

Implementation of sanitation in rural areas: from planning to practice - a case study in Campinas (SP), Brazil

ABSTRACT

The provision of adequate sanitation services and their sustainable universalization are fundamental requirements for the protection of public health and the maintenance of basic living conditions. This paper aim to discuss the topic and indicate the challenges and potentialities of the process of formulating and implementing sanitation actions in rural areas. Interviews were conducted with managers of the City Town of Campinas (PMC) and their considerations were compared with what is found in the literature, in addition to the use of the Collective Subject Discourse method. There was identified that in the formulation of PMSBs is important to obtain quality information and that planning is carried out in accordance with other public management methods. Regarding implementation, the need for financial sources, consolidation of project management, and monitoring indicators is highlighted. Therefore, it was concluded that efforts are necessary to make basic sanitation a reality in rural areas, but it is possible to change the current scenario focusing on the right elements.

KEYWORDS: Implementation. Plan. PMSB. Potentiality. Rural.

Marcelle Maria Gois Lima
Universidade Estadual de
Campinas, Campinas, São Paulo,
Brasil
marcelleglima@hotmail.com

**Mariana Rodrigues Ribeiro dos
Santos**
Universidade Estadual de Campinas
(Unicamp), Campinas, São Paulo,
Brasil
mariana@fec.unicamp.br

Introduction

In the world, eight out of ten people who have no access to water supply services for basic human consumption live in rural areas (WHO, 2019). Furthermore, in rural areas, there is 91% defecating in rural areas (WBG, 2021) and seven out of ten people who have no sewage services yet live in rural areas (WHO, 2019). Thus, it is essential for the universalization of sanitation that rural areas are included in public sanitation policies and that their actions are carried out.

In Brazil, the attention of the Public Authority has been—throughout history—focused on the demands of more urbanized and economically viable areas (FUNASA, 2019). The Brazilian public policy on basic sanitation is composed of a series of devices that must determine the direction of State actions. Among them are plans, programs, and projects (MAXIMIANO, 2008; BUCCI, 2006; FERREIRA, 2010; GALVÃO JR, MELO and MONTEIRO, 2013, OLIVEIRA, 2021).

The National Basic Sanitation Policy (Política Nacional de Saneamento Básico – PNSB), Law No. 14,026 of 2020, determines that basic sanitation is composed of: water supply, sanitary sewage, solid waste management, and rainwater drainage. Furthermore, the Municipal Basic Sanitation Plan (Plano Municipal de Saneamento Básico – PMSB) must be approved by the holders' acts, that is, each municipality—supported by the state—must establish its PMSB. Moreover, PMSBs must comprise both urban and rural areas, with solutions compatible with the local reality (BRASIL, 2020).

Unfortunately, a significant portion of municipalities do not have PMSB in Brazil. In 2017, only 41.5% of the 5,570 Brazilian municipalities had their plan prepared, according to the National Survey of Basic Sanitation (IBGE, 2018). Most existing plans are formulated without mentioning rural sanitation or a more detailed approach to how sanitation must be conducted in these locations (ABES-SP, 2018). Many of the plans that address rural area do so in a general way (SANTOS and SANTOS, 2019, DE ALMEIDA 2022).

Some guidelines have already been published to assist the process of preparing PMSBs (BRASIL, 2010; BRASIL, 2011; FUNASA, 2012). In all these documents, the importance of providing adequate service to rural areas is highlighted; however, there is still a need to address Brazilian rural sanitation with greater specificity (FERREIRA et al., 2019, ROLAND ET AL., 2019), considering the several existing “ruralities” (ROLAND ET AL., 2019 and TONETTI ET AL., 2018).

Therefore, we can observe that the basic instrument that should guide the process of implementing basic sanitation actions in rural areas—the PMSB—can be potentially improved. In addition, we should mention the fact that basic sanitation is supported by three main aspects: management, technology, and community participation (FUNASA, 2019). Without the first one duly consolidated by public policy, the other two cannot change the reality of rural sanitation alone.

Thus, in this study we aim to discuss the topic and indicate the barriers and possibilities of the process of formulating and implementing sanitation actions in rural areas.

Materials and methods

This study is essentially a qualitative research. According to Appolinário (2006), qualitative research involves observation techniques, interviews, discussions with local groups, use of resource—such as photographs and films—among others. This study involves conducting interviews with the civil servants of the City Council of Campinas, responsible for the formulation of the PMSB and its implementation in rural areas—which will be called “managers” throughout the article. In short, seven managers were interviewed: five from the Department for Green and Sustainable Development (Secretaria do Verde e Desenvolvimento Sustentável – SVDS) – responsible for sanitary sewage; one from the Department of Infrastructure (Secretaria de Infraestrutura – SEINFRA) – responsible for drainage; and one from the Department of Urban Cleaning (Departamento de Limpeza Urbana – DLU) – responsible for solid waste.

The qualitative analysis of the interviews was performed using the methodological procedure Collective Subject Discourse (CSD), developed by Lefevre and Lefevre (2014). CSD is a method of Social Representation that seeks to preserve the individual dimension together with the collective dimension. To this end, individual opinions with similar meanings are grouped into general semantic categories (LEFEVRE and LEFEVRE, 2014). Therefore, the CSD was used to unite the interviewees’ similar opinions. Moreover, dissonant points of view were compared, in addition to the scientific literature on the subject.

Thus, this research uses the case study as a tool, having the municipality of Campinas (state of São Paulo [SP], Brazil) as its object and aiming at identifying and discussing the proposed topic, in such a way that this reflection can stimulate good practices in other locations as well as encourage the search for the solution of the identified challenges.

Results and discussion

In this section we will explain how the municipality of Campinas developed actions aimed at its rural areas and how the implementation of these actions occurred. We expect that, by sharing this experience, the discussion on the topic will be expanded and the described good practices can be replicated.

Campinas (SP) and basic sanitation

The municipality of Campinas, located in the state of São Paulo and the main city in the Metropolitan Area of Campinas, is 98 km from the state capital and has an area of 801 km² (PREFEITURA DE CAMPINAS, 2020a). According to the City Council of Campinas (Prefeitura Municipal de Campinas – PMC), 407.5 km² out of the 796.4 km² of the municipality of Campinas correspond to rural areas (PREFEITURA DE CAMPINAS, 2020f). Regarding the number of households, in 2010, 342,935 were urban and 5,251 were rural (IBGE, 2020a). Thus, despite most of the population of Campinas dwelling in urban areas—as indicated by the degree of urbanization—a significant number of households are located in rural areas.

Basic sanitation in Campinas is above the Brazilian average, currently classified in the 24th place according to the annual sanitation ranking of Trata Brasil Institute (TRATA BRASIL, 2022); however, the characterization of rural sanitation in the municipality is still incipient. Product 2 of the PMSB—diagnosis—

, for example, presents data related only to urban areas (PREFEITURA DE CAMPINAS, 2013), which makes it difficult to specify its situation regarding the rural areas. Note that, the Municipal Master Plan of Campinas also establishes that rural sanitation must be included in its PMSB (PREFEITURA DE CAMPINAS, 2018).

Recently, the PMC released a follow-up report on the actions provided for in the PMSB (PREFEITURA DE CAMPINAS, 2020b). In this report, most of the basic sanitation indicators mentioned only address urban areas, and the only indicator for rural areas of the municipality is the service of solid waste collection from rural households: 50% which remained constant from 2012 to 2019 (PREFEITURA DE CAMPINAS, 2020b).

The inclusion of rural areas in PMSBs

The Campinas PMSB was prepared by civil servants from different departments of the City Council and the Water Supply and Sanitation Society (SANASA), under the coordination of SVDS—more specifically, the Department of Green and Sustainable Development (Departamento do Verde e do Desenvolvimento Sustentável – DVDS) (PREFEITURA DE CAMPINAS, 2013).

The Plan was designed in line with the Municipal Environmental Policy and with the following plans: Water Resources Municipal Plan, Green Municipal Plan, Management Plan of the Environmental Protection Area of Campinas, and Environmental Education Municipal Plan.

Moreover, the plan includes the Sustainable Rural Sanitation Program, which “aims to serve the rural population, with regard to basic sanitation, protection, and recovery of environmental resources” (free translation; PREFEITURA DE CAMPINAS, 2013). The program is mainly aimed at the adequacy of sanitary sewage and soil drainage/conservation (PREFEITURA DE CAMPINAS, 2013).

A caveat should be added: the Federal Law No. 11,445/2007, updated by Law No. 14,026/2020, refers to basic sanitation specifically involving urban drainage, which is why, initially, we considered not to address drainage in this research (BRASIL, 2007). Nevertheless, the Rural Brazil Sanitation Program (FUNASA, 2019) alludes to drainage in rural areas. The Sustainable Rural Sanitation Program determines some techniques with the purpose of “encouraging good agricultural practices to optimize the management of soil and water” (free translation; PREFEITURA DE CAMPINAS, 2013). Therefore, we consider drainage as one of the elements that compose rural sanitation.

It is noteworthy that, according to the World Health Organization, the basic provision of healthcare services is directly linked to these three aspects: water, sanitation, and hygiene (WASH) (WHO, 2024); hence, the international concept of sanitation slightly differs from the Brazilian.

As explained in Federal Law No. 12.206/2020 (Art. 9), in Brazil, it is up to the holder of public services to carry out the planning activity (BRASIL, 2020b). Thus, we understand that, although the municipality may have assistance from third parties, the formulation of its PMSB cannot be delegated. However, it is noteworthy that the municipality may have the support from other agencies and institutions in the process of preparing PMSBs. For instance, we can mention 50 PMSBs in the state of Ceará, prepared by an agreement between: the state

regulatory agency for basic sanitation, the secretariat of cities and the association of municipalities, and other sanitation actors (CEARÁ, 2012).

Notably, the role of the National Health Foundation (FUNASA)¹ in encouraging the formulation of PMSBs in municipalities with up to 50,000 inhabitants. In the state of Sergipe, two agreements were signed between the Foundation and the Institute of Technology and Research (ITP), in 2014 and 2017, with the purpose of qualifying 30 and 26 municipalities in Sergipe, respectively, in the formulation of PMSBs (FUNASA¹ E IPT, 2017). In the case of Campinas, it was clarified in an interview that information on water and sewage was obtained from the company that provides the sanitation service, which basically operates in urban areas, in such a way that there is a lack of further information on water supply/treatment in rural areas. Conversely, the characterization of the soil was obtained from the Geological Institute of the State of São Paulo (IG), and the information related to the population, from the Brazilian Institute of Geography and Statistics (IBGE).

Information is essential in the process of formulating plans and instruments of regulation and planning of basic sanitation, and one of the main difficulties in obtaining it results from the dispersion by different agencies and entities of the different administrative spheres. In addition, a reliable historical series lacks in the sector (GALVÃO JÚNIOR, BASÍLIO SOBRINHO AND SAMPAIO, 2010).

Furthermore, the technologies implemented in urban and rural areas are often different so that they are appropriate to the characteristics of the locality (TONETTI, A. L. et al., 2018). Hence, managers of the City Council of Campinas deemed important that, in the Plan, such areas are addressed separately: “The rural and the urban are totally different.” It was also argued that the water supply/sewage collection company that operates in urban sanitation, generally, has a reduced performance in the rural area, whose properties are very dispersed: “For them the cost would be high and there would be no return.”

For understanding the importance of the specificities of each region, according to some managers interviewed, there should be two PMSBs for each municipality: one for rural areas and another for urban areas. Other managers considered that, within a single plan, it is possible to deal with the rural and the urban, as long as separately.

In turn, the manager who works in drainage with road projects deems more important to formulate plans considering the watershed as a whole than specifying which roads are urban or rural. Thus, even though some dimension parameters and constructive elements—such as storm drains and stormwater pipes—are different, the manager of this area understands that the hydrological study does not separate the urban from the rural. Therefore, the drainage manager specifically considers it appropriate to address urban and rural roads without differentiation in PMSBs.

Conversely, the solid waste collection sector works differently: rural areas are included in “areas of difficult access,” which also include areas of irregular occupation, for example. In Campinas, overall, in such locations the collection is

“point-to-point”² and not “door-to-door,”³ as in regular urban areas, that is, the differentiation occurs according to the access to the area and not to its degree of urbanization.

Furthermore, managers, in general, understand that, as sanitation is related to several areas—such as water resources and health—, it is important that it is elaborated in an integrated way with other sectors and that it dialogues with other plans of the municipality and the watershed, as indicated by the Brazilian basic sanitation legal framework (BRASIL, 2020).

The interviewed managers also state that the rural area is not appropriately addressed in the PMSB of Campinas, due to lack of information and technical staff from the City Council at the time of formulation. Conversely, they also consider that the first step has been taken and that in the revisions of the plan, with the expertise acquired since 2013, the planning of actions aimed at rural areas will be increasingly assertive.

Implementation of basic sanitation actions in rural areas

As a for mentioned in the Methods section, different sectors of the City Council work in the implementation of actions in rural areas of Campinas. Notably, the main actions carried out until the period of the interviews were focused on sanitary sewage. Despite the managers being aware of the importance of the measures in the four sanitation points, the other elements were not yet in a very developed implementation phase at that time.

Until then, BRL 368,319.00 (approximately US\$ 87,904.29) has already been invested in the Program—data published on the PMC website in 2020. Financing was made possible through resources from the Environmental Preservation, Maintenance and Recovery Fund⁴ (Fundo de Recuperação, Manutenção e Preservação do Meio Ambiente – PROAMB) and Consent Decrees (PREFEITURA DE CAMPINAS, 2020c).

PMC managers clarified that the Consent Decree is a measure within the Payment for Environmental Services Program² (Programa de Pagamento por Serviços Ambientais – PSA) and encompasses the four points of basic sanitation: soil conservation (drainage), encouraging waste collection and recycling, water, and sanitary sewage. In the case of Consent Decrees, irregular environmental conduct, such as illegal logging, can be converted into donation of effluent treatment systems, as established by the PMC, for environmental compensation. Hence, those registered with the PSA can perceive the systems as “non-monetary incentives.”

In addition, 134 Biodigester Septic Tanks (Embrapa), 65 Commercial Biodigesters, and 10 Filtering Gardens were delivered by PMC. It is worth resuming that Campinas had, in 2010, 5,251 rural households (IBGE, 2020a), in such a way that the percentage of households served is still incipient.

Thus, the main actions carried out were the donation of effluent treatment systems and the qualification of users for the installation of the system — called “field days.” By 2020, eight workshops were held and the population can access

information on such actions on the City Council's official website (PREFEITURA DE CAMPINAS, 2020c).

The contact with the population for implementing actions of the Sustainable Rural Sanitation Program was made by the City Council itself, at the time of the interviews, going from property to property. The population was then invited to participate in the field days. The work of the City Council in the "field days" was considered not only a measure of technical instruction on the systems, but also an encouragement to environmental education. In fact, community participation is one of the pillars for the success of sanitation measures in rural areas (FUNASA, 2019 and TONETTI ET AL., 2018).

The proximity of the population and the effort of City Council managers to work in rural areas was deemed as fundamental for the process of implementing the actions: "Nowadays, it is very easy for people to let us in, because they have seen that it works." Furthermore, the residents themselves publicize the actions of the City Council, which contributes to its credibility.

As previously mentioned by Heller and Castro (2013), there is a need for greater integration between the technological-scientific and the social sciences fields for the management of basic sanitation. Therefore, it is not enough for City Council managers to have complete knowledge of the implemented sanitation systems if there is no adherence on the part of the population.

The interviewees highlighted the work of the Campinas Department of Health in rural areas and the importance of this department and the Department of Green and Sustainable Development, working together to guarantee rural population's health. Health and basic sanitation are strongly related and it is positive that those who work in public policies are aware of this.

In addition, the work of partners—such as the Coordination of Integral Technical Assistance (Coordenadoria de Assistência Técnica Integral – CATI), the University of Campinas (UNICAMP), the Pontifical Catholic University of Campinas (PUC), and the Agronomic Institute of Campinas (IAC)—was also highlighted in the collaboration with PMC in rural areas. Thus, we indicate, whenever possible, that City Councils seek assistance from agencies and institutions to assist in the implementation of sanitation actions.

Another issue addressed during interviews was the change in political leadership, which can lead to the discontinuity of ongoing actions due to the prioritization of others. Managers considered it essential that the proposed programs and actions be specified in municipal legislation, thus ensuring their continuity.

As a difficulty in implementing the actions, the management of donated systems in the properties was also mentioned. The possibility of outsourcing this monitoring service was raised, but the City Council did not find companies that would carry out such work for an affordable price.

All managers stressed the importance of management: "There is no use installing the system, or having it installed for the producer... you need to integrate the staff, they must be together, believe in the system, and we have to support them." Another manager points out: "The difficulty of rural sanitation is the management."

The Rural Brazil Sanitation Plan (Plano de Saneamento Brasil Rural – PSBR) is emphatic when addressing management in rural sanitation, both at the household and at a collective level: management, in the Policy, is associated with defining services, identifying demands as well as planning the means for meeting them (FUNASA, 2019).

In the case of sanitary sewage systems, frequent contact with the owners was also considered important to solve possible doubts as well as to monitor which systems are installed and in operation. It is expected that, in the future, each beneficiary will be visited at least once a semester. With frequent monitoring, this periodic instruction of the residents will be possible.

As a tool for supporting management, the responsible department—together with the Information Technology team of the City Council of Campinas—is developing a software that helps managing information and monitoring the donated effluent treatment systems. The concept is that the City Council-owner relationship is facilitated via information that the owners themselves provide to the software. The software will also be responsible for notifying when it should be fed and when managers should carry out periodic actions, such as contacting residents, for example.

On the other hand, the monitoring of actions via indicators is also incipient. Unfortunately, the only indicator used to monitor the sanitary sewage actions carried out is the number of donated systems. The next step will be to verify which of the donated systems are, in fact, installed. The locations, amounts, and types of donated systems can be monitored on the Geoambiental³ website⁵ of the City Hall. This geo-referenced monitoring informs the type of donated system, but not if it was installed, or if it is properly working. The interviewed managers are aware that such information alone is insufficient for the proper monitoring of actions and intend to include other indicators in the PMSB revision.

The PMC does not individually monitor sewage systems regarding their functioning—physical, chemical, and biological parameters, for example. On the one hand, some managers consider that, if properly installed, the system should work; on the other hand, others consider essential the analysis of effluent from distributed sewage systems.

Regarding drainage, the monitoring of urban and rural areas is carried out together. It was explained, in an interview, that the data presented in the plan as urban encompass, in practice, both urban and rural areas. The main indicators used to monitor the actions are paved areas, flooded areas, and green areas.

We can compare the situation presented in this study with what Pereira (2012) identified in her research: among the 18 PMSBs analyzed by the author, few presented quantifiable goals for universalization. To have an adequate monitoring, it is necessary, beforehand, that its objectives are quantifiable. The author also stated that the elaboration of programs, projects, and actions in the plans must be improved in most plans, as well as actions for emergencies and contingencies, which in some cases were not even mentioned.

All interviewed managers showed concern about rural sanitation in the Brazilian public policies: “The rural area, unfortunately, is left aside.” The managers

also highlighted the importance of isonomy in the quality of services provided to the population, regardless of whether it is urban or rural, and that this equity involves understanding their differences when serving them.

In fact, there were many challenges reported—both in the process of formulating the PMSB and in its implementation. It was clear, during the interviews, that such efforts are better consolidated when the legislation that supports them provides for actions aimed at rural sanitation, in view of the obligation of the State to guarantee them.

Conclusion

Taking this into consideration, we can conclude that, although the municipality of Campinas has good sanitation indicators when compared with the Brazilian average, it is still possible to improve its attention to basic sanitation in rural areas, especially concerning the monitoring of the actions carried out. Through the case study and literature review, we could identify some elements that contribute to sanitation measures in rural areas, such as consolidated legislation and monitoring of the actions carried out, or elements that hinder it such as bureaucratic issues, the dispersion and lack of information, and poor management.

In the process of including rural sanitation in the PMSBs, we highlight some points in this study. The first is that the PMSB must be in line with other plans and management tools, in such a way that actions are harmoniously established in relation to the planning context in which they are inserted, seeking to avoid conflicts. The second point of attention is the difficulty in obtaining quality information to compose the PMSB. It is known that, in several cases, data on rural areas are not as complete as the urban data; therefore, it is necessary to collect more information when necessary.

The third point is to encourage the support from other agencies and institutions in the process of preparing PMSBs, facilitating it. The possibility of formulating two PMSBs was also discussed: one for the rural and the other for the urban. The fact is that, regardless of whether it is a unified plan or not, the most important aspect is the inclusion of both areas in public planning.

In the process of implementing actions in rural areas, some measures have the potential to make them more effective. One of them is the choice of well-established financial sources, which is not always possible. The reason for this the inclusion of actions in the PMSB facilitates obtaining public resources. Another is the community's adherence to the selected decentralized sanitation solutions, which is facilitated by the participation of users themselves in the process of choosing the adopted systems. In this sense, it is recommended to hold workshops with the population on how to install and maintain the chosen technological solutions. Thus, the user learns to manage the system donated by the Public Authority, as identified in the case of Campinas.

The joint action of the health and sanitation sectors was also considered positive due to the effects of both departments on the population's quality of life. Likewise, it is recommended, whenever possible, the partnership with technical-scientific institutions, which can endorse the technical repertoire of public agents.

As challenges in the implementation process, we highlight the difficulty in obtaining indicators for monitoring the actions—which can be better organized by using software and whose monitoring must be maintained even with changes in political leadership. Furthermore, the main highlight is the management of the actions carried out, which demand financial, material, and human resources.

Therefore, several elements contribute to the current scenario of planning and implementing rural sanitation measures. For this situation to be reversed, it is necessary that the rural area is specified in the plans and that the monitoring of its actions is carried out. Only then the effective inclusion of rural areas in the universalization of basic sanitation will be possible.

NOTAS

1 The National Health Foundation (FUNASA) is a federal public foundation that is part of the Brazilian Unified Health System (SUS), which acts in the field of public health, social inclusion, and environmental preservation.

2 The “Environmental Preservation, Maintenance and Recovery Fund — PROAMB was established by Municipal Law No. 9,811, of July 23, 1998, and aims to develop the rational use of natural resources based on the principle of sustainable development. The Fund is managed by the Board of Directors, composed of 10 (ten) members, without any kind of remuneration, who are responsible for deciding on the application of resources, which will also be applied in the preservation of biological resources and ecosystems, research and technological development, environmental education, audit and control of the environment” (free translation). CAMPINAS, 2020d

³ <https://geoambiental.campinas.sp.gov.br/> (PREFEITURA DE CAMPINAS, 2020e)

REFERENCES

ABES-SP, Associação Brasileira de Engenharia Sanitária e Ambiental. **Termo de referência: Plano de Saneamento Rural Municipal**. São Paulo, 2018.

APPOLINÁRIO, F. **Metodologia da ciência: filosofia e prática da pesquisa**. São Paulo: Pioneira Thomson Learning, 2006. Google-Books-ID: 5SYoGQAACAAJ.

BRASIL. **Definição da Política e Elaboração de Planos Municipais e Regionais de Saneamento Básico**. Ministério das Cidades. Secretaria Nacional de Saneamento Ambiental. 2010. Disponível em: https://www.mprs.mp.br/media/areas/ressanear/arquivos/materialtecrs/novo_diretrizes_pmsb_mc.pdf. Acesso em: 11 fev. 2020.

BRASIL. **Definição da Política e Elaboração de Planos Municipais e Regionais de Saneamento Básico**. Ministério das Cidades. Secretaria Nacional de Saneamento Ambiental. 2010. Disponível em: https://www.mprs.mp.br/media/areas/ressanear/arquivos/materialtecrs/novo_diretrizes_pmsb_mc.pdf. Acesso em: 11 fev. 2020.

BRASIL. **Guia para a elaboração de Planos Municipais de Saneamento Básico**. Ministério das Cidades. Secretaria Nacional de Saneamento Ambiental. Brasília, 2011.

BRASIL. **Lei nº 11.445 de 05 de janeiro de 2007**. Diretrizes Nacionais de Saneamento Básico. Brasília, 2007.

BRASIL. **Lei nº 14.026, de 15 de julho de 2020**. Atualiza o marco legal do saneamento básico e altera a Lei nº 9.984, de 17 de julho de 2000, para atribuir à Agência Nacional de Águas e Saneamento Básico (ANA) competência para editar normas de referência sobre o serviço de saneamento, a Lei nº 10.768, de 19 de novembro de 2003, para alterar o nome e as atribuições do cargo de Especialista em Recursos Hídricos, a Lei nº 11.107, de 6 de abril de 2005, para vedar a prestação por contrato de programa dos serviços públicos de que trata o art. 175 da Constituição Federal, a Lei nº 11.445, de 5 de janeiro de 2007, para aprimorar as condições estruturais do saneamento básico no País, a Lei nº 12.305, de 2 de agosto de 2010, para tratar dos prazos para a disposição final ambientalmente adequada dos rejeitos, a Lei nº 13.089, de 12 de janeiro de 2015 (Estatuto da Metrópole), para estender seu âmbito de aplicação às microrregiões, e a Lei nº 13.529, de 4 de dezembro de 2017, para autorizar a União a participar de fundo com a finalidade exclusiva de financiar serviços técnicos especializados. Brasil, 2020b. Disponível em: <https://www.in.gov.br/en/web/dou/-/lei-n-14.026-de-15-de-julho-de-2020-267035421>

BUCCI, M. P. D. **Políticas Públicas: reflexões sobre o conceito jurídico**. São Paulo: Saraiva, 2006.

CEARÁ. **Vinte municípios do Ceará recebem planos de saneamento básico**. Fortaleza, 2012. Disponível em: <http://g1.globo.com/ceara/noticia/2012/11/vinte-municipios-do-ceara-recebem-plano-de-saneamento-basico.html> Acesso em 26 de Agost. de 2020.

DE ALMEIDA, Ian Rocha et al. Revisão participativa do plano municipal de saneamento básico de Ijuí-rs: participatory review of the Ijuí-rs municipal sanitation plan. **Revista Gestão e Conhecimento**, v. 16, n. 3, p. 1226-1240, 2022.

FERREIRA, L. A. F. et al. **Saneamento rural no planejamento municipal: lições a partir do Programa Nacional de Saneamento Rural (PNSR)**. Revista DAE, v. 67, n. 220, p. 36–51, 2019.

FUNASA, Fundação Nacional de Saúde, E IPT, Instituto de Tecnologia e Pesquisa. convênio nº 0274/2014. Disponível em: <https://www.itp.org.br/convenios/14>. Acesso em 26 de Agost. de 2020

FUNASA, Fundação Nacional de Saúde. **Termo de referência para a elaboração de Planos Municipais de Saneamento Básico**. Ministério da Saúde. Brasília, 2012
FUNASA, Fundação Nacional de Saúde. **Programa Saneamento Brasil Rural**. Brasília, 2019.

GALVÃO JR, A. C.; MELO, A. J. M E MONTEIRO, M. A. P. **Regulação do saneamento básico**. Série sustentabilidade – Coordenador Arlindo Philippi Jr. 1ª edição. Ed. Manole. Ltda. Barueri, 2013.

HELLER, L.; CASTRO, J. E. **Política Pública e Gestão de Serviços de Saneamento**. Editora UFMG, 2013.

IBGE, Instituto Brasileiro de Geografia e Estatística. **Munic: mais da metade dos municípios brasileiros não tinha plano de saneamento básico em 2017**. 2018. Disponível em: <https://agenciadenoticias.ibge.gov.br/agencia-sala-de-imprensa/2013-agencia-de-noticias/releases/22611-munic-mais-da-metade-dos-municipios-brasileiros-nao-tinha-plano-de-saneamento-basico-em-2017>. Acesso em: 29 dez. de 2019.

IBGE. Instituto Brasileiro de Geografia e Estatística. **Panorama de Campinas**. 2020a. Disponível em: <https://cidades.ibge.gov.br/brasil/sp/campinas/panorama> Acesso em: 08 de agosto de 2020

LEFEVRE, F.; LEFEVRE, A. M. C. **Discourse of the collective subject: social representations and communication interventions**. Texto & Contexto – Enfermagem. v. 23, n. 2, p. 502–507, 2014.

MAXIMIANO, A. C. A. **Introdução à Administração**. Editora Atlas. 5ª edição. São Paulo, 2008.

OLIVEIRA, T. C. **Guia referencial para gerenciamento de projetos e portfólios de projetos**. 2021. Disponível em: <http://repositorio.enap.gov.br/handle/1/6155>. Acessado em 27 de out. de 2024

PEREIRA, T. S. T. **Conteúdo e metodologia dos planos municipais de saneamento básico: um olhar para 18 casos no Brasil**. Monografia. Especialização em Gestão e Tecnologia do Saneamento. Fiocruz/Escola Nacional de Saúde Pública. Rio de Janeiro, 2012.

PREFEITURA DE CAMPINAS. **Conheça Campinas**. Câmara municipal de Campinas. 2020a. Disponível em: <https://www.campinas.sp.leg.br/institucional/conheca-campinas>. Acesso em 08 de agosto de 2020.

PREFEITURA DE CAMPINAS. Dados do município. Disponível em: <http://www.campinas.sp.gov.br/governo/seplurb/dados-do-municipio/cidade/>. Acesso em: 20 de dez de 2020f.

PREFEITURA DE CAMPINAS. **Decreto nº 18.199 de 19 de dezembro de 2013**. Institui o Plano Municipal de Saneamento Básico e dá outras providências. Prefeitura Municipal de Campinas. Campinas, 2013. Disponível em: <https://bibliotecajuridica.campinas.sp.gov.br/index/visualizaratualizada/id/92897>. Acesso em: 26 fev. 2020.

PREFEITURA DE CAMPINAS. **Geoambiental**. Secretaria do Verde e Desenvolvimento Sustentável - SVDS. 2020c. Disponível em: <https://geoambiental.campinas.sp.gov.br/>. Acesso em: 13 set. 2020e.

PREFEITURA DE CAMPINAS. **Lei Complementar nº 189 de 08 de janeiro de 2018**. Prefeitura Municipal de Campinas. Dispõe sobre o Plano Diretor Estratégico do município de Campinas. 2018.

PREFEITURA DE CAMPINAS. **Relatório de acompanhamento das ações previstas Plano Municipal de Saneamento Básico de Campinas – 2014-2020**. Decreto nº 20.999 de 12 de agosto de 2020. Prefeitura de Campinas. Campinas, 2020b.

PREFEITURA DE CAMPINAS. **Saneamento Rural Sustentável**. Prefeitura Municipal de Campinas. Disponível em: <http://www.campinas.sp.gov.br/governo/meio-ambiente/saneamento-rural-sustentavel.php>. Acesso em: 26 fev. 2020c.

ROLAND, N. et al. **A ruralidade como condicionante da adoção de soluções de saneamento básico**. v. 67, n. número 220, 2019.

SANTOS, L. de O. L.; SANTOS, M. R. R. dos. **Panorama dos planos municipais de saneamento básico das bacias do PCJ 10 anos após a lei n.11.445/07**. Revista dos Trabalhos de Iniciação Científica da UNICAMP, n. 26, 2019. Disponível em: <https://econtents.bc.unicamp.br/eventos/index.php/pibic/article/view/915>. Acesso em: 26 Fev. 2020.

TONETTI, A. L. et al. **Tratamento de esgotos domésticos em comunidades isoladas. Referencial para escolhas de soluções**. Universidade Estadual de Campinas. Faculdade de Engenharia Civil, Arquitetura e Urbanismo. Departamento de Saneamento e Ambiente – DSA. Grupo de Pesquisa Tratamento de Efluentes e Recuperação de Recursos. Campinas: Biblioteca Unicamp, 2018.

TRATA BRASIL. 14º Ranking do saneamento. 2022. Disponível em: <https://www.tratabrasil.org.br/pt/estudos/estudos-itb/itb/ranking-do-saneamento-2022>. Acessado em 09 de junho de 2022.

WHO, World Health Organization. **Progress on household drinking water, sanitation and hygiene 2000-2017: special focus on inequalities**. New York: United Nations Children's Fund (UNICEF) and World Health Organization. Geneva, 2019.

WHO, World Health Organization. **WASH in Health care facilities 2023 data update**. New York: United Nations Children's Fund (UNICEF) and World Health Organization. Geneva, 2019.

WBG. World Bank Group. Rural sanitation infographic. 2021. Disponível em: <https://drive.google.com/file/d/12xLcpYt01-WPdhmqqt0xcIOVDtCNJge/view>

Recebido: 20/11/2024
Aprovado: 30/06/2026
DOI: 10.3895/rts.v22n70.19506

Como citar:

LIMA, Marcelle Maria Gois, SANTOS, Mariana Rodrigues Ribeiro. Implementation of sanitation in rural areas: from planning to practice: a case study in Campinas (SP), Brazil. *Rev. Tecnol. Soc.*, Curitiba, v. 22, n. 70, p.178-191, jul./set., 2026. Disponível em:

<https://periodicos.utfpr.edu.br/rts/article/view/19506>

Acesso em: XXX.

Correspondência:

Direito autoral: Este artigo está licenciado sob os termos da Licença Creative Commons-Atribuição 4.0 Internacional.

