of the research universe and were classified based on their extension. Most (59.3%) participants claimed to keep an area in their property for environmental preservation purposes. However, such environmental preservation is lay, since it does not meet legal reserve requirements or enjoy the benefits from PPA (Permanent Preservation Area) legalization. In other words, participants referred to places that should be preserved (a concept attributed to empirical knowledge) for the sole purpose of assuring, for example, the

water resources necessary to supply their property.

The number of people living in the investigated properties is quite varying (from 1 to 9 individuals). However, the largest number of residents refers to more than one family unit living in the same rural property. There are several family units in a single family, a fact that can be attributed to tenure succession and to joint work for income generation purposes. Of the total number of landowners, only eight (08) reported the collaboration of third parties in the development of production processes; these third parties are day laborers, who were hired during tobacco and sugarcane harvesting periods. Therefore, family farming prevails in the herein investigated rural properties. The main activities performed in these properties comprise the cultivation of several food types for self-consumption. In addition, they commercially cultivate soybean, tobacco, and sugarcane. Some farms also grow grapes and watermelon, besides perfoming beekeeping activities or handcraft with stones.

Landowners were asked about the reason (s) why they live in that place (s); among the reasons listed by them, the main one was the fact that they were born there and, since they do not have, or have little, education. Living there was their only option, and so was the agricultural activity.

One participant, who lives in Marmeleiro, said: '*I think it's good, this is our life, I didn't attend school*' (Farmer N. 40). This statement, which, at first, refers to resignation, also reflects the satisfaction that, despite the lack of schooling, the landowner achieved good living conditions. The location of the property was also mentioned as a relevant factor for participants to stay in it, because, according to the participant who reported such condition, his property is well located in terms of access and proximity to the city. Another reason listed by Fontana Freda and Marmeleiro residents to stay in their properties is that living in the countryside enables them to have a better quality of life in comparison to the city, where living expenses are much higher. In addition, they mentioned the advantages of being their own bosses, such as not being at risk of underemployment or unemployment.

It is clear that participants acknowledge about the possible consequences that rural-city migratory processes may have on the quality of life of farmers and their families. They know that rural workers often leave the countryside in pursuit of better living conditions in cities, a process that, according to Casagrande and Souza (2012), is based on the possibility of having financial gains in the cities, i.e., greater convenience and less hard work than in agricultural production.

According to Mattar (2003), this very same migratory process, although rich in expectations, can also generate many social issues, such as the risk of unemployment and underemployment. Similarly, Pereira and Lopes (2013) have stated that street vendors, recyclable material pickers, car park attendants, among others, become increasingly common in the cities.

Perhaps, the description of this context leaves implicit - or even explicit - the importance of developping and applying public policies focused on changing the negative effects of field-to-city migrations in order to provide the necessary subsidies for rural producers to avoid the intensification of this migratory process.

A Fontana Freda resident, who answered the question about why he lives and stays in the rural area, was categorical: '*Because I prefer working in agriculture, because I didn't adapt to working as other people's employe'* (Farmer N. 114).

The pleasure of working in the field, whether in agriculture or livestock, and the talent for productive

work were recurring answers that denoted landowners' satisfaction in living in the rural area. '*I have the gift for agriculture and nothing lacks here in the property*' (Farmer N. 113) - this statement by a Fontana Freda resident reflects his attachment to the land and his contentment with the results of his production work, which gives him a good quality of life. It was also noticed that some residents remain in the countryside to continue the family activity and maintain their properties, either because they are attached to the land or because they need to stay in it.

Based on Figure 1C, shows that the location of the properties is the main conditioning factor for farmers' permanence in the rural area, a fact that meets the guiding questions of the current research. The origin of the water resources in the properties is shown in Figure 1D.

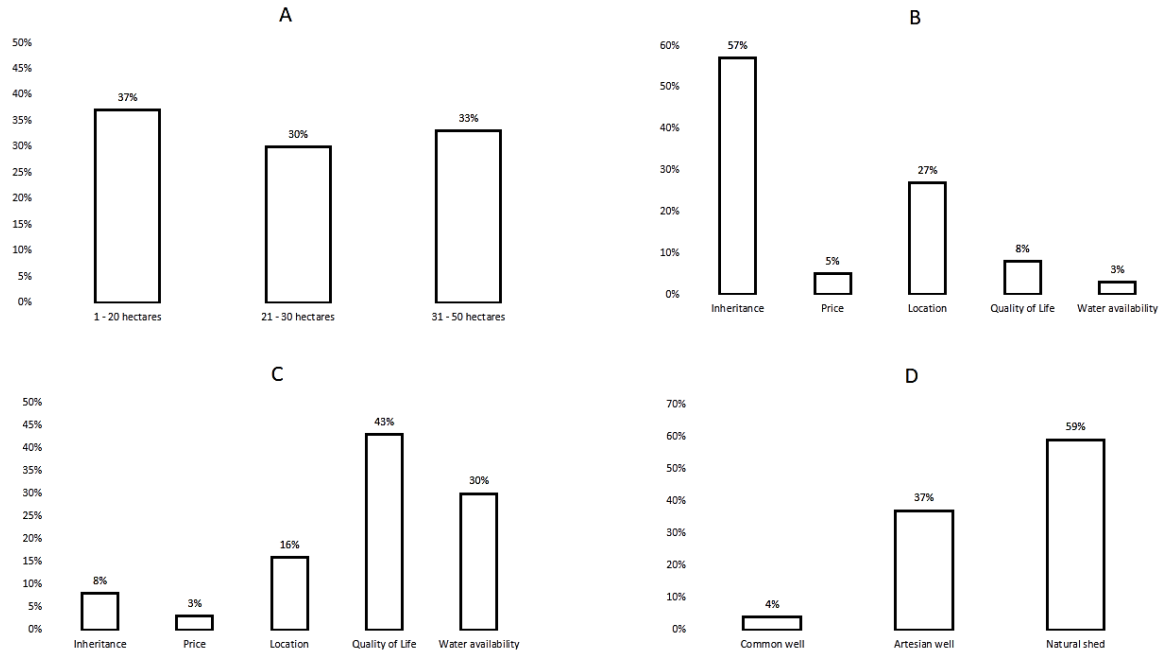

Figure 1: A- Area of rural properties, B- Reason for choosing rural, C- Factors for individuals' permanence in the field, and D- Origin of used water.

All properties use the available drinking water for family consumption, food and personal hygiene, and desedentation of domestic animals. Other sources, such as streams and dams, are used in activities such as poultry, cattle and pig farming, as well as for vegetable production purposes (vegetables and tobacco beds). Sugarcane, in its turn, does not require irrigation water for crop planting and maintenance; however, water is used to cool steam ducts during cachaça production processes.

With respect to breeding activities, each property has 17 cattle, 3 pigs and 30 chickens, on average, a fact that reinforces the need of drinking water availability in these properties. As for family income sources, the current study investigated whether there was activity diversity, i.e., other income sources besides family farming. Results showed that more than 65% of households solely rely on family farming.

The questionnaire application enabled identifying extraordinary factors that showed the strong awareness of local users about water as a common good. In other words, the joint use by five to six families of a single water source in a specific property was described by participants, a fact that highlights the social organization in pursuit of improving the quality of the consumed water and in cost sharing. Unlike

common knowledge, participants did not show resistance to sharing the natural resource in an equitable and sustainable manner.

Most (88.89%) of households consume water that has not been subjected to any previous treatment. Those who claim to treat the consumed water use the chlorination system of community wells, which was made available by the public power and is intended for countryside communities.

Participants were asked if any of their family members had already gotten sick due to the intake of water available in the property. There was no affirmative answer to this possibility, which leads to the conclusion that the quality of drinking water in the investigated region is satisfactory.

All investigated households have sewage treatment application. This reality proves the theoretical assumptions of the present research about the approach of public policies and programs focused on water resources management. According to the local administration, certain actions are no longer implemented, not because of insufficient financial resources, but due to lack of significant number of households presenting basic sanitation vulnerability issues. This reality is also reflected in the rural environment, according to collected data.

Some questions highlighted information about drinking water availability in the properties, about actions aimed at preserving such water, as well as emphisized informants' concept about the specific topic. The initial question concerned the history of drinking water availability, or not, during the dry seasons. Only 15% of the investigated families gave affirmative responses to this question. In order to solve this momentary water scarcity issue, the options and procedures adopted by participants lied on opening artesian wells in the property or transporting water from neighboring properties, which had abundant water resources.

Even nowadays, the imminence of droughts is seen as a threat to the quality of life in part of these properties because they undeniably depend on this resource to maintain their production activities, mainly for animal breeding, as well as for personal use, consumption and sanitation.

Based on the list of collected information, some participants have already received help from public agencies, such as the city hall, in times of water lack or scarcity. This assistance was based on opening drinking fountains for animal desedentation and on drilling artesian wells to for water distribution networks. Since the actions taken by the local government were set forth in specific governmental programs, they had no cost to landowners.

On average, 50% of respondent farmers reported differences in the amount of water available in their farms. Next, they answered complementary questions about variations in water volume. Most respondents stated that water volume has reduced over the years and that they were concerned about this issue.

It is clear that water is a determining factor for farmers' permanence in rural areas; however, in case of water shortage, 78% of farmers said they would continue living in the property, but they would ask for governmental help (Figure 2A). This fact demonstrates the association of their identity with rural environments but, at the same time, it highlights the key role played by water resources in such environments. Moreovre, it makes it clear that water scarcity would not only generate environmental issues, but also burden the public power.

The identity association with a place refers to already mentioned issues, such as the fact that the land passes from father to son in a continuous time cycle, the attachment to the land, the production work and,

mainly, the quality of life rural environments provide to its residents, who do not have to depend on the narrow possibilities offered by urban life.

With respect to water resource preservation (Figure 2B), respondents were aware that certain actions can affect the quality and quantity of drinking water. They also pointed out that public segments or other bodies rarely provide instructions about forms of water resource presenvation. Seventy percent (70%) of respondents, on average, said they have never received any guidance about preservationist actions; their statements were based on empirical knowledge, i.e., on knowledge resulting from their daily experiences and access to the media.

Therefore, it is evident that the herein collected data corroborate the statements by KHAN et al. (2008), according to whom the presence of water in rural areas is fundamental for families' permanence in the countryside.

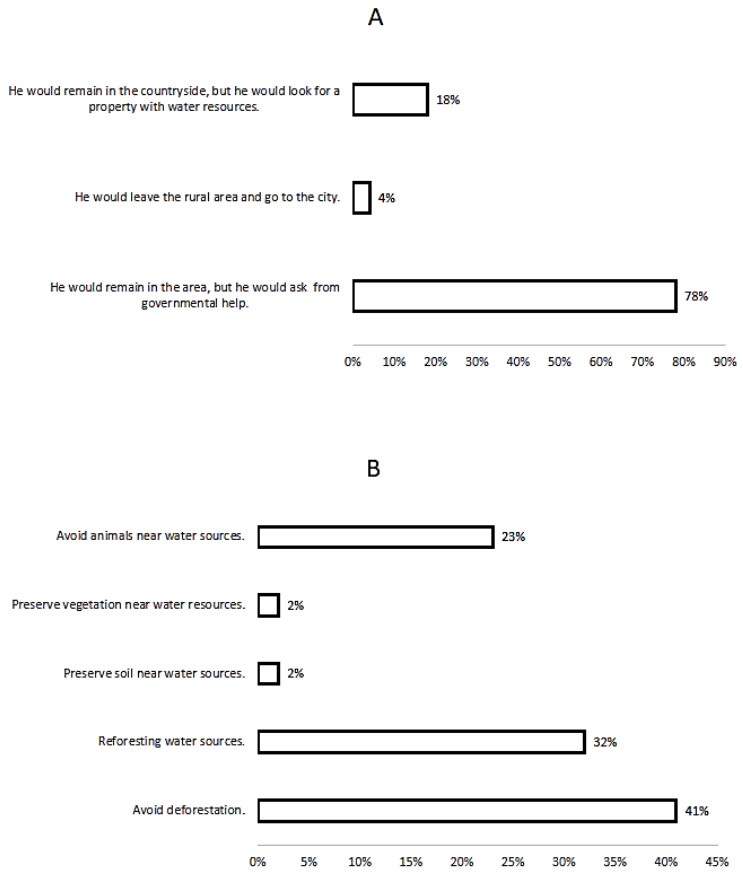

Figure 2: A- Actions taken by farmers in case of water scarcity,
B- Actions seen as priority for water conservation.

4. Final Considerations

Small rural properties visited during the current study have sufficient water resources for production activity maintenance and for household consumption. Some of them - less than 10% of the total - share the same source of funding. Overall, it is possible saying that landowners are sifginicantly aware of the importance of preserving the environment so they can continuously rely on available water resources. Thus,

they take actions focused on reducing the risk of water shortage or on avoiding the contamination of water sources. These actions are based on their empirical knowledge. However, their good sense of attitude helps them avoiding deforestation in their properties; besides, they do not use pesticides near water sources or allow animals to circulate in adjacent areas and, whenever necessary, they promote local reforestation.

In terms of local economy and quality of life, it is possible concluding that family farming prevails as the main means of subsistence in these rural properties - cases of parallel work are rare. The living standards in these properties were satisfactory. Water resource availability is essential for farmer families to live and stay in the countryside, as well as for their consumption or for the development of production activities. It is extremely important having this natural good in sufficient quantity and quality.

However, climate issues often seen during summer, mainly droughts, have significant impact onrural populations, who perceive them as a threat to their quality of life. These populations perceive differences in the amount of available water on a yearly basis; according to them, there is a negative variation in such availability, since water sources' flow has been decreasing.

5. Acknowledgement

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