

**Land Use And Occupation And Socio-Environmental Impacts In The
Municipality Of Sandovalina - SP**

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RESUMO: Given all the transformation that man produces on the environment, the original characteristics of the environments are modified or destroyed, resulting in environmental degradation, especially in places where once existed rich ecosystems and today are characterized by accelerated growth. In this sense, it is considered important to conduct an analysis of the use and occupation of land and its socio-environmental impacts, diagnosing the environmental quality of the watershed of the Taquaruçu stream in the municipality of Sandovalina - SP. In this way the methodology of this work were evidenced through analyses of the hydric behavior of the stream Taquaruçu, analyses of the state of the environmental quality of the spring and of the water and the physical and biotic characteristics of the areas, the identification of the uses and conflicts in relation to the hydric resources, and the transgressions to the environmental legislation. Finally, it is concluded that after the analyses made and carried out in the Taquaruçu stream and in the municipality of Sandovalina, it was possible to prove that greater supervision and awareness of the entire population about these areas is necessary, since they are in a critical situation, even though they are of total importance for the municipality and the entire region.

KEY WORDS: Water Resources, Environment. Degraded Areas. Taquaruçu stream watershed, Sandovalina-SP.

INTRODUCTION

The population growth and the increase in industrial activities and agricultural production cause greater pressure on water quality, due to the fact that these resources are used for various human activities, including serving as final effluent receptors. In this context, the pollution generated, in addition to causing environmental damage, can harm humans directly or indirectly.

In general, the environmental problems resulting from water pollution are related to the alteration of the biodiversity existing in the ecosystem while, for man, the compromising of water quality can impair his use and/or in more serious cases put his health at risk.

In recent years, surface water contamination has ceased to be analyzed locally, adopting a holistic view that encompasses the concept of watershed.

In this sense, the interest in conducting an analysis of land use and occupation and its socio-environmental impacts arises, diagnosing the environmental quality of the Taquaruçu stream hydrographic basin, since it is fully inserted in the municipality of Sandovalina-SP, and the Taquaruçu stream is one of the tributaries of the Paranapanema River, and in terms of uses, the hydrographic basin presents an urbanized area, rural settlements and large extensions of sugar cane monoculture.

Given these problems, this paper proposes to conduct an analysis of land use and occupation and its socio-environmental impacts, diagnosing the environmental quality of the Taquaruçu stream watershed in the municipality of Sandovalina - SP.

OBJECTIVES

The general objective of this study is to analyze the use and occupation of land and its socio-environmental impacts, diagnosing the environmental quality of the Taquaruçu stream watershed, located in the municipality of Sandovalina - SP.

Specific objectives that we developed were the: To understand the hydric behavior of the Taquaruçu stream; To analyze the environmental quality of springs and water quality and the physical and biotic characteristics of the area; To identify uses and conflicts in relation to the hydric resources; To identify changes of the environmental state of the Taquaruçu stream, from reports of residents and employees of the municipality; and, To identify transgressions to the environmental legislation.

MATERIALS AND METHODS

To evidence the analyses of the hydric behavior of the Taquaruçu stream, the floating method was adopted, following the guidelines of the author Palhares et al. (2007), using as floating object a 300 ml plastic bottle (pet) (without label), and determining the time for the bottle to travel the distance between the two points (4.0 m). When we adopt the surface float method, it is prepared to move with the same speed as the water surface, because being very light, it can suffer the influence of wind. (SANTOS et al., p. 196). The flow, by the float method, is given by the product of the average speed by the average cross-sectional area. The data collection by the method described, previously, was instantaneous. However, there was the need to previously insert the characteristics of depth and width of the section.

The analyses of the state of the environmental quality of the spring and water and the physical and biotic characteristics of the areas were carried out, for which three points were established: Point 1 (spring), Point 2 (near the spring, downstream) and Point 3 (within the urban area). The analyzed samples were used to determine the water quality based on the Standard Methods for Examination of Water and Wastewater (APHA, 1995).

The parameters monitored were as follows:

Physical parameters: Turbidity (uT), Temperature (°C) and Conductivity (us/cm).

Chemical parameters: pH and Dissolved Oxygen OD (mg/L).

To identify the uses and conflicts in relation to water resources and transgressions of environmental legislation in the area were identified through field surveys in visits to the locations studied. We also used the land use and land cover map of 2014, prepared by the Environmental Management and Socio-Spatial Dynamics Research Group (GADIS) of the Department of Geography, Faculty of Science and Technology, UNESP. To identify conflicting uses in the APPs, a 30 m buffer was drawn up for each bank of the river courses, according to the new Forest Code (Law No. 12.651, 2020).

In order to obtain more information about the development of the municipality and impacts on the environment, several interviews were conducted with residents of the settlements, employees of the House of Agriculture and the rapporteur of the Plan for Integrated Management of solid waste of Sandovalina-SP, in order to collect reports, experiences and information for the best development of the work.

In this way, this research activity is capable of offering and, therefore, producing new knowledge about an area or phenomenon, systematizing it in relation to what is or is not already known.

After the interviews were conducted, it was necessary to transcribe them (since part of them were only recorded and there was no digitalized material) and to analyze them, showing that, despite being a process that demands a lot of time, it allows to give meaning and understanding to the collected data, and thus the analysis contributed to the development of the work.

RESULTS

After the analyses performed and the bibliographic surveys, it was possible to view that according to the Center for Weather and Climate Research Applied to Agriculture - CEPAGRI (2014), based on monthly rainfall and thermometric data, the climate of the municipality of Sandovalina-SP can be classified, according to Koppen, as belonging to the type Aw - Tropical Humid, characterized by rainy season in summer and dry in winter, with an average annual temperature between 22° and 24° C and annual rainfall around 1500 mm. The coldest month

has an average temperature of 18° C and the driest month has rainfall of less than 60 mm, with the rainy period being delayed until autumn.

According to the Watershed Committee of Pontal do Paranapanema - CBH-PP (2014), the UGRHI 22 has the following soil classes: Argissolo, Gleissolos Háplicos, Latossolos, Neossolos and Nitossolos. The predominant soil in Sandovalina is the Red Latosolo type, as well as occurrences of Red Argissolo and Red-Yellow Argissolo.

Subsequently, with the information from the Plan for Integrated Management of Solid Waste (2012) and with the interview conducted with Heriton Dias then interlocutor of the Green Municipality, we raised the percentage of the urban area served by the regular collection service, and the percentage of the urban area served by the selective collection service, cover 100% of the urban territory of the municipality, this referring to the year 2012. However today (2020), there is no longer selective collection in the city, so, when analyzing the aspects of selective collection, it is less than 60%, since the same is not performed in the city.

The frequency of collection currently takes place from Monday to Friday, but a few months ago it was only once a week, thus becoming inefficient.

For special waste, the Municipal Health Secretary, together with the Sanitary Surveillance of Sandovalina-SP, forwards the entire amount of hospital waste from the municipality, as well as from pharmacies and dental offices, located in the city, to the city of Presidente Prudente, directed to the company Cheiro Verde Ambiental. The collection is performed every 15 days. All the material is stored in a specific location within the health center itself.

The frequency of sweeping public spaces is considered insufficient, since the municipality has processes for hiring a work front for the due activities, thus, the municipality does not present a frequency of sweeping.

The municipality of Sandovalina has some laws and decrees that are part of the Environmental Management Plan and that support the municipality in search of improvements and protection of the environment. It can be noted that the laws and municipal decrees seek to protect the quality of life of citizens of Sandovalina, promoting an Environmental Education. Everyone has the right to live in a balanced environment, but few are aware that they can help in its protection.

The municipality of Sandovalina is located west of the State of São Paulo, in the Pontal do Paranapanema, at 400 m altitude, and has the following geographical coordinates: 22° 27' 22" South Latitude of the Equator and 51° 45' 47" West Longitude of Greenwich. (EMBRAPA, 2020).

The municipality belongs to the administrative microregion of Presidente Prudente and is approximately 65 km from Presidente Prudente, and 620 km from the state capital. It is bordered by: Presidente Bernardes, to the north; Paranapanema River, to the south, bordering the State of Paraná; Pirapozinho, Estrela do Norte and Tarabai, to the east; Mirante do Paranapanema, to the west.

The access to the city is made by Rodovia Assis Chateaubriand (SP-425), which connects the States of São Paulo and Paraná, and by two municipal roads, one making the route to the municipality of Estrela do Norte and the other to the Taquaruçu Hydroelectric Power Plant. (CEPAM, 2014).

According to the Demographic Census of the Brazilian Institute of Geography and Statistics (IBGE), in 2010, the municipality of Sandovalina had a population of 2,699 inhabitants, called "Sandovalinenses". Of these, 1,814 were women and 1,885, men; being that 1,118 inhabitants resided in rural areas (527 women and 591 men) and 2,581 inhabitants, in urban areas (1,287 women and 1,294 men). (IBGE, 2020). According to the SEADE Foundation (2020), the population for 2020 is estimated at 4,211 inhabitants.

According to Fundação SEADE (2014), in relation to the typology of Gross Domestic Product (GDP) of the Municipalities of São Paulo, Sandovalina has an industrial profile, due to the high participation of industry in current years.

In UGRHI 22 (Pontal do Paranapanema), agriculture and food production are the mainstays of the regional economy, with sugar and ethanol mills, meat packing plants and slaughterhouses standing out. Due to the independence of some sectors that complement each other, there are also extensive areas cultivated with pastures and sugarcane, in addition to corn and soybeans. (CBH-PP, 2014).

The city of Sandovalina has agro-industrial economy and registers expressive growth attributed to the expansion of the sugarcane industrial complex, with implementation and expansion of mills and distilleries in the region.

The municipality's economic base is anchored in the sugar and ethanol production with the presence of the alcohol plant (Duke Energy), UmoeBioenergy, which is currently also producing energy, for the industry's internal and external use. Since May 2012, the plant has been producing energy from sugarcane bagasse. The bioenergy generated is 30 megawatts per hour (MW/h), enough, according to the company, to supply a city with 100,000 homes or 200,000 inhabitants. The energy that supplies the homes of consumers in several cities in the region and in the country, in addition to spaces such as the Sports and Tourist Center and the Babaquá Municipal Bathhouse, which provide leisure for the inhabitants and residents of the region. (CEPAM, 2014).

In the municipality there are small farms, mostly with subsistence production. The city also has a small wood factory, which contributes to local development.

The municipality has two Agrarian Reform settlements: Dom Thomaz Balduino, with 68 farmers, and Bom Pastor, with 130 family farmers.

With the economic activities present in the proximities of the Taquaruçu stream, it has been observed that modifications are occurring in the course and quality of the stream. In this way, taking into consideration the industrial and agricultural activities in the hydrographic basin in which the Taquaruçu stream is inserted, it is believed that the diagnosis in this area, by means of field surveys, can be considered a tool of great importance for the identification of the uses and conflicts in relation to the hydric resources.

The Taquaruçu Hydroelectric Power Plant is located between the municipalities of Sandovalina - SP and Itaguajé -PR. In operation since the 1990s, it is the second largest hydroelectric plant on the Paranapanema River (Duke Energy).

According to information from the Solid Waste Management Plan (2012) and the interview conducted with the agronomist Fábio Yukio, responsible for the House of Agriculture of the municipality, the predominant economic activities in the municipality are livestock and agriculture. The use and occupation of land in the municipality was mostly characterized by pasture and temporary crops in 2007 and 2008. However, an increase in the number of temporary crops was noted almost a decade later, as was the number of Agricultural Production Units (APUs).

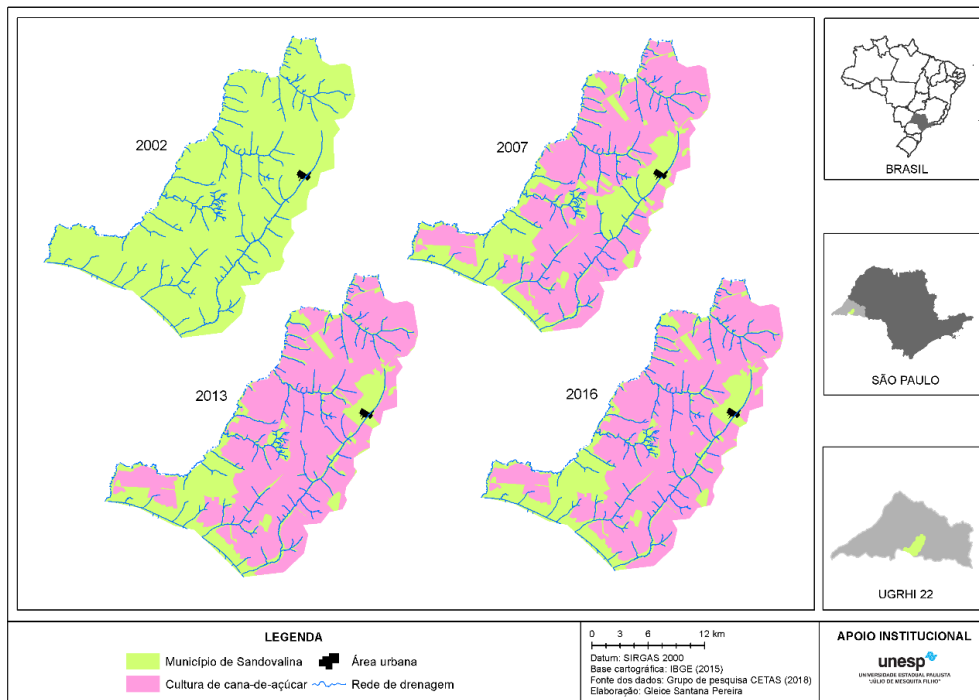
The municipality of Sandovalina is part of the 10th Administrative Region: the Administrative Region of Presidente Prudente, formed by 53 municipalities.

According to Barreto and Thomaz Jr (2012), the process of territorialization of sugarcane in the 10th Administrative Region of Presidente Prudente is still recent, if we make a comparison with other areas of sugarcane cultivation in the state of São Paulo or in Brazil. It is also noteworthy that the expansion of sugarcane agribusiness in the region occurred at different times, related to periods of restructuring in the sugarcane sector.

From the expansion of sugarcane culture, among the municipalities of the 10th Administrative Region of Presidente Prudente, the municipality of Sandovalina-SP stands out,

where until the year 2000 there was no sugarcane production for the industry. In 2014, its area exceeded 33,000 hectares, as can be seen in Figure 1.

Figure 1 - Evolution of sugarcane planting in the Municipality of Sandovalina



Source: CETAS research group (2018)

Along with the advances in sugarcane monoculture, there are, on the other hand, numerous problems related to the environment and to the residents (rural and urban) who live in or are surrounded by sugarcane plantations. Among the problems signaled as a result of the expansion of sugarcane plantations are the contamination of surface and underground water, soil and food contamination, an increase in the number of diseases, loss of other crops due to the use of agrotoxics, deforestation, loss of species of fauna and flora, and contamination of soil and water resources (Alessi NP, 1994).

DISCUSSION AND CONCLUSION

It is true that the risk of environmental damage is always present in a growing city, and it is no different in Sandovalina, which grew demographically and economically in recent years. However, the right to the environment comprises a human and ecological vision, and must be closely interconnected, man and environment. Each intervention of man in nature should be analyzed the risks and if there is damage, its immediate repair, mainly in view that everyone is entitled to a balanced environment, and for that it is necessary that there are joint forms with the population to protect the environment, promoting a welfare between municipal growth in all its aspects and the prevention of the environment that provides the existence of human beings, valuing the dignity of the human person.

With the analysis of the hydric behavior of the Taquaruçu stream, it is concluded that although the method adopted for the measurement of flow does not present much precision, the results obtained show that the hydrographic basin presents great amplitude between the winter and summer flows, which can indicate deficiencies in the process of infiltration and retention of water in the hydrographic basin.

In the water analysis of the Taquaruçu stream it is possible to conclude that the dissolved oxygen values indicate a critical condition, called hypoxia. These values can be justified by the fact that in the spring a large part of the water remains without circulation, causing the DO values to be reduced.

For the pH values were found values with a considerable variation, it is concluded then that this variation was due to seasonality, being visible the verification in winter and summer, and their values are difficult to interpret.

As for the temperature values of a body of water, its increase causes an acceleration/increase in the chemical and biological reactions involved in the environment. Thus, it is possible to conclude that the lower temperature is due to the fact that the collection point (spring), which is located in a wooded and shaded area, has a higher temperature because it is located in an urban area, near paved streets where there is greater absorption of sunlight.

The values obtained in the turbidity parameter, are within the CETESB standards, so it is understood that as there is no sediment deposition, the turbidity values are slightly lower and where there is sedimentation of materials, the values suffer an increase.

For the values of electrical conductivity in water bodies it is concluded that all are directly related to various factors, which the increase may be due to a greater amount of silica, caused by the transport of sediment in the rainy season.

During the realization of the work it was possible to verify the characterization of the study area regarding the physical and environmental aspects and from the bibliographic research, it was then verified that the municipality has undergone many significant changes, changes that have altered and alter the quality of the environment of the places studied.

According to the historical occupation and administrative formation, the geographic and demographic data, it is concluded that the municipality, despite having little urban area, has an extensive rural area, and this has great importance for the municipality, either by the financial return it gives to the urban area as for the return of the small and large areas.

In the use and occupation, it was found that the municipality was mostly characterized by pasture and temporary crops, however, there was an increase in the number of temporary crops almost a decade later.

It is also concluded that the settlements still need a lot of support from the responsible bodies, since they still go through many precariousness. In view of this, an effective environmental management is necessary, through a municipal policy, in protective and preventive actions. According to the legislation focused on the environment, it is observed that the municipality seeks to promote the protection of the healthy environment to the population, seeing that through participatory public policies will be able to prevent environmental damage, and that awareness through environmental education can contribute much, because a properly informed population does not practice acts that harm their own lives and those of future generations.

Given this, it should be said that the citizens of Sandovalinenses, has the ability and duty to promote values and actions that involve changes in the subject that learns and focuses on their identity and attitudes before the world. Developing skills such as more cooperation, so we can have high expectations on the recovery of the environment, and the preservation of natural assets that have not yet become extinct on our planet.

It is understood that the Municipality of Sandovalina - S.P. needs to strengthen the work done, and not measure efforts so that there is the achievement of a good development of laws and decrees governing the municipality, so that the same and its population is aware, sensitize and mobilize in all these paradigms on the preservation of the environment.

In this context, it was observed that it is necessary to create more complete environmental protection policies, and enforce them, integrating all levels of activities pertaining to the sector and establishing short, medium and long term planning.

It was also noted that the municipality has laws and decrees that protect the APP areas, the Taquaruçu stream and the entire environment, but many of these regulations are still not being obeyed and complied with, or have been ignored even by the rulers and the population.

In this sense, we tried our best to confront and analyze the data and elements found in both sources of data, avoiding possible biases during this research.

Thus, after the analyses made and carried out in the Taquaruçu stream and in the municipality of Sandovalina, it was possible to prove that greater supervision and awareness of the entire population about these areas is necessary, since they are in a critical situation, even though they are of total importance for the municipality and the entire region.

Finally, it is possible to highlight that when men find more appropriate forms of relationship with the components of nature, much more encouraging of good relationship man-environment, so the environmental development between different users, would enable an evolution (positive) behavior of humans in relation to the use of these resources.

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