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The review of São José do Rio Preto (SP) Master Plan and its integration with the Turvo Grande Basin Plan: analysis of water management criteria

A revisão do Plano Diretor do município de São José do Rio Preto (SP) e sua integração com o Plano de Bacia do Turvo Grande: análise de critérios de gestão hídrica

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ABSTRACT: Municipal Master Plans must integrate the present guidelines into the Water Plans, identifying control and inspection tools through which citizens can manage and the public administration can supervise and guarantee their effective compliance. The objective of this work was to investigate the relationship between these environmental planning instruments, using the Municipal Master Plan of São José do Rio Preto, SP, located in the Turvo and Grande Rivers Basin (UGRH 15) as a case study. To do so, an analysis of the history of the Municipal Master Plan review was conducted, seeking to identify the possible contributions of information from the Basin Plan to the development of the Municipal Master Plan's diagnosis and prognosis. An analysis of synergies existing in both Plans was carried out, regarding the diagnosis and proposals, in criteria related to water resources, such as water quality and quantity, solid waste, protection and revegetation of Permanent Preservation Areas, recovery and prevention of urban and rural erosions, environmental zoning, and others. The results showed that, for the majority of the selected criteria, there was partial or total synergy between the Plans, which were coincidental, due to the lack of formal articulation. It is concluded that, through the analysis of the Turvo Grande Basin Plan and the São José do Rio Preto Master Plan, integrated management did not occur systematically, due to the absence of Committee participation in the Master Plan review process, even though municipal representatives in this body were present in its preparation. Furthermore, there are no formal mechanisms for coordination between planning systems in the country, such as Strategic Environmental Assessment.

Keywords: urban planning; strategic environmental assessment; integrated water resources management.

RESUMO: Os Planos Diretores Municipais devem integrar as diretrizes presentes nos Planos de Recursos Hídricos, identificando instrumentos de controle e fiscalização, por meio dos quais os cidadãos e a administração pública possam fiscalizar e garantir seu efetivo cumprimento. O objetivo deste trabalho foi averiguar a relação entre esses instrumentos de planejamento ambiental, tendo como estudo de caso o Plano Diretor Municipal de São José do Rio Preto, SP, situado na Bacia Hidrográfica dos Rios Turvo e Grande (UGRH 15). Para tanto, foi realizada uma análise do histórico da revisão do Plano Diretor Municipal, buscando identificar as possíveis contribuições das informações presentes no Plano de Bacias para a elaboração do diagnóstico e prognóstico do Plano Diretor Municipal. Realizou-se a análise das sinergias existentes em ambos os Planos, em termos de diagnóstico e proposições, nos critérios afeitos aos recursos hídricos, como qualidade e quantidade hídricas, resíduos sólidos, proteção e revegetação de Áreas de Preservação Permanentes, recuperação e prevenção de erosões urbanas e rurais, zoneamento ambiental e outros. Os resultados demonstraram que, para a maioria dos critérios selecionados, houve sinergia parcial ou total entre os Planos, que foram coincidentes, devido à falta de articulação formal. Conclui-se que, por meio da análise do Plano de Bacia do Turvo Grande e do Plano Diretor de São José do Rio Preto, a gestão integrada não ocorreu de forma sistemática, em razão da ausência de participação do Comitê no processo de revisão do Plano Diretor, mesmo que representantes do município nesse órgão estivessem presentes em sua elaboração. Além disso, não há mecanismos formais de articulação entre sistemas de planejamento no país, como a Avaliação Ambiental Estratégica.

Palavras-chave: planejamento urbano; avaliação ambiental estratégica; gestão integrada de recursos hídricos.

1. Introdution

The rapid growth of urbanization has been causing profound changes in the hydrological cycle, such as natural conditions of infiltration, vegetation cover, topography, and natural surface water drainage networks, altering the processes of water distribution among the land surface, subsurface, and atmosphere (Canholi, 2013).

To avoid such impacts, the municipality has instruments related to territorial planning, such as Master Plans, zoning, land subdivision, and the development of housing programs, delineation of industrial, urban, and environmental preservation zones, urban transport plans and systems, among other activities with impacts on water resources, especially in watersheds located in predominantly urban areas (Carneiro, Cardoso & Azevedo, 2008).

The Statute of the City (Federal Law No. 10,257 of July 10, 2001), which defines the general guidelines for Brazilian urban policy (Brazil, 2001), addresses city planning and the social function of urban land. According to this law, urban property fulfills its social function when it meets the fundamental requirements for city planning expressed in the Master Plan, ensuring the satisfaction of citizens' needs regarding quality of life, social justice, and economic activities development (Brazil, 2001; Menzori, Souza & Gonçalves, 2021).

The Municipal Master Plan must be approved by Municipal Councils and is mandatory for cities with more than twenty thousand inhabitants, constituting the primary instrument of urban development policy. Additionally, municipalities with the following characteristics require the development of a Master Plan:

> II - members of metropolitan regions and urban agglomerations;
> III - located where the municipal public authority intends to use the instruments provided for in article 182(4) of the Federal Constitution; IV - members of areas of special tourist interest;
> V - located within the influence area of undertakings or activities with significant environmental impact of regional or national scope.
> § 1 - In the case of carrying out undertakings or activities classified in item V of the caput, the technical and financial resources for the elaboration of the master plan will be included among the compensation measures adopted (Brazil, 2001, art. 41, item I)

According to Júnior & Montandon (2011), Master Plans, in general, do not express an integrated approach to environmental issues with other urban sector policies, which continue to be treated in a segmented and often conflicting manner, without effective mechanisms for coordination.

Maricato (2000) argues that for a sustainable Master Plan, its development needs to be guided by the principle of equity because discussions of municipal problems should result from political confrontation among various social actors. Thus, the city will cease to be a mere commodity, and existing natural resources will effectively be seen as finite.

Therefore, according to Santin & Corte (2012), societal participation is crucial in the development and applicability of the Master Plan. Sustainability will not be achieved if cities develop without protecting and managing water resources, as urban management instruments, notably land use and occupation, must prioritize environmental issues, including water resources.

Souza (2010) describes different perspectives on urban planning, highlighting the autonomous current of urban planning and management as the only one that promotes decision-making autonomously. For the author, other planning currents involve decision-making by a minority at the expense of the community. The autonomy proposed by Souza (2010) is based on the politicization radicalization of urban planning, where "[...] institutionalized separation between leaders and led [...] gives rise to the opportunity for the emergence of a public sphere endowed with vitality and animated by conscious, responsible, and participating citizens" (Souza, 2010, p. 175).

According to Villaça (1999), the increase in popular participation in the urban planning process has been achieved, albeit incipiently, through the struggle of social movements to leverage public opinion on the directions of the territories they inhabit.

Urban planning must guarantee the city's social function and, therefore, requires participation in its development, considering that it is the population and local authorities who know the local social, economic, and environmental problems, being able to identify and solve them more easily, compared to other units of the Federation (Oliveira & Pereira, 2015).

In turn, Mammadova (2017) emphasizes that integrated management between environmental, economic, and sociocultural factors commonly does not occur in planning instances, as these are typically addressed as separate systems, thus posing an obstacle to sustainable urban development. Integrated planning allows recognizing the city as a landscape that, although modified by humans, depends entirely on environmental factors for its maintenance and reproduction.

According to Maricato (2000), it is not due to lack of urban plans that Brazilian cities present serious problems, and it is not necessarily due to

the poor quality of these plans, but because their growth occurs outside the approved plans in Municipal Councils, which follow traditional interests of local politics and specific groups linked to the current government. According to Villaça (1999), the Master Plan:

> Would be a plan that, from a scientific diagnosis of the physical, social, economic, political, and administrative reality of the city, [...] would present a set of proposals for future socioeconomic development and future spatial organization of urban land uses, infrastructure networks, and fundamental elements of urban structure [...]" (Villaça, 1999, p. 238)

Based on a scientific diagnosis of the physical, social, economic, political, and administrative reality of the city, the municipality, and its region, the Municipal Master Plan would present a set of proposals for future socioeconomic development and spatial organization of urban land uses, infrastructure networks, and fundamental elements of urban structure, in the short, medium, and long terms, approved by municipal law (Villaça, 1999).

Despite the existence of territorial and sectoral planning tools, such as the Master Plan, it is up to the professionals responsible for Urban Planning to demonstrate to the managers the causes, consequences, and risks involved in its precarious implementation, as urban planning is directed towards meeting collective interests and environmental preservation and conservation (Cobalchini & Tabalipa, 2018).

Watershed Plans, on the other hand, elaborated and implemented under the responsibility of Basin Committees and Agencies, define strategies for water management at the regional level, in order to preserve, conserve, and promote improvements in water quality and quantity, according to the National Water Resources Policy (PNRH), established by Law No. 9,433, of January 8, 1997 (Brazil, 1997). Thus, Municipal Master Plans and Watershed Plans play an important role in seeking the security and quality of water resources in a region (Dyckman, 2018).

Legally, article 31 of Law No. 9,433/1997 informs that, in implementing the National Water Resources Policy, municipalities must promote the integration of local policies for basic sanitation, land use, occupation, and conservation, and the environment with federal and state water resources policies (Brazil, 1997).

According to Pizella (2015), Municipal Master Plans must integrate the guidelines present in Watershed Plans, identifying instruments of control and oversight, through which citizens and public administration can participate in their elaboration and ensure their effective implementation. The author emphasizes that Basin Committees must consider municipal land use planning and its influences on water resources in the watershed as a whole.

Corroborating the perspective of integration between water resources management and environmental management, Rodriguez, Silva & Leal (2011) accentuate that watershed planning has been changing conceptually, first with a focus on water management, then with a conception of the basin as the conjunction of environmental factors, and more recently with a vision of integrated environmental planning.

Lima (2001) reinforces that the identification of the basin as unifying the environmental processes and human interferences has led to the application of the watershed management concept, giving a new meaning to its scope.

There are few mechanisms that effectively enable an integrated policy between municipalities and the watersheds in which they are located, thus increasing the need to innovate in creating new instruments and local planning and management strategies that support the formulation and articulation of urban and regional policies (Rocco, Royer & Gonçalves, 2019). Municipal Master Plans need greater coordination with Watershed Plans since there would be greater possibilities to define the aptitudes and vulnerabilities to land uses in a watershed, and consequently, territorial management.

Despite the difficulties in managing territorial units with different scales, Peres and Silva (2013) and Justi and Rauen (2018) point out that, when developing the Master Plan, the watershed should be considered, and likewise, in the revision of Watershed Plans, there should be actions directed at municipalities. For the authors, municipal land use and zoning guidelines should incorporate environmental variables from water planning and other environmental factors. In the City Statute, moreover, the need for compatibility between such multi-scale planning is presented: "The content of the master plan must be compatible with the provisions contained in water resources plans, formulated in accordance with Law No. 9,433, of January 8, 1997" (Brazil, 2001, art. 42-A, paragraph 2).

In this context, the objective of this article was to investigate whether, in the review process and in the Law that established the Municipal Master Plan of São José do Rio Preto, a medium-sized municipality located in the state of São Paulo, there are environmental criteria regarding water preservation and conservation that converge with the Turvo Grande Watershed Plan (UGRH 15), in which the municipality is located. Additionally, it sought to identify whether members of the Basin Committee participated in the review of the Master Plan, either as participating entities or through the municipality's representatives in the watershed in question.

2. Metodology

An analysis of the content of the Rio Turvo Grande Watershed Plan (revised in 2015) and the Municipal Master Plan of São José do Rio Preto (revised in 2021) was conducted, aiming to identify possible synergies between them in the following criteria, according to Pizella (2019):

1. Municipal zoning, considering that the organization of the territory takes into account environmental aspects of water resources preservation and conservation by including, for example, zones of land use with different permeability coefficients;

2. Predominant and intended water uses, as both plans define water uses subject to authorization, and municipal water management directly impacts the watershed in which it is located;

3. Quantity and quality of water (surface and groundwater), due to the reasons previously addressed;

4. Collection and disposal of urban and rural solid waste, a theme present in Municipal Master Plans and Watershed Plans, which affect soil and water quality. Municipal management needs to adopt preventive actions, such as permanent waste collection, separation in selective collection, and installation of landfills for final disposal;

5. Urban drainage, as urban drainage systems affect water quality in the watershed;

6. Rural and urban erosions, since erosive processes in municipalities impact the quality and quantity of surface waters;

7. Urban afforestation, as vegetated areas help in water absorption in the soil and are therefore fundamental for maintaining water quality and quantity in the watershed;

8. Specially protected areas (Permanent Preservation Areas, Legal Reserves, Indigenous and Quilombola Lands, and Conservation Units) that, besides maintaining environmental quality in the municipality, aim to protect water resources;

9. Water losses in the municipality's supply system, which require intervention in municipalities for the conservation of water quantity in the watersheds;

10. Environmental Education actions, as a mechanism for raising awareness among the population for maintaining environmental quality in the municipality, including water resources.

To identify existing synergies between the plans in question in the proposed criteria, the minutes of the diagnostic and prognostic actions elaboration meetings that occurred during the revision of the Municipal Master Plan were observed, and the diagnoses and prognoses present in the Water Resources Plan regarding the previously defined criteria were analyzed.

After analyzing the content, the criteria were classified as follows: **synergy** between the plans, in situations where there was convergence between them; **partial** synergy between the plans, in cases where there was not total convergence of objectives in the analyzed criteria; and **absence** of synergy, in situations where the objectives of the criteria diverged.

Due to the importance of social participation during the elaboration of the Master Plan, its occurrence was verified, and an attempt was made to identify whether the municipality's representatives on the Basin Committee provided information about the Watershed Plan that supported the elaboration of the Master Plan.

The minutes of the public hearings were found, as well as the revised Master Plan, on the website of the municipality of São José do Rio Preto. The Watershed Plan is available on the website of the water resources information system of the state of São Paulo.

The analyses were triangulated with the literature on the subject.

2.1 Study Areas

2.1.1. Turvo Grande Watershed (UGRHI 15)

According to SIGRH (2020), the Water Resources Management Unit (UGRHI) 15 is located in the Northwest region of the state of São Paulo, with its Committee headquartered in the city of São José do Rio Preto (SIGRH, 2021).

The drainage area of UGRHI 15 is 15,925 km², with the main rivers and tributaries being: Turvo River, Grande River, São Domingos River, Onça Stream, Preto River, and Cachoeirinha River (SIGRH, 2021).

UGRHI 15 covers 75 municipalities, of which 43 are fully contained within the Basin and 21 are partially within this territorial scope. The population of UGRHI 15, according to SEADE (2019), is 1,310,660 inhabitants, of which 93.8% live in urban areas, while 6.2% live in rural areas. According

to CPTI (2012), the municipality with the largest urbanized area is São José do Rio Preto, which also houses 408,258 people, representing 33% of the total Basin population. Thus, about a third of the Basin's residents are concentrated in just one municipality. Among the 75 municipalities in the Basin, only 20 have Urban Development Master Plans.

UGRHI 15 does not have a Basin Agency (SIGRH, 2021).

According to SIGRH (2021), the main activities in UGRHI are in the primary sector, with emphasis on sugarcane cultivation, pasture for cattle breeding, and perennial crops such as orange, coffee, banana, grape, and rubber tree. In the secondary sector, the segments of industry and construction stand out. In the tertiary sector, commerce, services, and public administration activities are highlighted.

In UGRHI 15, there are 04 protected areas, divided into Full Protection Conservation Units (FPCU), namely: Paulo de Faria Ecological Station, Northwest São Paulo Ecological Station, and Grota de Mirassol Municipal Natural Park. As a Sustainable Use Conservation Unit, there is the Cavas II Private Natural Heritage Reserve (PNHR). This PNHR is located in Colina (UGRHI 12), but there is a territorial portion in UGRHI 15 (CBHTG, 2017).

In UGHRI 15, the surface water availability varies from Average Flow = 121 m3/s, to a minimum Flow (Q 7,10) = 26 m3/s, while the 95% Flow = 39 m3/s. The exploitable underground reserve is 13 m3/s (SIGRH, 2021).

2.1.2. São José do Rio Preto (SP) Municipality

The municipality of São José do Rio Preto is located in the northern part of the state of São Paulo, at coordinates 20º 49'11" south latitude and 49º 22'46" west longitude. The total area of the municipality is 431.30 km², with an urban area of 251.27 km² and a rural area of 180.03 km². It is bordered to the north by the municipalities of Ipiguá and Onda Verde, to the south by Cedral and Bady Bassitt, to the east by Guapiaçu, and to the west by Mirassol (São José do Rio Preto, 2020).

The hydrographic network consists of the Preto River, with its main tributaries being the Macaco, Lagoa or Onça, Canela, Borá, Piedade, Felicidade, São Pedro, Anta, and Talhado streams, along with two artificial lakes formed by the Preto River.

According to SEADE (2019), the São José do Rio Preto Administrative Region (AR) comprises 96 municipalities, which, in 2018, were home to 1,429,166 inhabitants, making it the fifth largest AR by population in the state.

3. Results and Discussion

3.1. The process of revising the municipal master plan of São José do Rio Preto and the participation of society.

The revision of the São José do Rio Preto Master Plan began in 2018, with a two-year delay, as Law No. 224/2006, which regulated the Sustainable Development Master Plan of São José do Rio Preto, was enacted in 2006. Therefore, its revision

should have taken place in 2016, as provided for in the Statute of Cities.

The elaboration of the São José do Rio Preto Master Plan was carried out by the Municipal Government, coordinated by the Municipal Secretariat of Strategic Planning, Science, Technology, and Innovation (Prefeitura de São José do Rio Preto, 2021).

The first step related to the revision of the Master Plan was the publication of Decrees No. 18,028 of April 26, 2018, and No. 18,080 of July 13, 2018, creating Working Groups for updating the Sustainable Development Master Plan (Prefeitura de São José do Rio Preto, 2021).

The Working Group was composed of the Public Authority, through Municipal Secretariats, and Civil Society, with the participation of various sectors, including the following institutions: Union of the Civil Construction Industry of the State of São Paulo; Council of Architecture and Urbanism of São José do Rio Preto; Association of Engineers, Architects, and Agronomists of São José do Rio Preto; Association of Professionals and Information Technology Companies; National Service for Commercial Learning; Commercial and Industrial Association of São José do Rio Preto; Brazilian Bar Association; Union of Entities Maintaining Higher Education Institutions in the State of São Paulo; Regional Council of Real Estate Brokerage Oversight; Regional Council of Engineering and Agronomy; Department of Highways and Roads; São Paulo State Industries Center; Brazilian Institute of Architects; and Municipal Council for the Defense of Historical, Artistic, Cultural, and Touristic Heritage. It is noticeable that there were no representatives from neighborhoods or social movements present in the municipality during the initial stages of the Master Plan's elaboration, where the definition of the topics to be discussed in its scope takes place, only members of the technical area. Not even the Municipal Councils were part of this important stage, except for the Municipal Council for the Defense of Historical, Artistic, Cultural, and Touristic Heritage.

The first stage of the Master Plan revision consisted of a series of lectures proposed by the Municipal Secretariat of Strategic Planning on various topics, such as (São José do Rio Preto City Hall, 2021): Cultural Development, Public Management Development, Environmental Development (Green--blue City, Solid Waste, and Sanitation), Economic Development, Human and Social Development, and Territorial Development (Urban Planning, Renewable Energy, Mobility, and Digital City).

The second stage of the Master Plan revision consisted of holding public hearings. To this end, the Planning Secretariat conducted a study and divided the municipality into 10 regions. Each region had a public hearing and could contribute to the elaboration of its diagnostic stage. To facilitate data collection and community aspirations, a "spoken map" was developed during the public hearings, where the population could express their aspirations for improvements in their living area. In parallel, a questionnaire was administered to those present (Prefeitura de São José do Rio Preto, 2021).

After the public hearings, the data from the questionnaires were grouped and presented by region and theme, making it easier to identify the demands and needs outlined in the diagnosis. It is worth noting that there were demands for the preservation of springs, recovery of permanent preservation areas, construction of linear parks, tree planting in neighborhoods, inhibition of irregular

solid waste disposal, among others (Prefeitura Municipal de São José do Rio Preto, 2021).

The third stage of the revision of the Master Plan occurred through meetings with the institutions of the Working Groups to discuss and elaborate the bill drafts. In these meetings, the inputs from the public hearings and the discussions of the representatives of the segments that composed the Working Group were taken into account.

The Basin Committee was not invited to join the Working Group, even though the Mayor of São José do Rio Preto acts as President of the Turvo Grande Committee. In terms of the participation of Basin Committee members, according to Peres and Silva (2013), it is worth noting that, although they are institutions with diverse attributions and capacities, their involvement in this process is of utmost importance, since water resources-related issues permeate various themes present in the Master Plan.

According to Pizella (2015), the Committees, in general, need to consider municipal land use planning and its influences on water resources in the watershed as a whole, which is why their participation was indispensable throughout the process, as the Committee is the body that has the best technical competence to contribute information about the mutual influences between the common themes of Basin Plans and Master Plans.

This reflection considers the role and importance of this governing body in the decision-making process, in a scenario where all actors should use their spaces to positively influence it, considering that the process of revising the Master Plan must be participatory. It is also pointed out that other institutions invited to participate in the revision of the Master Plan have seats on the Basin Committee, but what is observed is that the subject ends up not being debated and discussed outside the Committee Plenaries.

At the time of approval of the Master Plan, the Public Defender's Office of the State of São Paulo (2020) requested the cancellation of the public hearing that would approve it or not, due to the proposed format of the hearing (remote, due to the coronavirus pandemic), which would hinder public participation. Thus, the Public Defender's Office appealed to the São Paulo Court of Justice and obtained an injunction, suspending the proceedings of the public hearings in the Municipal Chamber, alleging the restriction of the public in the Chamber, due to social disparities in access to the internet.

The haste of the legislature to vote on the project would harm public participation, necessary for the validation of the Master Plan, affecting the power of choice and decision of the population. However, public hearings took place on December 18 and 19, 2020, with a restricted attendance of 30 members of civil society, in addition to Secretaries and Councilors, while other interested parties were able to participate virtually. Despite meeting the legal requirements enabling public participation, there was an evident detriment in this regard.

As a result of the Public Hearing in the Municipal Chamber and the process of revising the Master Plan of São José do Rio Preto, the bill drafts were approved by the councilors, with subsequent referral for the Mayor's sanction, in the early months of 2021.

3.2. Synergies and conflicts between the municipal master plan and the watershed management plan

3.2.1. Municipal zoning

Considering that the Master Plan was developed subsequent to the Watershed Plan, some similarities should be present in the former in terms of diagnoses and proposals.

According to the Municipal Zoning Law, urban land was divided into 14 Zones, with distinct permeability rates, without scientific criteria in their delimitation.

For the land use planning, the following zones were defined:

I – Environmental Protection and Control Macrozone;
II – Consolidated Urban Macrozone;
III – Urban Expansion Macrozone;
IV – Occupation Restriction Macrozone; and
V – Controlled Occupation Macrozone.

In terms of water protection and conservation, emphasis was placed on the Environmental Protection and Control and Controlled Occupation Macrozones, which had the following objectives:

> The Environmental Protection and Control Macrozone aims to protect water sources, as well as to facilitate the retention and infiltration of rainwater, controlling urban occupation of environmental areas or areas distant from installed infrastructure, in order to regulate the city's horizontal expansion and encourage sustainable tourism (Prefeitura Municipal de São José do Rio Preto, 2021, art. 10, §1º).

> The Controlled Occupation Macrozone comprises the area of the Moraes stream basin and the surroundings of the Northwest São Paulo State Forest. The objective of the Controlled Occupation Macrozone is to guide the region's growth by: I – Providing a high soil permeability rate, low occupancy rate, and encouraging occupancy (Prefeitura Municipal de São José do Rio Preto, 2021, art. 16).

Municipal Preservation Areas (MPA) and Permanent Preservation Areas were established, with the extension of the riparian buffers along rivers defined as greater than that set by the Law on Protection of Native Vegetation (or the new Federal Forest Code of 2012). Guidelines were also presented for the establishment of Municipal Green Areas Systems and Conservation Units, including Linear Parks and Ecological Corridors (Prefeitura Municipal de São José do Rio Preto, 2021).

Rural areas were addressed indicating the elaboration of the Municipal Rural Development Plan, which should be guided by the maintenance of rural roads and soil conservation, avoiding erosion and stream siltation. As a source of resources, Payment for Environmental Services, present in the State government's Water Producer Program, was mentioned (Prefeitura Municipal de São José do Rio Preto, 2021).

Observing the Watershed Plan (CBHTG, 2017) and the environmental zoning proposed in the Master Plan, **there was partial synergy** between the analyzed Plans, as the Watershed Plan only presents the elaboration of a zoning map of the natural susceptibility of the relief units of the Basin to support soil conservation actions, with no actions for its use in the municipalities of the basin.

3.2.2. Predominant and Intended Uses of Water and Potential Conflicts

Analyzing the Watershed Plan CBHTG (2017), it was possible to characterize the demands for surface and groundwater resources. Knowledge of water demand is fundamental for water resources management, as it reflects direct pressure on water availability, potentially highlighting critical or conflict situations.

The largest number of permits issued by DAEE was granted for irrigation use (31.16% of the total); following this, there is sanitary use (19.06% of the total), public water supply (17.06%), alternative solutions for private supply (8.06%), and industrial use (7.56%). The remaining uses represent less than 5% each of the total number of permits. The municipality of São José do Rio Preto has the highest numbers of permits for both consumptive and non-consumptive use in the Basin (CBHTG, 2017).

Regarding the Master Plan, there is mention of the topic in item II, referring to uses for water supply, sewage collection, and treatment: "management of water resources for public supply must necessarily consider plans and actions aimed at reducing consumption, reducing losses, and implementing effluent collection and treatment systems" (São José do Rio Preto, 2021, article 64, item I).

In this sense, it is important to note that the municipality's authority has 344 wells from the Bauru aquifer and 9 from the Guarani aquifer in operation. In relation to surface withdrawals, the volume treated and made available to the population in 2020 was 9,795,247 m3, while for groundwater withdrawals in 2020, the volume withdrawn and made available to the population was 39,903,214 m3. Currently, surface withdrawals from Lakes 1 and 3 of the municipal reservoir of São José do Rio Preto are responsible for approximately 25% of the water supplied to the municipality. The remaining 75% comes from both the Guarani aquifer (approximately 25%) and the Bauru aquifer (50% of the total).

São José do Rio Preto has a Water Treatment Plant (WTP) in the municipality, and all sludge and by-products from the process are sent to the Wastewater Treatment Plant (WWTP).

In the Municipal Master Plan, there is no emphasis on other predominant or intended uses of water beyond public supply (São José do Rio Preto, 2021).

The Watershed Plan and the Master Plan only show compatibility regarding the main use of water, which is public supply. There was, therefore, **partial synergy** between the plans.

3.2.3. Quantity and Quality of Water Resources (Surface and Groundwater)

According to the Watershed Plan CBHTG (2017), concerning the availability of surface water, São José do Rio Preto, holding the lowest values in the Basin, showed decreasing values during the period, with an upward peak only in 2010 for surface waters. In terms of groundwater availability, besides also presenting the lowest values in the Basin, it experienced a decrease during the analyzed period, with decreasing values in the first three years of its historical series, followed by a continuous reduction from 2010 to the year 2015.

Regarding the quality of surface waters, according to the annual average of the Water Quality Index (WQI), point PRET 04300 stands out, showing a worsening trend, located downstream of the municipality's Sewage Treatment Plant. At the Annex F of the Watershed Plan CBHTG (2017), there is a forecast for an expansion and adequacy of the sewage treatment system in the municipality.

On the other hand, the analysis of groundwater quality considered the high concentration of nitrate, an indicator of potability, which can cause damage to aquatic life and various use restrictions. In general, the results obtained show that the "Potable" class fluctuated over the considered period (2007 to 2015), representing the majority of samples in all years, corresponding to 73.53% of the total. However, despite these results, improvements in the captured water treatment system are necessary (CBHTG, 2017).

In the Master Plan, there is as a principle, in the territorial planning present in its article 7, item III "Control, conserve, and recover the water quality of the municipality's basins". Item IV presents "Use natural resources rationally, especially water and soil, aiming to ensure a sustainable municipality for present and future generations." Thus, superficially, the Master Plan pays attention to the quality and availability of water in the municipality (São José do Rio Preto, 2021).

There was, in this theme, **synergy** of objectives present in the Watershed Plans and the Municipal Master Plan, as both seek to improve water quality.

3.2.4. Collection and Disposal of Urban and Rural Solid Waste

According to the Watershed Plan CBHTG (2017), sub-basin data shows São José do Rio Preto and Mirassol with the best rates of household waste collection, with little fluctuation in the analyzed historical series (2010 to 2015), reaching maximum values in the last three years of the period. São José do Rio Preto has the highest values for household solid waste generation, with a similar behavior in the analyzed historical series (2011 to 2015).

In 2013, there was a significant increase in the amount of urban solid waste sent to the municipal landfill. It is noted that, after the increase in 2013, the estimated portion of urban solid waste generated and sent for treatment and/or disposal in the landfill remained constant (CBHTG, 2017).

The Master Plan brings guidelines and general objectives regarding the Solid Waste Management Policy, addressing the intensification of the surveillance system for irregular disposal; monitoring and control of the closure of the old landfill; implementation of the Management Plan for large generators; incentive and expansion of selective collection; development of programs with waste generation reduction goals; integration between industry and distributors aiming at reverse logistics, and development of studies for the implementation of new technologies (São José do Rio Preto, 2021).

Both Plans do not address the collection and disposal of rural waste. Thus, there was **synergy** between the analyzed Plans, which covered only the urban área.

3.2.5. Urban Drainage

According to the Master Plan (São José do Rio Preto, 2021), in article 64, subsection II - Urban Water Cycle Management Policy, in its item V, measures are established for preventive and corrective actions to balance the urban drainage system. Item VI of this article adresses the maintenance of permeable areas in urban drainage basins, and item VII brings the implementation of urban parks in strategic locations for urban macro-drainage, with the provision of large permeable areas and water retention reservoirs, aiming to reduce the impacts promoted by surface drainage water.

According to the Watershed Plan CBHTG (2017), the parameter related to urban drainage infrastructure, in the study phase, does not have an official data source. Therefore, due to the lack of systematized information, the evaluation of possible future actions was proposed. For the prognosis, a survey of drainage and macro-drainage projects in urban and rural areas subsidized by the State Water Resources Fund (FEHIDRO) was carried out.

In UGRHI 15, eight types of projects were identified that fit into drainage/macro-drainage plans and works, namely: Macro-Drainage Master Plan; Urban Macro-Drainage Master Plan; and Macro-Drainage Master Plan in rural areas in the municipalities of: Jales, Cajobi, Monte Azul Paulista, Álvares Florence, Meridiano, Santa Adélia, Uchoâ, and Onda Verde. Of the eight projects, six are completed, one is in the execution phase, and one has not yet started.

Thus, considering the lack of information on urban drainage in the Watershed Plan regarding the municipality of São José do Rio Preto, **there was no synergy** between the analyzed Plans because the Watershed Plan does not present actions related to drainage infrastructure in the municipality.

3.2.6. Erosion Control in Rural and Urban Areas

Regarding erosion, according to the Master Plan (São José do Rio Preto, 2021), in article 64, item VIII, there is a need for regulations on the execution and maintenance of earthworks and rural roads to prevent siltation and erosion in drainage channels. In article 72, item II b, the importance of erosion control and environmental damage on roads and rural properties is mentioned.

Analyzing the occurrence of erosion in rural areas, it is observed that the Cascavel/Cã-Cã, Ribeirão do Marinheiro, and Rio Preto sub-basins have the highest number of erosion events, with 164, 81, and 55 events respectively. Analyzing the occurrence of erosion in urban areas, among the sub-basins with the highest number, the following stand out: Rio São Domingos, with 41 records; Rio Preto, with 40 records; Ribeirão do Marinheiro, with 22 records; and Cascavel/Cã-Cã and Alto Turvo, with 17 events each (CBHTG, 2017).

According to the Watershed Plan CBHTG (2017), among the actions listed in the Prognosis, there is the planned georeferenced survey of urban erosions; development of a project providing guidance for non-structural actions to combat urban and rural erosion; preparation of a georeferenced map of vulnerability and erosion risks on local road networks; and recovery of urban and rural erosions.

Thus, **there was synergy** between the analyzed Plans in terms of common objectives for controlling rural and urban erosions.

3.2.7. Urban Afforestation

The Watershed Plan does not address guidelines for urban afforestation in UGRHI 15, while the Municipal Master Plan superficially mentions that the Afforestation Plan should maintain articulation, interaction, and integration with the guidelines of the Master Plan. However, afforestation influences the quality and quantity of water in the Basin.

Thus, **there was no synergy** between the analyzed Plans.

3.2.8. Areas Specially Protected (Permanent Preservation Areas, Legal Reserves, Indigenous and Quilombola Lands, and Conservation Units)

According to the Watershed Plan CBHTG (2017), in the UGRHI 15 area, there are four Conservation Units: two Ecological Stations - Paulo de Faria Ecological Station and Noroeste Paulista Ecological Station, both created by the State sphere in 1981 and 1999, respectively; a Municipal Park (Grota de Mirassol Municipal Natural Park), created in 2001, and a state Biological Reserve (Pindorama Biological Reserve), created in 1986.

The Paulo de Faria Ecological Station is located in the Bonito/Patos/Mandioca sub-basin, in the municipality of Paulo de Faria, while the Noroeste Paulista Ecological Station covers areas of the municipalities of Mirassol and São José do Rio Preto, falling within the Rio Preto sub-basin. At the outer limit of the Rio Preto sub-basin, in the municipality of Mirassol, is the Grota de Mirassol Municipal Natural Park. Finally, the Pindorama Biological Reserve, located in the city of Pindorama, is situated in the Rio São Domingos sub-basin.

According to the Watershed Plan CBHTG (2017), studies and selection of areas for the implementation of Conservation Units in the UGRHI are planned, as well as registration of existing nurseries and identification of needs for the implementation of others for native seedling production (creation of a seedling bank) aimed at the recovery of degraded areas, reforestation, and preservation areas. There is also a program for the recovery of riparian forests in the springs of the Rio Preto.

The Watershed Plan does not mention Permanent Preservation Areas, Legal Reserves, Indigenous Lands, and Quilombola Lands, with the latter two being nonexistent in the Basin.

The Municipal Master Plan highlights the protection of the Municipality's Conservation Units, classifying them as Areas of Special Environmental Interest, in addition to defining Permanent Preservation Areas with wider border strips than those established in the Federal Forestry Code of 2012, creating Municipal Preservation Areas. Thus, the Master Plan focuses more on the protection of these areas than the Watershed Plan.

Therefore, there was **partial synergy** between the analyzed Plans, considering that both have mechanisms for the protection and conservation of existing Conservation Units, such as the need for their expansion, and establish programs for the recovery of springs and riparian forests; however, the Watershed Plan does not address Permanent Preservation Areas and Legal Reserves.

3.2.9. Water Losses in the Municipality's Supply System

Regarding water losses, the Master Plan addresses them through article 64, item II, mentioning that "The management of water resources for public supply must necessarily consider plans and actions aimed at reducing consumption, reducing losses, and implementing a system for collecting and treating effluents" (São José do Rio Preto, 2021, article 64, item II).

In the Watershed Plan (CBHTG, 2017), the loss index of the water distribution system is the estimated percentage of losses from the public water supply system and is also strongly linked to the quality and availability of water resources. Considering only the year 2015 regarding the classification of municipalities in the established reference values, São José do Rio Preto is classified as Regular, with a water distribution system loss index of 31.89%. There is a need to develop actions to combat losses in municipal public supply systems.

Thus, there was synergy between the analyzed Plans.

3.2.10. Actions on Environmental Education

Environmental education is highlighted in the Master Plan in Subsection IX, "Environmental Education," establishing that the Municipal Environmental Education Policy may be revised if necessary, according to the provisions of the Master Plan. It should be present in the different actions proposed by the Municipal Environmental Policy, considering the cross-cutting nature of the theme and must meet the guidelines and objectives proposed in the Master Plan (São José do Rio Preto, 2021).

In the Watershed Plan, in its prognosis, in the intervention proposals for Water Resources Management in UGRHI-15, Theme 9 - Dissemination of information and environmental education focusing on water resources, based on the Diagnosis and Prognosis, it is suggested: Prioritize the actions of the Environmental Education and Social Mobilization Plan focusing on water resources; Promote technical events and dissemination; and Finance projects to disseminate knowledge relevant to UGRHI 15 (CBHTG, 2017).

Thus, it can be inferred that **there was synergy** between the analyzed Plans, since the Master Plan addresses Environmental Education broadly, not only concerning water resources, in which both Plans foresee effective Environmental Education actions.

3.3. Reflections on the synergies identified between the plans on water management

After analyzing the Watershed Plan and the Master Plan, it was possible to evaluate the synergies highlighted between the plans.

In this sense, it is noteworthy that the criteria showing convergence of common objectives and/or prognoses were "*Quantity and quality of water*," "*Collection and disposal of urban and rural solid waste*", "*Rural and urban erosions*," "*Water losses in the municipality's supply system*," and "*Environmental education actions*," encompassing 50% of the topics selected for study.

Regarding points with partial synergies, where the plans do not clearly establish the identification of common problems and the proposition of shared

actions, "*Environmental Zoning*," "*Preponderant and intended uses of water and potential conflicts*," and "*Specially protected areas*" stood out, covering 30% of the analyzed topics.

The absence of synergies between the plans occurred in the following criteria: "*Urban Drainage*" and "*Urban Afforestation*," accounting for only 20% of the analyzed topics.

From this analysis, it is observed that the majority of the criteria showed some degree of convergence between the plans. Considering that, according to the minutes observed, there were no mentions of the UGRHI Resource Plan in the revision of the Master Plan, it can be inferred that the identified synergies did not occur to meet the guidelines of the Watershed Plan, but rather due to the need to include environmental aspects in the Master Plan, as provided for in the City Statute. The disarticulations found indicate a lack of analysis of the recommendations of the Watershed Plan, as verified.

The article did not aim to ascertain whether the measures presented in the Master Plan have the potential for implementation in the municipality or whether the planning carried out fulfills administrative formalities. The importance of the article lies in analyzing plans that have intentions to conserve water resources and whether they have common guidelines in this regard.

Literature analysis indicates that the Master Plan, a central instrument of urban management, is poised to effectively contribute to the protection of water resources by recognizing that the development and growth of cities must preserve all resources necessary for life and include mechanisms that enable the control of land use and occupation (Peres & Silva, 2013; Rocco, Royer & Gonçalves, 2019).

According to Yu, Malecha, and Bercke (2021), the socio-environmental vulnerabilities of a locality reflect the interaction among various planning systems over the territory, as they guide development policies. Thus, there is a need for integration between the objectives and instruments of plans to avoid conflicts and mitigate potential socio-environmental impacts. The authors emphasize the importance of collaborative planning systems.

Mostert (2006) reports that the implementation of plans is the challenge of integrated water resources management. Water is related to the evolution of society, and its priorities vary from place to place, making it impossible to evaluate independently of its context. Additionally, there is difficulty in considering all aspects and functions of water, given the complexity of its context. Therefore, the analysis of Municipal Master Plans demonstrates that the issue of water resources management is placed marginally within the environmental theme, as some plans show less development of environmental themes, such as water resources.

According to Carneiro, Cardoso & Azevedo (2008), there is a difficulty in executing public policies and legislation defined by municipalities, partly due to the lack of enforcement structure and the absence of instruments to incentivize space regularization. In summary, what is observed is an inefficient legal system, lacking urban planning consistency, and therefore unable to control the main urban problems, such as those that cause damage to water systems.

In this regard, Peres & Silva (2013) propose the need for articulation between Municipal Master Plans and Watershed Basin Plans, enabling the definition of watershed aptitudes and, consequently, territorial management guidance. In addition, muni-

cipal planning bodies should coordinate with Basin Committees. Even though they are institutions with diverse attributions and capacities, it is possible to seek participation mechanisms and more integrated policies.

According to Peres (2012), the actions included in Basin Plans related to municipalities are generic and are not articulated with the actions proposed by their respective Master Plans. The few actions that exist end up prioritizing some better-known sectoral themes: green area recovery, sewage treatment, proper solid waste disposal, and protection and conservation of water resources, which are the same as those presented in the Master Plan under analysis.

There are no specific guidelines or actions aimed at attempting to reverse inappropriate land use and occupation processes that occur in municipal territories and affect the basin as a whole.

However, according to Peres & Silva (2013), Municipal Master Plans and Watershed Basin Plans are instruments with great potential for integration, with challenges primarily lying in the political realm. For these Plans to effectively achieve their objectives, the concept of planning must be seen as a dynamic process in which constant political-institutional negotiations constitute strategies for their implementation, monitoring, and revision.

According to Nijhum et al. (2021), Municipal Master Plans should consider environmental aspects, such as ecosystem services, in their development. Therefore, the implementation of Strategic Environmental Assessment is necessary in Brazil, as it aims to evaluate the potential environmental impacts of Policies, Plans, and Programs. Thus, integration between the objectives, diagnostics, and prognoses of Plans that affect the same territory needs to present synergies to avoid impacts on environmental assets.

Plans alone do not solve regional or municipal problems. They fundamentally depend on political participation from society, considering citizenship practice and the construction of a social pact (Rocco, Royer & Gonçalves, 2019).

The Master Plan, as a participatory planning instrument, should guarantee the community's right to act in all phases of its creation process through information and consultation mechanisms. According to Saule-Júnior (1997), the right to information requires the Public Authority to provide information on all acts related to the Master Plan's elaboration process, such as providing preliminary proposals of the Plan and publishing the draft bill of the Plan.

However, according to Machado (2013), effective and material participation of society should also be guaranteed through other mechanisms that value the particular histories of each locality and the diverse contributions of the involved populations, incorporating them into Master Plans and basin plans. It is not just about presenting to the population a basin plan elaborated within the closed work environment of the Public Authority's technical-scientific body to validate it, but ensuring the effective participation of the local population in the consolidation and materialization of a social pact, effectively implementing joint and integrated management with socio-technical negotiation of public policies.

In this sense, the empirical basis of local population knowledge about water bodies in a watershed must be consolidated, as it holds invaluable socio-environmental value. Additionally, watercourses are part of a population's history, gaining symbolic

meanings that occupy an important part of their cultural heritage (Machado & Cardoso, 2000).

The water resources management model traditionally adopted in Brazil throughout the 20th century has delayed society's participation and position. Besides its centralizing aspect, the "[...] environmental problems involving water were not being socially perceived as an environmental issue" (Lima, 2001, p. 1142).

Despite the factors mentioned, the existing power asymmetries in the municipality, as well as in other administrative spheres, must be considered. In the city, however, this aspect is more visible through the socio-spatial segregation of urban space, which prevents equal access of all citizens to urban goods and facilities. The lack of effective social participation occurs due to the adoption of a positivist and authoritarian urban planning model, prior to the democratizing Urban Reform, which, in theory, materialized in the City Statute. According to Antonello (2013):

> The essence of logical positivism in the master plans produced during this period in the country perfectly matches the interests of the authoritarian government, particularly with the neutrality that the scientific discourse was clothed in, since the neopositivist principles of a neutral science, based on mathematical logic, would provide scientists (planners, technicians, architects, geographers, among others) with an activity devoid of interference from prejudices and value judgments. Thus, urban problems would only become the focus of action if they were measurable" (Antonello, 2013, p. 243).

According to Silva & Silva (2014), another factor hindering Plan synergies lies in the discontinuity of public administration due to governmental changes that affect the water resources management entity, compromising institutional strengthening and causing interruptions in Plans and water management actions.

Silva & Silva (2014) point out that at the municipal level, there is limited institutional capacity in managing land use and planning, contributing to environmental degradation. Therefore, for the consolidation of integrated and participatory water resources management aligned with local sustainable development and improving society's quality of life, strengthening water infrastructure is necessary. This requires continuous financial investments for the execution of Plans and projects by the public administration, as well as expanding society's decision-making space.

The scientific community already possesses a considerable volume of knowledge about the hydrological cycle and water degradation processes. However, the impact of human actions, institutional and technical difficulties regarding water management in qualitative and quantitative terms require more scientific studies. As Tundisi & Matsumura-Tundisi (2003, p. 206) state;

> The solution to water problems lies, on one hand, in the necessary technological advances (scientific and engineering solutions), and on the other hand, in political, managerial, and institutional organizational advances at the level of river basins, municipal consortia, interstate and international basins (Tundisi & Matsumura-Tundisi, 2003, p. 206).

Although conceptually diverse and for many utopian as a current goal, the paradigm of environmental sustainability helps societies to seek continuous advancements in the rationalization of

urban and non-urban space use and occupation, as well as in the less degrading appropriation of natural resources (Castro, Alvarenga & Magalhães Júnior, 2005).

The disorderly growth of the urban environment compromises the natural resources necessary for life, violating citizens' rights and their dignity. The use and neglect of water bodies result in unsustainable and environmentally unbalanced cities, violating constitutional precepts and legislation regulating the matter, turning natural resources, which are already limited, into scarce and even nonexistent in the future. Thus, the necessary relationship between urban planning and water management through the Master Plan becomes evident (Santin & Corte, 2012).

Integrated management at the regional and municipal levels requires common planning objectives and actions (Pizella, 2015). To this end, Watershed Committees can be the link between the basin territory and the municipality, as Municipal Public Authorities have representatives on the Committees.

In the case under study and as previously observed, it was found that the municipality's representatives on the Committee did not participate as such in the revision process of the Rio Preto Municipal Master Plan, a fact that may have occurred due to the Committee not being included as a participating body in its elaboration. In view of integrated water management, as advocated in the National Water Resources Policy, some mechanism of inclusion of Basin Committees in municipal territorial planning systems would be necessary to effectively establish common commitments among the municipalities that make up the basins and to avoid potential conflicts arising from this non-observance.

Notwithstanding the factors addressed, it is considered essential to apply the Strategic Environmental Assessment tool in sectoral and territorial planning as an environmental policy instrument, in order to articulate planning systems from their conception to the stage of monitoring the guidelines. With this instrument, the topics related to the various Plans are better articulated, in addition to incorporating the socio-environmental dimension into the objective of any planning. Thus, there would be synergy between the criteria addressed in this article in both Plans.

4. Conclusion

Municipal Master Plans need to be integrated with Watershed Plans, as through this, it is possible to identify the capabilities of a watershed, thus directing territorial management. It is important to highlight that municipal planning must be directly linked to the participation of Basin Committees since, despite the different geographic scales, actions taken in the municipal territory affect water resources at the regional level, and vice versa.

Territorial governance can result in an important tool when the main challenges include the need for articulation and integration of public policies. For effective water resources management, it is necessary for planning systems at multiple scales to be aligned, requiring dialogue among the actors involved to guide common public policies, ensuring democratic participation of society in discussions related to water use.

It is concluded that, through the analysis of the UGRHI 15 Basin Plan and the São José do Rio Preto Master Plan, shared and integrated manage-

ment did not occur systematically due to various factors, such as: municipal representatives on the Committee did not act systematically in both spheres (regional and municipal), so that the objectives, diagnosis, and prognosis present in the Basin Plan were not intentionally reflected in the Municipal Master Plan, even though several common criteria showed synergies between the Plans. Through the analysis of the Master Plan review process, there was no consultation of the Basin Plan to guide it in the water aspect. Such lack of coordination between Plans is a practice in Brazil that needs to be rethought by public managers and interested society.

Thus, to ensure synergy between Plans, it is essential to have actions and movements that stimulate Municipal Master Plans to connect with Basin Plans, such as the use of Strategic Environmental Assessment in planning. In addition, criteria for prioritization for obtaining resources from the State Water Resources Fund (FEHIDRO) could be discussed within Basin Committees, where municipalities that need to develop and revise Master Plans and adopt integrated management would receive higher scores than others, encouraging it.

The analysis of the São José do Rio Preto Master Plan review process showed low participation from society, which does not align with the City Statute. Among the participants, groups representing civil society were not part of the scope of the Plan, at a time when the topics that will be discussed about the city to be collectively built are defined. A serious issue arose at the time of Plan approval, where few people had the opportunity to participate, restricting the right to citizenship, which is realized through the active participation of individuals who have in the city the reproduction of their lives and aspirations.

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