



Water Protector Project for Payment for Ecosystem Services (PES) of Vera Cruz/RS: Socioeconomic and Situational Characteristics

Projeto Protetor Das Águas Por Pagamento por Serviços Ambientais (PSA) de Vera Cruz/RS: Características Socioeconômicas e Situacionais

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Abstract

As a result of the decrease of water (quantity/quality) and the difficulties to reduce its degradation in rural areas, government agencies and institutions have developed and implemented policies for Payment for Ecosystem Services (PES) related to the conservation of water resources. Water Protector Project, which started in 2011, is the first Brazilian project fully funded by the private sector. Through payments to rural landowners, through a voluntary transaction, it guarantees the provision of environmental services aimed at improving water resources. Currently, with 63 active participants, very little is known about the profile of these rural landowners. Therefore, this study had as main objective to analyze the Socioeconomic and Situational Characteristics of the landowners that adhered to the “Water Protector Project” of Vera Cruz / RS. Structured and face-to-face interviews were conducted with 39 active participants, thus making it possible to trace the socioeconomic and situational profile of the landowners of this project. As a conceptual basis, Neoclassical Environmental Economics was chosen as a reference in this research, based on the Coase Theorem. The data analysis allowed us to conclude that they are small rural families, most of them are adults, and work in agriculture for life and the vast majority of participants have lived in this region for many generations.

Keywords: Water Resources Management; Water Conservation; Ecosystem Service; Payment for Ecosystem Services; Water Protector Project.

Resumo

Em decorrência da queda da quantidade e qualidade de água e das dificuldades para reduzir sua degradação em áreas rurais, órgãos governamentais e instituições têm elaborado e implementado políticas de Pagamento por Serviços Ambientais (PSA) relacionadas à conservação dos recursos hídricos. O Projeto Protetor das Águas de Vera Cruz/RS, iniciado em 2011, é o primeiro projeto brasileiro totalmente financiado pela iniciativa privada. Através de pagamentos para proprietários rurais, através de uma transação voluntária, o mesmo garante o fornecimento de serviços ambientais visando a melhoria dos recursos hídricos. Atualmente com 63 participantes ativos, muito pouco se sabe sobre o perfil destes proprietários rurais. Portanto, este estudo teve como principal objetivo analisar as Características Socioeconômicas e Situacionais dos proprietários rurais que aderiram ao “Projeto Protetor das Águas” de Vera Cruz / RS. Foram realizadas entrevistas estruturadas e presenciais com 39 participantes ativos possibilitando, assim, traçar o perfil socioeconômico e situacional dos proprietários de terra deste projeto. Como base conceitual, a Economia Ambiental Neoclássica foi escolhida como referência, baseada no Teorema de Coase. A análise de dados permitiu concluir que são pequenas famílias rurais, em sua maioria adultos e trabalham com agricultura a vida toda e a grande maioria dos participantes reside nesta região a muitas gerações.

Palavras-chaves: Gestão de Recursos Hídricos; Conservação de Água; Serviço Ecológico; Pagamento por Serviços Ambientais; Projeto Protetor das Águas.

1 Introduction

Agriculture is an important economic activity for country's economy; it is a form of income for many families and it is a source of food and resources. According to the Food and Agriculture Organization of the United Nations (OCDE/FAO, 2015), nine out of ten of the world's 570 million farms are managed by households. Most countries have an economy that is

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dependent on agriculture - either in a small or big way - from employment generation to National Income (FAO, 2011).

Agriculture as a concept has also grown. A decade or two ago, it was associated only with the production of basic crops. Modern agriculture includes forestry, beekeeping, fruit growing, poultry farming, and dairy farming, among many others. Along with the growth of agriculture, there is also a growing concern for the environment and its preservation.

Consequently, agriculture changes are necessary for the recovery of degraded areas in order to make the area suitable for new sustainable use. Agriculture must be practiced with natural resource management techniques that contribute to the conservation of the environment. So, problems to reconcile agricultural production and environmental preservation exist; but they must be resolved through fair public policies. Subsequently, this new agriculture approach is often incorporated into political agendas and debates in civil society (MEA, 2005).

Among all of the ES, those related to water are among the most important for human well-being (DE GROOT et al., 2010). Water is considered in Brazilian law, as being a good of 'all', and of each indistinctly (BRASIL, 1997). One of the main values attributed to water corresponds to its function of sustaining all life forms on the planet.

Ecosystems associated with water resources provide a range of environmental services, such as water and food supply, regulation of water flow and infiltration, drainage and natural irrigation, flood protection, soil retention and prevention of erosion and sedimentation, protection against salinization of aquifers. Therefore, these services are of great importance to guarantee agricultural productivity (DE GROOT; WILSON; BOUMANS, 2002).

Among the attitudes that seek to promote the conservation of ecosystem services, there is an environmental valuation instruments called Payments for Ecosystem Services (PES). PES is a “voluntary transactions between service users and service providers that are conditional on agreed rules of natural resource management for generating offsite services” (WUNDER, p.241, 2015). The potential of PES in rural areas is related to the possibility of being able to produce agronomic practices that are able to protect the proper functioning of ecosystem services and, thus, ensure the productive basis of long-term food security for local communities (FAO, 2011).

In this sense, the number of PES initiatives in Brazil and worldwide has increased (FAO, 2011; FENG et al., 2018; PEREIRA; ALVES SOBRINHO, 2017). Consequently, further studies on the subject in general are necessary. Therefore, the aim of this research is to analyze the personal and demographic characteristics of the landholders and their rural properties that joined the ‘Water Protector Project of Vera Cruz / RS’. The relevance of the proposed theme is justified in its importance in building the profile of the participants to understand how adherence occurs.

2. Literature Review

The concern of the society with the environment, and the concern of the quality and availability of natural resources have increased. As a result, environmental valuation instruments, such as Payments for Ecosystem Services (PES), are gaining attention and the number of projects has increased over the last few years (ZANELLA; SCHLEYER; SPEELMAN, 2014).

This increasing number of initiatives demonstrates their relevance in seeking to repair some of the negative externalities of the current form of production and consumption, externalities represented by environmental pollution and the degradation of available environmental services (SHIKI; FARIA; SHIKI, 2011).



PES principles are theoretically based on Neoclassical Environmental Economics - based on the Coase Theorem (1960) with the aim of minimizing or correcting impacts on ecosystem services, contributing to obtaining economic efficiency by internalizing positive externalities via monetary payments (GODOY, 2011; SCHOMERS; MATZDORF, 2013; WUNDER, 2005). Coase's theorem holds that externalities do not cause the imperfect allocation of resources, as long as transaction costs are nil, and property rights, well defined and respected. Therefore, the actors (the producer and the consumer of externality) would have a market incentive to negotiate an agreement for mutual benefit, in such a way that the externality was “internalized” (ANDRADE et al., 2012; GRIMA et al., 2016; PAGIOLA; ARCENAS; PLATAIS, 2005; SCHOMERS; MATZDORF, 2013; ZYLBERSZTAJN; SZTAJN, 2002). Externalities can be identified when an actor's action affects the other's well-being or gain, but without any market mechanism that compensates those affected. Externalities can be negative or positive (SOARES; SILVA; TORREZAN, 2015).

According to some views, PES is an economic instrument that tries to stimulate the protection of ecosystem services and to minimize the current management failure (which does not consider the value of an ecosystem service) through a new market (WUNDER, 2015). Wunder defines PES concept as a “voluntary transactions between service users and service providers that are conditional on agreed rules of natural resource management for generating offsite services” (WUNDER, 2015, p.241). This concept is used in this work.

PES systems have been used as a form of incentive and motivation for the protection and sustainable use of biodiversity and natural resources; using economic incentive instruments for the sustainable management of ecosystems. This class of compensation policy aims to recognize the agent who sacrifices part of his income for conservation of the nature (ANDRADE et al., 2012) and contribute to the preservation of nature and sustainable development (MORAES, 2012). In consequence, PES schemes provide or reduce these eventual financial losses. In other words, through the opportunity costs and maintenance of environmental services, the providers of these services receive financial incentives from the beneficiaries and users of this environmental service. The Protector-Receiver principle has been recognized as more efficient and effective in controlling environmental damage (DELEVATI et al., 2018; MORAES, 2012; OUVENEY et al., 2017; SHIKI; FARIA; SHIKI, 2011).

Therefore, PES works with the recovery, maintenance and improvement of ecosystems that generate environmental services. Even though it sounds simple to accomplish, it is a complicated process and each project is unique. The process of implementing a PES project ranges from the mapping of springs, the search for finance to farmers' adherence, so it is a long and meticulous process (ZANELLA; SCHLEYER; SPEELMAN, 2014).

In order to encourage PES policies in Brazil, the National Water Agency (ANA – Agência Nacional de Águas) was created by Law No. 9,984 of 2000 (BRASIL, 2000), which is the regulatory agency for this type of assessment instrument (PES), through the Water Producer Program (Programa Produtor de Água - PPA). The ANA is legally liable for implementing the National Water Resources Management System, created to ensure the sustainable use of Brazilian rivers and lakes for the current and future generations (ANA, 2019).

In 2001, ANA developed the Water Producer Program but the program started to operate in 2005, when the first project “Conservador das Águas de Extrema/MG” was implemented. In the Water Producer Program, the valuation of water protection environmental services is based on a Reference Value, which is the opportunity cost of using one hectare of the project area, expressed in R\$ / hectare /year. This value is obtained by the development of an economic study, specific to the project area, based on the most used agricultural activity in the region, or on a set of activities that best represents the average net gains obtained from its use (ANA, 2012; ANDRADE et al., 2012; DELEVATI et al., 2018; MORAES, 2012). The opportunity cost refers to the profit that the service provider would not receive when rejecting to develop



another land use activity (WÜNSCHER; ENGEL; WUNDER, 2008). To this end, the program supports, guides and certifies projects aimed at reducing erosion and silting up of sources in the rural environment, improving the quality, expansion and regularization of water supply in watersheds of strategic importance to the country.

3. Methodological Procedures

The study adopted a descriptive and exploratory research design via case study research method. Exploratory research aims to provide greater familiarity with the problem, to make it more explicit or to constitute hypothesis (GIL, 2008). The study is characterized by a predominantly quantitative approach. Therefore, it involves the processes of collection, analysis, interpretation and writing of the results (CRESWELL, 2007).

Primary data were collected by a structured interview, according to Gil (2008), this technique develops from a fixed list of questions, whose order and wording remains invariable for all interviewees. For a better understanding of the project, a collection of secondary data was realized with those responsible for the project, such as the representative of the project. According to GIL (2008), secondary data survey main aim is the description of the characteristics of a given population or phenomenon, or the establishment of relationships between the variables studied. A documentary analysis was also conducted between August and October, 2019; data from previous sources were used and all this documentation were researched at Web of science, Scopus and Google Scholar.

Interviews and secondary data collection took place from August 26 to 28, 2019 and from September 11 to 13, 2019, during which time the author visited as many rural properties as possible and Vera Cruz City Hall. Thirty-nine landowners participating in the project from were interviewed. The sample was no probabilistic, being the interviewees chosen according to their availability of agenda and willingness to participate in the study. In order to achieve the objectives of this work, structured interviews were conducted with active project participants. The data were collected through individualized and face-to-face interviews through structured script, and were recorded by hand by the researcher.

The structured interview is based on the study conducted in Australia “Encouraging Participation in Market Based Instruments and Incentive Programs” by Professor Mark Morrison, Dr Jeanette Durante, Ms Jenni Greig and Dr John Ward. It is a research project of the Social and Institutional Research Program of Land & Water Australia and it was completed in April of 2008. Subsequently, the author adapted the Australian questionnaire to the Brazilian reality with the help of her advisor. The first part of the questionnaire is the socioeconomic characteristics of the respondents and their families, at this stage the questions were adapted according to the questionnaire of the Agricultural Census 2017. The second part of the questionnaire is the situational category (rural properties). At this stage some questions are opened, such as property size, and others are closed. Regarding the open questions, after tabulating the data, the author divided the answers into scales for a better analysis of the results. After data collection, the author organized, entered, stored, and tabulated the data in Microsoft Office Excel in the spreadsheet form during October of 2019. Thus, enable the author to analyze the research results.

3.1. Vera Cruz/RS and Water Protector Project

Vera Cruz is located in the Rio Pardo Valley region, nearby Santa Cruz do Sul City, where the main tobacco industries of Brazil are located, such as Souza Cruz and Philip Morris. The presence of these companies has the support of the rural producers in which the cultivation



of tobacco for processing is the main source of income. According to data from the municipal government, the tobacco industries are the majority, 95% of the rural properties are based on tobacco cultivation (VERA CRUZ, 2019).

The main water resource of the region is the ‘Arroio Andréas’, it has fundamental importance for water supply for Vera Cruz City. According to IBGE (2010) the stream supplies more than 7,200 households in Vera Cruz City, besides supplying the water demand of more than 1,000 rural households. With an estimated population of 26,863 people for 2019, (IBGE, 2019), most of them are women, and most of them live in the city, with more than two thousand inhabitants in relation to the rural area

The population for this research is the formal participants of the Water Protector Project in the city of Vera Cruz / RS. The project started in 2010, with the support of the municipal government, jointly with the University of Santa Cruz do Sul (UNISC) and in partnership with Universal Leaf Tobacco and Fundación Altadis (a non-profit organization, belonging to the Imperial Tobacco Group).

Currently, the project counts on the formal adhesion of 63 landowners covering 68 properties and totaling 144.6 hectares of preserved areas (DELEVATI et al., 2018). The realization occurs in partnership with UNISC, supported by the Ministry of the Environment City (through ANA), Pardo Committee, Emater/RS- Ascar, Afubra and SindiTabaco (VERA CRUZ, 2019).

In 2016, ANA joined the program five new objectives were signed: environmental education of the population; producer training carried out by Emater; implementation of 50 hectares of no-till (proper soil management and conservation practices); 20 km improvement of internal roads of participating rural properties (improving roads and property access with gravel placement and drainage adequacy); readjustment of the slopes near the water capitation (ANA, 2019; VERA CRUZ, 2019). Just 45 participants are part of this group that receives support and products for no-tillage, such as corn seed, oats, and gravel, and compost, herbicide, among other materials or help in labor.

Upon joining the project, the landowner receives annually R\$ 325,00 (three hundred and twenty-five reais) per preserved hectare, receives annually R\$ 200,00 (two hundred reais) for joining the project and exemption from water tariffs (up to 15 m³) (VERA CRUZ, 2019).

4. Results and Discussion

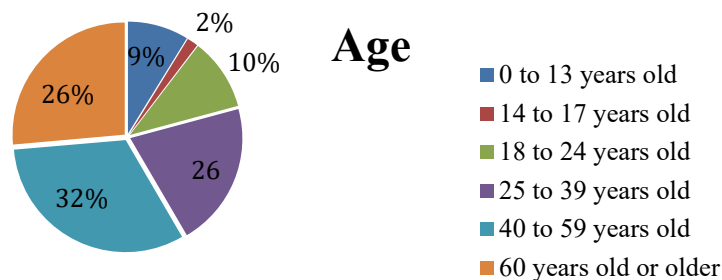
As previously explained 39 landowners were interviewed, of this total, 24 joined the project in the first year (2011), 7 in the second year (2012), 7 in the third year (2013) and 1 in the fourth year (2014). Hence most respondents have been participating in the project since its beginning.

The first question of the questionnaire was intended to describe the family structure. The total sum of family members was 125 people. The mean population per family was 3,2. The 40 to 59 age group prevails, with over 50% of the population over 40 years of age, thus corroborating the 30% retirees people respondents. With a low number of children among the interviewed families (Figure 1).

The respondents were predominantly female (52%). During the interviews, the role of women in the initial stage of the project was noted. In the first project meetings, as reported by respondents, some women encouraged the participation of other landowners, highlighting the future benefits of the project, the importance of water in the region and the environment for all.



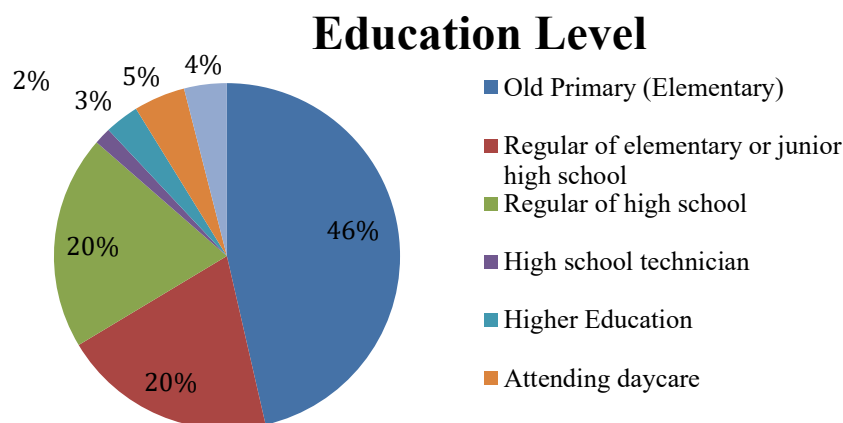
Figure 1: Age distribution of family structure of landowners interviewed



Source: The author (2019).

As can be seen Figure 2 in the largest education categories were Old Primary (46%), Elementary School (20%) and High School (only 20%). Old Primary was the first stage of school education and lasts for the first 4 years. It was reported during the interviews, mainly by older respondents, that in the past the school in the region only went until the fourth grade.

Figure 2: Education levels of interviewed

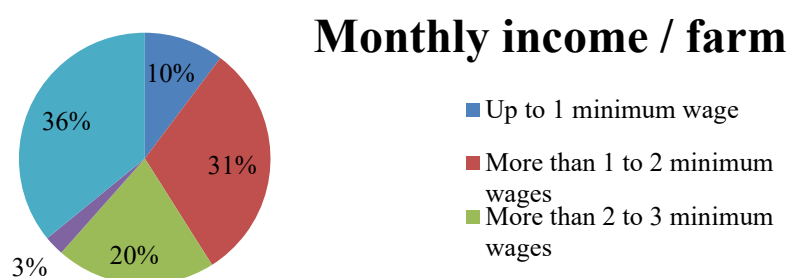


Source: The author (2019).

Participants were also asked about their family income earned on the farm. According to Brazilian Decree No. 9,661 of January 1, 2019, the Brazilian minimum wage is R\$ 998,00 (nine hundred and ninety eight reais) (BRASIL, 2019). As can be seen in Figure 3, 36% had no income and 31% earned between 1 to 2 minimum wages.

No income on the farm respondents, can either be retirees, or work off-farm. Therefore, the monthly income from agricultural activity is low, ranging between 1 and 3 minimum wages.

Figure 3: Family monthly incomes earned on the farm declared by interviewed



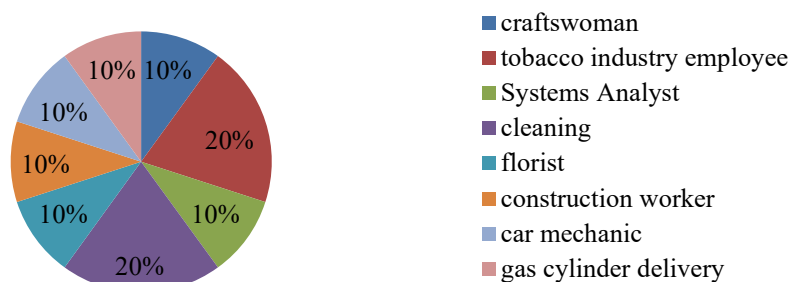
Source: The author (2019).



Respondents were asked about family income earned off-farm. Thus 26% have a non-agricultural income and the average monthly salary for this job is more than 1 to 2 minimum wages. As a result, off-farm income is important among the rural families surveyed. Figure 4 shows what kind job is performed. However, the producers' income can be considered low.

Figure 4: Type of work off-farm declared by interviewed

Type of work off-farm



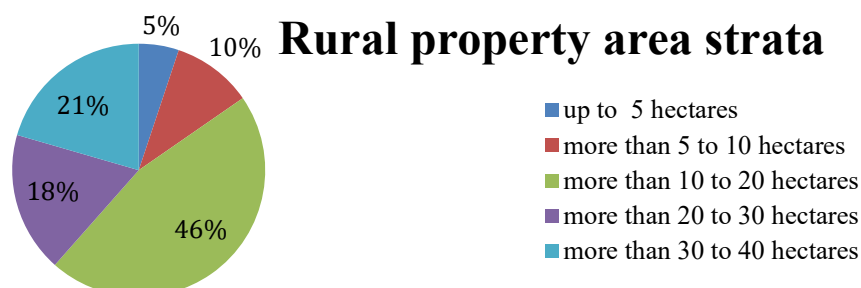
Source: The author (2019).

There were differences in responses about the type of jobs off-farm; just 20% worked in tobacco industry and 20% as a cleaning, thus generally jobs that require little professional qualification.

All landowners participating in the project have worked in agriculture since childhood and all are owners of the land. The properties belonging to the research sample ranged from 1 ha to 37 ha, the largest frequency of the size of the properties (46%) is between more than 10 to 20 hectares (Figure 5). Consequently, they can be considered as small farmers.

Respondents were asked about the area dedicated to agriculture in their properties (Figure 6), just 10% of the landowner's uses between more than 10 to 20 hectares for agriculture. In this question no distinction was made for the purpose of agriculture, whether it was for family consumption or trade purpose. During the visit to the properties, the interviewed narrate that the region is not flat, so a large part of the properties are not used for agriculture, it is preserved,

Figure 5: Rural property area strata declared by respondents.



Source: The author (2019).



Figure 6: Rural property area strata dedicated to agriculture declared by respondents

Rural property area strata/ agriculture



Source: The author (2019).

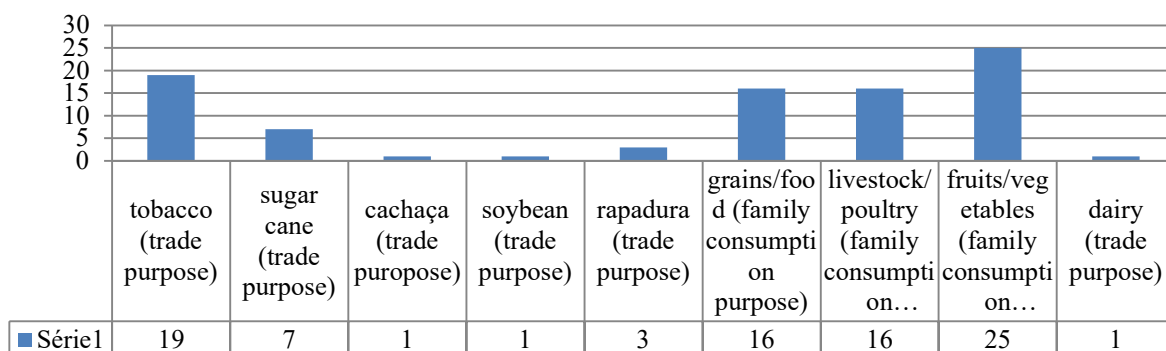
Landowners were also asked about the size of the area devoted to the program, 97% of rural properties dedicating up to 5 hectares. As explained earlier, the basin was diagnosed by visiting all rural properties that have springs and riverside areas. Subsequently, the possible preservation areas within each property were reviewed and negotiated with landowners, as narrated by Mr. Gilson Becker. After the landowner determined the area to participate in the project, the determined area was demarcated and fenced (DELEVATI et al., 2018).

Respondents were asked to specify the main farming activities undertaken on their rural property. In other words, what they planted or raised or produced on their properties, either for trade or family consumption. Thus, six categories for trade purpose were found and three categories for family consumption.

As can be seen in Figure 7, tobacco, sugarcane, cachaça (Brazilian alcoholic beverage derived from sugar cane), soybean, rapadura (Brazilian sweet derived from sugar cane), and milk are the main farming activities amid trade purpose. Even so, tobacco production has the largest number of producers (19). Even though, 74% of the landholders do not have a family succession plan. Sugarcane, cachaça, and rapadura producers are all located in the same region called ‘Batata ló’.

Figure 7: Main farming activities undertaken on rural properties declared by interviewed

Farming activities



Source: The author (2019).

As usual in the region, most landholders consume what they cultivate or exchange crops with neighbors (Figure 7). Among those who grow for their own consumption are potatoes, cassava, corn, beans and rice, and a wide variety of fruits and vegetables. Thus, 16 landholders raise livestock and or poultry. During data collection, it was realized that the whole family

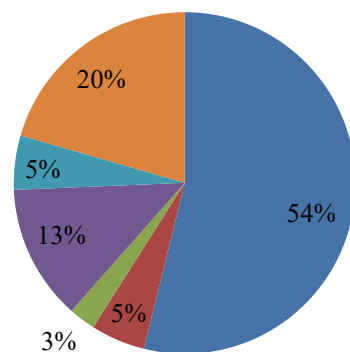


works on the property. It was also noted the help among neighbors during planting and harvesting only 3 properties have employees in agriculture. All 36 other families have no employees. These are typical traits of family farming: production for income and self-consumption, help between neighbors in agricultural activities, and work developed mainly by family members.

To finalize, respondents were asked how they defined themselves (Figure 8). Five predefined options have been given to choose from. If they did not define themselves among these options, they could describe themselves in the sixth option.

Figure 8: How the landowner defines himself, declared by interviewed

Define Yourself



- I'm a full-time farmer – this is how I make my living and I work on the farm most days.
- I'm a part-time farmer – I work off farm some of the time and/or a fair proportion of my income come from off-farm sources.
- I'm a semi-retired farmer, living and/or working on the farm some of the time.
- I'm a retired farmer – I live on the land but someone else runs the farm now.
- I live on the land for the lifestyle – I'm someone who lives on the land, but I don't consider myself a farmer.
- Retired and resident

Source: The author (2019).

The most frequently listed definition category by participants was 'I am a full-time farmer' (54%) – meaning this is how they make their living and they work on the farm most days. The remaining participants listed a wide variety of definition including a new one, where they defined themselves as a retired farmer that still lives in the property.

During the interviews, the interviewees declared that they and their family's members are farmers and see themselves as farmers. They were raised that way; it is the only thing that they were taught to do. o even if they retire, they will always be farmers.

5. Final Considerations

This research aimed to analyze the socioeconomic and situational characteristics of the landholders that joined the 'Water Protector Project of Vera Cruz / RS', in which thirty-nine formal project participants were interviewed personally by the author.

It is concluded that they are small rural families mostly adult and their families have worked with agriculture all their lives, with typical traits of family farming, and note that all farmers produce basically the same products. The knowledge about agriculture, the region's climate, and the production of tobacco or for family consumption were passed on from generation to generation. As a large part of the participants produce or have already produced tobacco.

During data collection the author interviewed more women than men, even when men were present in the interviews. It was noted the importance of women from participating families since the beginning of the project, either due to their awareness of water use, preservation or the social connectivity they represent, and non-farm income is important among



respondents, especially for women. They were more active during the interviews, narrating their influence on their families and neighbors to join the project and their work in society and community. Female participation perhaps happened more frequently in this project, because men have a look at agricultural production, and women on other aspects, such as: non-agricultural activities, external income, care for the family and the environment, among so many others.

There were some limitations in the research, such as not having interviewed all participants, even though I tried. It is suggested for the next researches to analyze the role of future generations and women role.

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